UNIT 1 PRINCIPLES OF MANAGEMENT

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the history of management thoughts;
- appreciate the benefits and principles of management;
- understand management as science and art and both; and
- the relevance of principles of management in an organisation.

1.1 INTRODUCTION

Organisations and the Need for Management

For most of our lives, we are members of one organisation or another—a college, a sports team, a musical or theatrical group, a religious or civic organisation, a branch of the armed forces, or a business. Some organisations, like the army and large corporations, are structured very formally. Others, like a neighbourhood bridge team as neighbourhood car theft prevention committee, are more casually structured. But all organisations, formal or informal, are put together and kept together by a group of people who see that there are benefits available from working together toward some common goal. So a very basic element of any organisation is a goal or purpose. The

goal will vary—to win a league championship, to entertain an audience, to sell a product—but without a goal no organisation would have a reason to exist.

All organisations also have some programme or method for achieving goals and plan. The plan might be to practice playing skills, to rehearse a certain number of times before each performance, or to manufacture and advertise a product. Whatever it is, without some plan for what it must do, no organisation is likely to be very effective.

Organisations must also acquire and allocate the resources necessary to achieve their goals. Perhaps a playing field or rehearsal hall must be available, or money must be budgeted for wages. All organisations depend on other organisations for the resources they need. A team cannot play without the required equipment; manufacturers must maintain contracts with suppliers. XYZ hospital, in south Delhi for example, depends on medicine suppliers, suppliers of many different types of equipment, and also on good medical colleges for supply of good doctors.

Management Organisations

Management is the practice of consciously and continually shaping organisations. All organisations have people who are responsible for helping them achieve their goals. These people are called managers. These managers—coaches, conductors, sales executives, superintendent—may be more obvious in some organisations than in others, but without effective management, organisations are likely to get into difficulties.

1.2 WHY STUDY MANAGEMENT THEORY?

Theories are perspective with which people make sense of their world experiences. Formally, a theory is a coherent group of assumptions put forth to explain the relationship between two or more observable facts.

First, theories provide a stable focus for understanding what we experience. A theory provides criteria for determining what is relevant. To an entrepreneur, who is in the business of building roads, may theorize that a large and compliant workforce is relevant factor for his business. In other words, his theory of management included, among other things, this assumption about the supply of labour.

Second, theories enable us to communicate efficiently and thus move into more and more complex relationships with other people. Imagine the frustration the road builder would encounter if, in dealing with other people, he always had to define even the most basic assumptions he makes about the world in which he lives! Because he and his managers fully understood his theory about building roads, they could interact easily as they faced day-to-day challenges.

Third, theories make it possible—indeed, challenge us—to keep learning about our world. By definition, theories have boundaries; there is only so much that can be covered by any one theory. Once we are aware of this, we are better able to ask ourselves if there are alternative ways of looking at the world (especially when our theories no longer seem to fit our experience) and to consider the consequences of adopting alternative beliefs.

1.3 THE SCIENTIFIC MANAGEMENT SCHOOL

Scientific Management theory arose in part from the need to increase productivity. In the United States especially, skilled labour was in short supply at the beginning of the twentieth century. To expand the productivity Frank and Lillian Gilbreth devised the body of principles known as scientific management theory.

Frederick W. Taylor

Frederick W. Taylor (1956-1915) rested his philosophy on four basic principles:

1) *The development of a true science of management*, so that the best method for performing each task could be determined.

2) *The scientific selection of workers*, so that each worker would be given responsibility for the task for which he or she was best suited.

3) *The scientific* education and development of the worker.

4) *Intimate, friendly cooperation between management and labour.*

Taylor contended that the success of these principles required a complete mental revolution on the part of management and labour. Rather than quarrel over profits, both sides should try to increase production; by so doing, he believed, profits would rise to such an extent that labour and management would no longer have to fight over them. In short, Taylor believed that management and labour had a common interest in increasing productivity.

Taylor based his management system on production-line time studies. Instead of relying on traditional work methods, he analysed and timed steel worker's movements on a series of jobs. Using time study as his base, he broke each job down into its components and designed the quickest and best methods of performing each component. In this way he established how much workers should be able to do with the equipment and materials at hand. He also encouraged employers to pay more productive workers at a higher rate than others, using a scientifically correct rate that would benefit both company and worker. Thus, workers were urged to surpass their previous performance standards to earn more pay. Taylor called his plan the **differential rate system.**

Contributions of Scientific Management Theory

The modern assembly line pours out finished products faster than Taylor could ever have imagined. This production "miracle" is just one legacy of scientific management. In addition, its efficiency techniques have been applied to many tasks in non-industrial organisations, ranging from fast-food service to the training of surgeons.

1.4 CLASSICAL ORGANISATION THEORY SCHOOL

Scientific management was concerned with increasing the productivity of the shop and the individual worker. **Classical organisation theory** grew out of the need to find guidelines for managing such complex organisations as factories.

Henry Fayol

Henry Fayol (1981-1925) is generally hailed as the founder of the classical management school, not because he was the first to investigate managerial behaviour, but because he was the first to systematize it. Fayol believed that sound management practice falls into certain patterns that can be identified and analysed. From this basic insight, he drew up a blueprint for a cohesive doctrine of management, one that retains much of its force to this day.

While Taylor was basically concerned with organisational functions, however, Fayol was interested in the total organisation and focused on management, which he felt had been the most neglected of business operations. Before Fayol, it was generally believed that managers are born, not made. Fayol insisted, however, that management was a skill like any other one that could be taught once its underlying principles were understood.

Max Weber

Reasoning that any goal-oriented organisation consisting of thousands of individuals would require the carefully controlled regulation of its activities, the German sociologist Max Weber (1864-1920) developed a theory of bureaucratic management that stressed the need for a strictly defined hierarchy governed by clearly defined regulations and lines of authority. He considered the ideal organisation to be a **bureaucracy** whose activities and objectives were rationally thought out and whose divisions of labour were explicitly spelled out. Weber also believed that technical competence should be emphasized and that performance evaluations should be made entirely on the basis of merit.

Today we often think of bureaucracies as vast, impersonal organisations that put

impersonal efficiency ahead of human needs. We should be careful, though, not to apply our negative connotations of the word bureaucracy to the term as Weber used it. Like the scientific management theorists, Weber sought to improve the performance of socially important organisations by making their operations predictable and productive. Although we now value innovation and flexibility as much as efficiency and predictability, Weber's model of bureaucratic management clearly advanced the formation of huge corporations such as Ford. Bureaucracy was a particular pattern of relationships for which Weber saw great promise.

Although bureaucracy has been successful for many companies, in the competitive global market of the 1990s organisations such as General Electric and Xerox have become bureaucracy busters, throwing away the organisation chart and replacing it with ever-changing constellations of teams, projects, and alliances with the goal of unleashing employee creativity.

Mary Parker Follett

Mary Parker Follett (1868-1933) was among those who built on the basic framework of the classical school. However, she introduced many new elements, especially in the area of human relations and organisational structure. In this, she initiated trends that would be further developed by the emerging behavioural and management science schools.

Follett was convinced that no one could become a whole person except as a member of a group; human beings grew through their relationships with others in organisations. In fact, she called management the art of getting things done through people. She took for granted Taylor's assertion that labour and management shared a common purpose as members of the same organisation, but she believed that the artificial distinction between managers (order givers) and subordinates (order takers) obscured this natural partnership. She was a great believer in the power of the group, where individuals could combine their diverse talents into something bigger. Moreover, Follett's holistic model of control took into account not just individuals and groups, but the effects of such environmental factors as policies, economics, and biology.

Follett's model was an important forerunner of the idea that management meant more than just what was happening inside a particular organisation. By explicitly adding the organisational environment to her theory, Follett paved the way for management theory to include a broader set of relationships, some inside the organisation and some across the organisation's borders. A diverse set of modern management theories pays homage to Follett on this point.

1.5 THE BEHAVIOURAL SCHOOL: THE ORGANISATION IS PEOPLE

The **Behavioural school** emerged partly because the classical approach did not achieve sufficient production efficiency and workplace harmony. To managers' frustration, people did not always performed according to predicted or expected patterns of behavior. Thus there was increased interest in helping managers' deal more effectively with the people side of their organisations. Several theorists tried to strengthen classical organisation theory with the insights of sociology and psychology.

Organisational behaviour, commonly referred to as OB, is an interdisciplinary field dedicated to better understanding and managing people at work. By definition organisational behaviour is both research and application oriented. Three basic levels of analysis in OB are individual, group, and organisational. OB draws upon a diverse array of disciplines, including psychology, management, sociology, organisation theory, social psychology, statistics, anthropology, general systems theory, economics, information technology, political science, vocational counseling, human stress management, psychometrics, ergonomics, decision theory, and ethics. This rich heritage has spawned many competing perspectives and theories about human work behaviour. By the mid-1980s, one researcher had identified 110 distinct theories about behaviour within the field of OB.

Organisational behaviour is an academic designation. With the exception of teaching/

research positions, OB is not an everyday job category such as accounting, marketing, or finance. Students of OB typically do not get jobs in organisational behavior, per se. This reality in no way demeans OB or lessens its importance in effective organisational management. OB is a horizontal discipline that cuts across virtually every job category, business function, and professional speciality. Anyone who plans to make a living in a large or small, public or private, organisation needs to study organisational behaviour.

A historical perspective of the study of people at work helps in studying organisational behaviour. According to a management history expert, this is important because Historical perspective is the study of a subject in light of its earliest phases and subsequent evolution. Historical perspective differs from history in that the object of historical perspective is to sharpen one's vision of the present, not the past.

In other words, we can better understand where the field of OB is today and where it appears to be headed by appreciating where it has been. Let us examine three significant landmarks in the evolution of understanding and managing people:

1) The human relations movement.

2) The total quality management movement.

3) The contingency approach to management

1.6 THE HUMAN RELATIONS MOVEMENT

A unique combination of factors during the 1930s fostered the human relations movement. First, following legalization of union-management collective bargaining in the United States in 1935, management began looking for new ways of handling employees. Second, behavioural scientists conducting on-the-job research started calling for more attention to the human factor. Managers who had lost the battle to keep unions out of their factories heeded the call for better human relations and improved working conditions. One such study, conducted at Western Electric's Chicago-area Hawthorne plant, was a prime stimulus for the human relations movement. Ironically, many of the Hawthorne findings have turned out to be more myth than fact.

The Hawthorne Legacy: Interviews conducted decades later with three subjects of the Hawthorne studies and reanalysis of the original data with modern statistical techniques do not support initial conclusions about the positive effect of supportive supervision. Specifically, money, fear of unemployment during the Great Depression, managerial discipline, and high-quality raw materials—not supportive supervision—turned out to be responsible for high output in the relay assembly test room experiments. Nonetheless, the human relations movement gathered momentum through the 1950s, as academics and managers alike made stirring claims about the powerful impact that individual needs, supportive supervision, and group dynamics apparently had on job performance.

The Writings of Mayo and Follett: Essential to the human relations movement were the writings of Elton Mayo and Mary Parker Follett. Australian-born Mayo, who headed the Harvard researchers at Hawthorne, advised managers to attend to employee's emotional needs in his 1933 classic, The Human Problems of an Industrial Civilisation. Follett was a true pioneer, not only as a woman management consultant in the male-dominated industrial world of the 1920s, but also as a writer who saw employees as complex combinations of attitudes, beliefs, and needs. Mary Parker Follett was way ahead of her time in telling managers to motivate job performance instead of merely demanding it, a pull rather than push strategy. She also built a logical bridge between political democracy and a cooperative spirit in the workplace.

McGregor's Theory Y: In 1960, Douglas McGregor wrote a book entitled The Human Side of Enterprise, which has become an important philosophical base for the modern view of people at work. Drawing upon his experience as a management consultant, McGregor formulated two sharply contrasting sets of assumptions about human nature (see Table 1.1). His Theory X assumptions were pessimistic and negative and, according to McGregor's interpretation, typical of how managers traditionally perceived employees. To help managers break with this negative tradition, McGregor formulated his **Theory Y**, a modern and positive set of assumptions about people. McGregor

believed managers could accomplish more through others by viewing them as self-energised, committed, responsible, and creative beings.

A survey of 10,227 employees from many industries across the United States challenges managers to do a better job of acting on McGregor's Theory Y assumptions. From the employees' perspective, Theory X management practices are the major barrier to productivity improvement and employee wellbeing. The researcher concluded:

The most noteworthy finding from their survey is that an overwhelming number of American workers—some 97 per cent—desire work conditions known to facilitate high productivity. Workers uniformly reported—regardless of the type or organisation, age, gender, pay schedule, or level in the organisational hierarchy—that they needed and wanted in their own workplaces the conditions for collabouration, commitment, and creativity research has demonstrated as necessary for both productivity and health. Just as noteworthy, however, is the finding that the actual conditions of work supplied by management are those conditions that research has identified as *competence suppressors'* procedures, policies, and practices that prevent or punish expressions of competence and most characterise unproductive organisations.

Table 1.1: McGregor's Theory X and Theory Y

Outdated (Theory X) Assumptions about people at work	Modern Theory (Y) Assumptions about people at work
1) Most people dislike work; they avoid it when they can.	1) Work is a natural activity, like play or rest.
2) Most people must ge coerced and threatened with punishment before they will work. People require close direction when they are working.	2) People are capable of self-direction and self-control if they are committed to objectives.
3) Most people actually prefer to be directed. They tend to avoid responsibility and exhibit little ambition. They are interested only in security.	3) People generally become committed to organisational objectives if they are rewarded for doing so.
	4) The typical employee can learn to accept and seek responsibility.
	5) The typical member of the general population has imagination, ingenuity, and creativity.

New Assumptions about Human Nature: Unfortunately, unsophisticated behavioural research methods caused the human religionists to embrace some naïve and misleading conclusions. For example, human religionists believed in the axiom, "A satisfied employee is a hardworking employee". Subsequent research, as discussed later in this book, shows the satisfaction performance linkage to be more complex than originally thought.

Despite its shortcomings, the human relations movement opened the door to more progressive thinking about human nature. Rather than continuing to view employees as passive economic beings, managers began to see them as active social beings and took steps to create more humane work environments.

1.7 THE TOTAL QUALITY MANAGEMENT MOVEMENT

A great deal has been written and said about quality in recent years. So much, in fact, that total quality management (TQM) has been dismissed by some as just another fad. Yet **TQM** programmes are alive and well in the workplace. Training magazine's 1995 survey of US companies with 100 or more employees found 58 per cent of them pursuing **TQM** initiatives (more than any other type of programme). Similar has been the trend in India disregarding the underlying principles of TQM because of apparent faddishness would be unwise as ignoring sound nutrition and exercise guidelines because of endless discussions about dieting, **TQM** principles have profound practical implications for managing people today.

What is TQM? TQM means that the organisation's culture is defined by and supports the constant attainment of customer satisfaction through an integrated system of tools,

techniques, and training. This involves the continuous improvement of organisational processes, resulting in high quality products and services.

Quality consultant Richard J. Schonberger sums up TQM as "continuous, customer-centered, employee-driven improvement." TQM is necessarily employee driven because product/service quality cannot be continuously improved without the active learning and participation of every employee. Thus, in successful quality improvement programmes, TQM principles are embedded in the organisation's culture.

The Deming Legacy: TQM is firmly established today thanks in large part to the pioneering work of W. Edwards Deming. Ironically, the mathematician credited with Japan's post-World War II quality revolution rarely talked in terms of quality. He instead preferred to discuss good management during the hard-hitting seminars he delivered right up until his death at age 93 in 1993. Although Deming's passion was the statistical measurement and reduction of variations in industrial process, he had much to say about how employees should be treated. Regarding the human side of quality improvement, Deming called for the following:

- Formal training in statistical process control techniques and teamwork.
- Helpful leadership, rather than order giving and punishment.
- Elimination of fear so employees will feel free to ask questions.
- Emphasis on continuous process improvements rather than on numerical quotas.
- Teamwork.
- Elimination of barriers to good workmanship.

One of Deming's most enduring lessons for managers is his 85-15 rule. Specifically, when things go wrong, there is roughly an 85% chance the system (including management, machinery, and rules) is at fault. Only about 15% of the time is the individual employee at fault. Unfortunately, as Deming observed, the typical manager spends most of his or her time wrongly blaming the punishing individuals for system failures. Statistical analysis is required to uncover system failures.

Principles of TQM: Despite variations in the language and scope of TQM programmes, it is possible to identify four common TQM principles:

1) Do it right the first time to eliminate costly rework.
2) Listen to and learn from customers and employees.
3) Make continuous improvement on every day matter.
4) Build teamwork, trust, and mutual respect.

Deming's influence is clearly evident in this list. Once again, as with the human relations movement, we see people as the key factor in organisational success.

In summary, TQM advocates have made a valuable contribution to the field of OB by providing a practical context for managing people. When people are managed according to TQM principles, everyone is more likely to get the employment opportunities and high-quality goods and services they demand.

1.8 THE CONTINGENCY APPROACH

Scholars have wrestled for many years with the problem of how best to apply the diverse and growing collection of management tools and techniques. Their answer is the contingency approach. The **contingency approach** calls for using management techniques in a situationally appropriate manner, instead of trying to rely on one best way. According to a pair of contingency theorists:

Contingency theories developed and their acceptance grew largely because they responded to criticisms that the classical theories advocated one best way of organising and managing. Contingency theories, on the other hand, proposed that the appropriate organisational structure and management style were dependent upon a set of contingency factors, usually the uncertainty and instability of the environment.

The contingency approach encourages managers to view organisational behaviour within a situational context. According to this modern perspective, evolving situations, no hard-and-fast rules, determine when and where various management techniques are appropriate. For example, contingency researchers have determined that there is no single best style of leadership. Organisational behaviour specialists embrace the contingency approach because it helps them realistically interrelate individuals, groups, and organisations. Moreover, the contingency approach sends a clear message to managers in today's global economy. Carefully read the situation and then be flexible enough to adapt.

1.9 THE MANAGEMENT SCIENCE SCHOOL

At the beginning of World War II, Great Britain desperately needed to solve a number of new, complex problems in warfare. With their survival at stake, the British formed the first operational research (OR) teams. By pooling the expertise of mathematicians, physicists, and other scientists in OR teams, the British were able to achieve significant technological and tactical breakthroughs. When the Americans entered the war, they formed what they called operations research teams, based on the successful British model, to solve similar problems. The teams used early computers to perform the thousands of calculations involved in mathematical modeling.

When the war was over, the applicability of operations research to problems in industry gradually became apparent. New industrial technologies were being put into use and transportation and communication were becoming more complicated. These developments brought with them a host of problems that could not be solved easily by conventional means. Increasingly, OR specialists were called on to help managers come up with answers to these new problems. Over the years, OR procedures were formalized into what is now more generally called the management science school.

1.10 THE SYSTEMS APPROACH

Rather than dealing separately with the various segments of an organisation, the **systems approach** to management views the organisation as a unified, purposeful system composed of interrelated parts. This approach gives managers a way of looking at the organisation as a whole and as a part of the larger, external environment. Systems theory tells us that the activity of any segment of an organisation affects, in varying degrees the activity of every other segment.

Activity

1) Visualise your organisation as a system and list the critical sub-systems within it. Note down various flows between these sub-systems which interlink them.

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2) Visualise your organisation as a sub-system of the environment and decribe the interaction between the two.

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1.11 RECENT DEVELOPMENTS IN MANAGEMENT THEORY

Theories are powerful influences. The longer we use a given theory, the more comfortable we become with it and the more we tend to not seek out alternative theories unless events force us to change. This helps explain why modern management theory is really a rich mosaic of many theories that have endured over at least the past century. One benefit of understanding this concurrent popularity of many points of view about organisations is that it prepares you for your own organisational experiences. If this unit has not already brought to mind different managerial principles to which you have been exposed, it will prepare you for the day when, for example, you work for a management science manager who in turn works for a manager who practices some other theories to follow. Or if you have already experienced such managers, it will help you understand their perspectives better.

1.12 PRINCIPLES OF MANAGEMENT

Observational studies by Mintzberg and others have found the typical manager's day to be a fragmented collection of brief episodes. Interruptions are commonplace, while large blocks of time for planning and reflective thinking are not. In one particular study, four top-level managers spent 63% of their time on activities lasting less than a hour. But what specific skills do effective managers perform during their hectic and fragmented workdays?

Many attempts have been made over the years to paint a realistic picture of what managers do. Diverse and confusing lists of managerial functions and roles have been suggested. Fortunately, a stream of research over the past 20 years by Clark Wilson and others has given us a practical and statistically validated profile of managerial skills (see Table 1.2). Wilson's managerial skills profile focuses on 11 observable categories of managerial behaviour. This emphasis on skills is very much in tune with today's result-oriented organisations. Indeed, Wilson's unique skills-assessment technique goes beyond the usual self-support approach with its natural bias. In addition to surveying a given manager about his or her 11 skills, the Wilson approach also asks those who report directly to the manager to answer questions about their boss's skills.

Table 1.2: Skills Exhibited by an Effective Manager

- Clarifies goals and objectives for everyone involved.
- Encourages participation, upward communication, and suggestions.
- Plans and organises for an orderly workflow.
- Has technical and administrative expertise to answer organisation-related questions.
- Facilitates work through team building, training, coaching, and support.
- Provides feedback honestly and constructively.
- Keeps things moving by relying on schedules, deadlines, and helpful reminders.
- Controls details without being overbearing.
- Applies reasonable pressure for goal accomplishment.
- Empowers and delegates key duties to others while maintaining goal clarity and commitment.
- Recognizes good performance with rewards and positive reinforcement.

According to Wilson and his colleagues, the result is an assessment of skills mastery, not simply skill awareness. The logic behind Wilson's approach is both simple and compelling. Who better assess a manager's skills than the people who experience those behaviours on a day-to-day basis those who report directly to the manager?

The Wilson managerial skills research yields three useful lessons:

1) Dealing effectively with people is what management is all about. The 11 skills in Table 1.2 constitute creation/commitment/feedback/reward/accomplishment cycle with human interaction at every turn.

2) Managers with high skills mastery tend to have better submit performance and employee morale than managers with low skills mastery.

3) Effective female and male managers do not have significantly different skill profiles, contrary to claims in the popular business press in recent years.

1.13 21st CENTURY MANAGERS

Today's workplace is indeed undergoing immense and permanent changes. Organisations are being engineered for greater speed, efficiency, and flexibility. Teams are pushing aside the individual as the primary building block of organisations. Command-and-control management is giving way to participative management and empowerment. Customer-centred leaders are replacing ego-centred leaders. Employees increasingly are being viewed as internal customers. All this creates a mandate for a new kind of manager in the 21st century. Table 1.3 contrasts the characteristics of past and future managers.

Table 1.3: Evolution of the 21st Century Manager

	Past Managers	Future Managers
Primary Role	Order giver, privileged elite, manipulator, controller	Facilitator, team member, teacher, advocate, sponsor, coach
Learning and Knowledge	Period learning, narrow specialist	Continuous life-long learning, generalist with multiple specialities.
Compensation Criteria	Time, effort, rank	Skill, results
Cultural Orientation	Monocultural, monolingual	Multicultural, multilingual
Primary Source of Influence	Formal authority	Knowledge (technical and interpersonal)
View of people	Potential problem	Primary resource
Primary Communication Pattern	Vertical	Multidirectional
Decision-making Style	Limited input for individual decision	Broad-based input for joint decisions
Ethical Considerations	Afterthought	Forethought
Nature of Interpersonal Relationships	Competitive (win-lose)	Cooperative (win-win)
Handling of Power and Key Information	Hoard	Share
Approach to Change	Resist	Facilitate

1.14 SIGNIFICANCE OF MANAGEMENT PRINCIPLES

Organisations differ in the quality of the systems they develop and maintain and in the results they achieve. Different models of organisational behaviour substantially cause varying results. These models constitute the belief system that dominates management's thought and affects management's actions in each organisation. Therefore, it is highly important that managers recognize the nature, significance, and effectiveness of their own models, as well as the models of others around them.

Douglas McGregor was one of the first writers to call attention to managerial models. In 1957, he presented a convincing argument that most management actions flow

directly from whatever theory of human behaviour the managers hold. He suggested that management philosophy controls practice. Management's human resource policies, decision-making styles, operating practices, and even organisational designs flow from key assumptions about human behaviour. The assumptions may be implicit rather than explicit, but they can be inferred from observing the kinds of actions that managers take.

Theory X is a traditional set of assumptions about people. It assumes that most people dislike work and will try to avoid it if they can. Workers are seen as being inclined to restrict work output, having little ambition, and avoiding responsibility if at all possible. They are believed to be relatively self-centered, indifferent to organisational needs, and resistant to change. Common rewards cannot overcome this natural dislike for work, so management is almost forced (under Theory X assumptions and subsequent logic) to coerce, control, and threaten employees to obtain satisfactory performance. Though managers may deny that they hold this view of people, many of their historical actions suggest that Theory X has been a typical management view of employees.

Theory Y implies a more humanistic and supportive approach to managing people. It assumes that people are not inherently lazy. Any appearance they have of being that way is the result of their experiences with organisations, and if management will provide the proper environment to release their potential, work will become as natural to them as recreational play or rest and relaxation. Under Theory Y assumptions, management believes that employees will exercise self-direction and self-control in the service of objectives to which they are committed. Management's role is to provide an environment in which the potential of people can be released at work.

McGregor's argument was that management had been ignoring the facts about people. It had been following an outmoded set of assumptions about people because it adhered to Theory X when the facts are that the Theory Y set of assumptions is more truly representative of most people. There will always be important differences among people, so a few individuals will fit the assumptions of the Theory X model. Nearly all employees, however, have some potential for growth in their capabilities and demonstrated performance. Therefore, McGregor argued, management needed to change to a whole new set of assumptions about people—one based on emerging behavioural science research. These new assumptions had a powerful impact on subsequent managerial actions.

When seen through the lenses of history, McGregor deserves credit for a number of contributions. First, he stimulated subsequent generations of managers to think consciously about their belief systems and management models. Second, he was an early advocate of the practical value of reading and using research findings to better understand human behaviour. Third, he introduced and publicized one of the early theories of motivation—the hierarchy of needs model by A.H. Maslow. Finally, he became a spokesman for a trend that had been developing over a long period of time—the need to bring human values into balance with other values at work.

Models such as Theory X and Theory Y are also called paradigms, or frameworks of possible explanations about how things work. Any model that a manager holds usually begins with certain assumptions about people and leads to certain interpretations, implications, and even predictions of events. Underlying paradigms, whether consciously or unconsciously developed, become powerful guides to managerial behaviour. Managers tend to act as they think, because they are guided by their dominant thoughts.

Examples of paradigms and paradigm shifts abound. Japanese industry focused on low price for its products in the 1950s and 1960s; now the Japanese are world leaders because of their emphasis on quality. Some organisations projected a take it or leave it approach when demand for their goods and services was high (and competition low); now they try to become responsive to their customers' wishes and needs. Money was presumed to be the universal motivator in the early part of the twentieth century; now managers widely recognize that employees have other, widely varying needs (such as social, esteem, and self-actualization needs).

Top management's models are particularly important to identify, for the underlying model that exists within a firm's chief executive officer tends to extend throughout that

firm. For this reason, models of organisational behaviour are highly significant. Examples abound of the impact throughout the firm of a single executive, such as CEOs Roger Enrico at Pepsi Co and Eckhard Pfeigger at Compaq Computer.

We highlight in this unit the following four principles (paradigms): autocratic, custodial, supportive, and collegial. (Earlier models, such as those of feudalism and slavery, are bypassed.) In the order mentioned, they represent an approximate historical evolution in management practice during the last 100 years or more. Although one model tends to dominate at a particular time in history, at the same time, each of the other models is practiced by some organisations.

Just as organisations differ among themselves, so practices may vary within the departments or branches of one organisation. The production department may work within a custodial model while the supportive model is being tried in the research department. And, of course, the practices of individual managers may differ from their organisation's prevailing model because of those managers' personal preferences or different conditions in their department. Thus no one model of organisational behaviour is sufficient to describe all that happens in an organisation, but identifying a model can help distinguish one way of organisational life from another.

The selection of a model by a manager is determined by a number of factors. As we discussed earlier, the prevailing philosophy, vision, mission, and goals of managers affect (and are affected by) their organisational behaviour model. In addition, environmental conditions help determine which model will be most effective. The current turbulent conditions in some industries, for example, may drive firms toward the more collegial models, since rapid decision making and flexibility are needed. This suggests that the model should not be static and unchanging, but adapted across time. Our discussion of four models, beginning with the autocratic, roughly follows their historical evolution.

1.14.1 The Autocratic Model

The autocratic model has its roots in history, and certainly, it became the prevailing model of the industrial revolution. In an autocratic environment the managerial orientation is formal, official authority. Right of command delegates this authority over the people to whom it applies. Management believes that it knows what is best and that the employee's obligation is to follow orders. It assumes that employees have to be directed, persuaded, and pushed into performance, and such prompting is management's task. Management does the thinking; the employees obey the orders. This conventional view of management leads to tight control of employees at work. When combined with the often brutal and backbreaking physical tasks of that era and the intolerable conditions of disease, filth, danger, and scarcity of resources, the autocratic model was intensely disliked by many employees (and still is).

Under autocratic conditions the employee orientation is obedience to a boss, not respect for a manager. The psychological result for employees is dependence on their boss, whose power to hire, fire and 'perspire' them is almost absolute. The boss pays minimum wages because employees give minimum performance. They are willing to give minimum performance though sometimes reluctantly because they must satisfy subsistence needs for themselves and their families. Some employees give higher performance because of internal achievement drives, because they personally like their boss, because the boss is a natural-born leader, or because of some other factor; but most of them give only minimum performance.

The autocratic model is a useful way to accomplish work. It is not complete failure. The picture of the autocratic model just presented is an extreme one; actually, the model exists in all shades of gray, from rather dark to rather light. This view of work built great railroad systems, operated giant steel mills, and produced the dynamic industrial civilization that developed in the United States. It does get results, but unusually only moderate results. Its principal weakness is its high human costs.

The autocratic model was an acceptable approach to guide managerial behaviour when there were no well-known alternatives, and it still can be useful under some conditions (such as organisational crises).

However, the combination of emerging knowledge about the needs of employees and changing societal values suggested that there were better ways to manage organisational systems. A second step in the ladder of progress was needed, and it was soon forthcoming.

1.14.2 The Custodial Model

As managers began to study their employees, they soon recognised that although autocratically managed employees did not talk back to their boss, they certainly thought back. There were many things they wanted to say, and sometimes they did say them when they quit or lost their tempers. Employees were filled with insecurity, frustrations, and aggressions toward their boss. Since they could not vent these feelings directly, sometimes they went home and vented them on their families and neighbours; so the entire community might suffer from this relationship.

An example of the effects of management-induced frustration on the behaviour of employees occurred in a wood-processing plant. Managers treated workers crudely, sometimes even to the point of physical abuse. Since employees could not strike back directly for fear of losing their jobs, they found another way to do it. They symbolically fed their supervisor to a log-shredding machine! They did this by purposely destroying good sheets of veneer, which made the supervisor look bad when monthly efficiency reports were prepared.

It seemed rather obvious to progressive employers that there ought to be some way to develop better employee satisfaction and security. If the insecurities, frustrations, and aggressions of employees could be dispelled, the employees might feel more like working. In any case, they would have a better quality of work life.

To satisfy the security needs of employees, a number of companies began welfare programmes in the 1890s and 1900s. In their worst form these welfare programmes later became known as paternalism. In the 1930s welfare programmes evolved into a variety of fringe benefits to provide employee security. Employer, unions and government began caring for the security needs of workers. They were applying a custodial model of organisational behaviour.

Employee security remains a high priority for millions of workers in today's uncertain job market where lifetime employment is seldom promised to any employee. Many firms have historically gone out of their way to stabilize their workforce and preserve employee jobs. To avoid layoffs, they constantly retrain employees, reduce overtime, freeze hiring, encourage both job transfers and relocations, provide early retirement incentives, and reduce subcontracting to adjust to slowdowns in the computer industry.

A successful custodial approach depends on economic resources. The resulting managerial orientation is toward money to pay wages and benefits. Since employee's physical needs are already reasonably met, the employer looks to security needs as a motivating force. If an organisation does not have the wealth to provide pensions and pay other benefits, it cannot follow a custodial approach.

The custodial approach leads to employee dependence on the organisation. Rather than being dependent on their boss for their weekly bread, employees now depend on organisations for their security and welfare. Perhaps more accurately stated, an organisational dependence is added to a reduced personal dependence on the boss. If employees have ten years of seniority under the union contract and a good pension programme, they cannot afford to quit even if the grass looks greener somewhere else.

There are many programmes consistent with a custodial environment at the workplace. The Calvert Group, a Maryland-based mutual funds company, provides support of physical fitness, massage therapy, wellness seminars, parental leave, dependent-care time, and child-care programmes. Calvert reported that the turnover rate has fallen sharply from its preprogramme level of 30 per cent annually, the number of sick days taken is down, health care expenses are lower, and recruitment and training costs have been reduced. Apparently, employees become dependent on these custodial practices and then reluctant to change employers.

Employees working in a custodial environment become psychologically preoccupied with their economic rewards and benefits. As a result of their treatment, they are well

maintained and contented. However, contentment does not necessarily produce strong motivation; it may produce only passive cooperation. The result tends to be that employees do not perform much more effectively than under the old autocratic approach.

The custodial model is described in its extreme in order to show its emphasis on material rewards, security, and organisational dependence. In actual practice, this model also has various shades of gray, from dark to light. Its great benefit is that it brings security and satisfaction to workers, but it does have substantial flaws. The most evident flaw is that most employees are not producing anywhere near their capacities, nor they are capable. Though employees are happy, most of them really do not feel fulfilled or motivated. In confirmation of this condition, a series of studies at the University of Michigan in the 1940s and 1950s reported the happy employee is not necessarily the most productive employee. Consequently, managers and academic leaders started to ask again, is there a better way?

The search for a better way is not a condemnation of the custodial model as a whole but rather a condemnation of the assumption that this is the final answer, best way to motivate employees. The error in reasoning occurs when people perceive the custodial model as so desirable that there is no need to build on it toward something better. Although the custodial model is desirable to provide employee security, it is best viewed as the foundation for growth to the next step.

1.14.3 The Supportive Model

The supportive model of organisational behaviour had its origin in the "principle of supportive relationships" as stated by Rensis Likert, who said:

The leadership and other processes of the organisation must be such as to ensure a maximum probability that in all interactions and all relationships with the organisation each member will, in the light of his (or her) background, values, and expectations, view the experience as supportive and one which builds and maintains his (or her) sense of personal worth and importance.

Likert's principle is similar to the human resources approach.

One key spark for the supportive approach was a series of research studies at the Hawthorne Plant of Western Electric in the 1920s and 1930s. Led by Elton Mayo and F.J. Roethlisberger, the researchers gave academic stature to the study of human behaviour at work by applying keen insight, straight thinking, and sociological backgrounds to industrial experiments. They concluded that an organisation is a social system and the worker is indeed the most important element in it. Their experiments concluded that the worker is not a simple tool but a complex personality that often is difficult to understand. The studies also suggested that an understanding of group dynamics, coupled with the application of supportive supervision, was important.

The Mayo-Roethlisberger research has been strongly criticized as being inadequately controlled and over interpreted, but its basic ideas, such as a social system within the work environment, have stood the test of time. The important point is that it was substantial research about human behaviour at work, and its influence was widespread and enduring. The studies have truly been a landmark in the historical evolution of organisational behaviour, and awakened further interest in the supportive model.

The supportive model depends on leadership instead of power or money. Through leadership, management provides a climate to help employees grow and accomplish in the interests of the organisation the things of which they are capable. The leader assumes that workers are not by nature passive and resistant to organisational needs, but they are made so by an inadequately supportive climate at work. They will take responsibility, develop a drive to contribute, and improve them if management will give them a chance. Management's orientation, therefore, is to support the employee's job performance, rather than to simply support employee benefit payments as in the custodial approach.

Since management supports employees in their work, the psychological result is a feeling of participation and task involvement in the organisation. Employees may say we instead of they when referring to their organisation. They are more strongly

motivated than by earlier models because their status and recognition needs are better met. Thus they have awakened drive for work.

Supportive behaviour is not the kind of behaviour that requires money, rather, it is a part of management's lifestyle at work, reflected in the way that it deals with other people. The manager's role is one of helping employees solve their problems and accomplish their work.

The supportive model works well with both employees and managers, and it has been widely accepted at least philosophically by many managers in the United States. Of course, their agreement with supportive ideas does not necessarily mean that all of them practice those approaches regularly or effectively. The step from theory to practice is a difficult one. Nevertheless, there are more and more reports of companies that reap the benefits of a supportive approach, as this example illustrates:

When computer sales slowed at Hewlett-Packard, CEO John Young ordered all workers in the affected divisions to take two days off without pay each month. (This action was taken to avoid layoffs.) Many employees continued to work on the payless days anyway. In an even more dramatic move, managers in a profitable division voluntarily took 10 per cent pay cuts to show their solidarity with other Hewlett-Packard employees. This example suggests that a supportive approach, if practiced consistently in profitable times, represents an investment that can pay high dividends when the firm needs them.

The supportive model of organisational behaviour tends to be especially effective in affluent nations because it responds to employee drives toward a wide array of emerging needs. It has less immediate application in the developing nations, because their employees' current needs and social conditions are often quite different. However, as those needs for material rewards and security become satisfied, and as employees become aware of managerial practices in other parts of the world, we may also expect employees in those countries to demand a more supportive approach. Consequently, their progression through the models is frequently a more rapid one.

1.14.4 The Collegial Model

A useful extension of the supportive model is the collegial model. The term collegial relates to a body of people having a common purpose. The collegial model, which embodies a team concept, first achieved widespread applications in research labouratories and similar work environments. More recently it has been applied in a wide range of other work situations as well.

The collegial model traditionally was used less on assembly lines, because the rigid work environment made it difficult to develop there. A contingency relationship exists in which the collegial model tends to be more useful with un programmed work, an intellectual environment, and considerable job freedom. In other environments management often believes that other models may be more successful.

The collegial model depends on management's building a feeling of partnership with employees. The result is that employees feel needed and useful. They feel that managers are contributing also, so it is easy to accept and respect their roles in the organisation. Managers are seen as joint contributors rather than as bosses.

The feeling of partnerships can be built in many ways. Some organisations have abolished the use of reserved parking spaces for executives, so every employee has an equal chance of finding a space close to the workplace. Some firms have tried to eliminate the use of terms like bosses and subordinates, feeling that those terms simply create perceptions of psychological distance between managers and non-managers. Other employers have removed time clocks, set up "fun committees," sponsored company canoe trips, or required managers to spend a week or two annually working in field or factory locations. All these approaches are designed to build a spirit of mutuality, in which every person makes contributions and appreciates those of others.

The managerial orientation is toward teamwork. Management is the coach that builds a better team. The employee response to this situation is responsibility. For example, employees produce quality work not because management tells them to do so or because the inspector will catch them if they do not, but because they feel inside

themselves an obligation to provide others with high quality. They also feel an obligation to uphold quality standards that will bring credit to their jobs and company.

The psychological result of the collegial approach for the employee is self-discipline. Feeling responsible, employees' discipline themselves for performance on the team in the same way that the members of a football team discipline themselves to training standards and the rules of the game. In this kind of environment employees normally feel some degree of fulfillment, worthwhile contribution, and self-actualization, even though the amount may be modest in some situations. This self-actualization will lead to moderate enthusiasm in performance.

The collegial model tends to produce improved results in situations where it is appropriate. One study covered scientists in three large research labouratories. Labouratories A and B were operated in a relatively traditional hierarchical manner. Labouratory C was operated in a more open, participative, collegial manner. There were four measures of performance: esteem of fellow scientists, contribution to knowledge, sense of personal achievement, and contribution to management objectives. All four were higher in labouratory C, and the first three were significantly higher.

1.15 RELEVANCE IN HEALTH CARE INSTITUTIONS

Health care institutions are unique in several ways. In the first case these are the only places where we come across wide skill differential among the people working there. On the one hand we see highly skilled physicians and paramedics, on the other hand very large number of people who are easily substitutable. Managing an organisation characterised by such a high level of differential knowledge throws up unique management problems. Second dimension is added because of their criticality. Their ability to make an impact on the well being of the community is undisputable. Third dimension, as an out growth of the previous one, is communities' dependence on the health care institutions. There are large numbers of people who maintain happy and comfortable life without possessing a care or a computer; in other words we are not totally dependent on these industries manufacturing these goods. Where as, from birth to death, which are normal events in ones life one cannot do away without health care institutions. The fourth and the most compelling reason is the need for better management of these institutions, so that they can be run profitably and add value to society. The last issue is the most important. Unless this aspect is not properly looked into, the way the entire manufacturing and financial sectors are being taken over by the multinationals; the same destiny is likely to happen with our heath care institutions.

All these call for proper organisation of these institutions. And one of the fundamental requirements of proper organisation is to develop methodically trained professionals who will be able to infuse meaning and purpose for the institutions, and also add value to the stakeholders. To achieve this the first requirement is to develop trained manpower who will be in charge of these institutions. Towards this end awareness about the scientific principles is the first step.

1.16 LET US SUM UP

This is one question, which is not easy to answer. One can ask the same question with regard to physics, whether it is an art or science. Physics no doubt is a science; in fact nobody can have any slightest doubt about it. Many of our every day usages are the contribution of science. Unless one has slightest idea about the principles of physics, the fans we use everyday can not be manufactured. In fact all the fans available in the market for sale have been manufactured on the sound principles of physics. Technical specifications and cost remaining the same, we are likely to purchase that fan which looks attractive to us. This making thing attractive is an art, where science has no role. That fan manufacturer is likely to make good business that has been able to master the science of fan manufacturing and the art of making it attractive.

Similar is the case with management. Management principles and theories are mainly the produet of rigorous scientific methodology. Without a proper scientific framework

and approach no management principles can be comprehended. However, when it comes to application we all know that the same principles have to be conditioned going by the prevalent socio-cultural reality. That may be the key for a successful business manager, since he knows theory coupled with knowledge of the ground realities. That makes it possible to apply a management theory in a situation correctly. At this stage the theory steps out of the threshold of science and becomes an art. Therefore, it can be said that science of a theory becomes art when it is correctly applied. Can we say now that management can be both a science and art depending upon from which perspective we are looking at it.

1.17 FURTHER READINGS

Cattell, R.B. (1973), "Personality Pinned Down", *Psychology Today* (July, 1973), pp.40-46.

Davar, R.S. (1981), *Personnel Management and Industrial Relations*, Vikas Publishing House: New Delhi.

Drucker, Peter F. (1981), *Management Tasks, Responsibilities and Practices*, Allied Publishers Prviate Limited: New Delhi.

French, Wendell (1974), *The Personnel Management Process: Human Resources Administration*, Houghton Mifflin Company: Bombay.

Hersey, P. and Blanchard, K.H. (1980), *Management of Organisational Behaviour: Utilizing Human Resources*, Third Edition, Prentice Hall of India (Pvt.) Ltd.: New Delhi.

Ivancevich, J.M., Donnelly, Jr. J.H. and Gibson, J.L. (1980), *Managing for Performance*, First Edition, Business Publication Inc.: Dallas.

Katz, R.L. (1974), "Skills of an Effective Administrator", *Harvard Business Review*, 52(5) 90-102.

Monappa, A., Saiyaddin, Mirza S. (1979), *Personnel Management*, Tata & McGraw-Hill: New Delhi.

Pareek, U. (1981), *Beyond Management*, First Edition, Oxford and IBH Pub. Co.: New Delhi.

Pareek, U. and T.V. Rao (1981), *Designing and Managing Human Resource Systems*, Oxford & IBH Publishing Co.: New Delhi.

Peters, Thomas, J. and Waterman, Robert H. (1985), *In Search of Excellence*, Harper and Row: New York.

Rao, T.V. and D.F. Pereira (1986), *Recent Experiences in Human Resources Development*, Oxford & IBH Publishing Co.: New Delhi.

Sinha, J.B.P. (1980), *The Nurturant Task Leader*, First Edition, The Concept Publishing House: New Delhi.

Tata, J.R.D. (1986), *Keynote*, Tata Press Limited: Bombay.

UNIT 2 FUNCTIONS OF MANAGEMENT

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- explain the basic roles and functions of management;
- identify the objectives of managerial functions and their pre-requisites; and
- to develop an understanding about the necessity of the managerial processes.

2.1 INTRODUCTION

An organisation is formed for the fulfilment of certain objectives like earning a desired rate of profit on investment, exploitation of certain natural resources, development of a given geographical area, and supplying to the public some essential goods or services. Machines, materials, money and all other non-human resources are the tools and aids that man uses to achieve his tasks. Thus, a proper selection of men, their tactful handling and proper management is the essense of good overall management of an organisation.

2.2 FUNCTIONS/OBJECTIVES OF MANAGEMENT

Let us try and assess as to what management does. For example, let us determine the work involved in the construction of a mini steel plant. Broadly, these are:

- preparation of a feasibility report;
- working out a detailed project report;
- projection of time schedule or PERT network for completion of the project;
- arrangement and allocation of funds;
- selection of personnel and procurement of equipment;
- erection;
- commissioning; and
- despatch, marketing, finance and other commercial aspects.

If we break these broad items into finer elements and analyse the nature of work

involved in each of them, the process will reveal five basic elements which go into management. These are:

- Planning the course of action to be adopted to attain pre-determined objectives;
- Setting up an organisational structure and assigning specific responsibilities to different individuals;
- Directing and coordinating the efforts of all members working for the organisation;
- Controlling the activities of the members through setting up standards for their performance;
- Motivating the members to cooperate with one another for the achievement of the objectives.

In other words we can say that the functions and the objectives of Management may be the following:

1) To achieve an effective utilisation of human resources for the achievement of organisation goals.

2) To establish and maintain an adequate organisational structure and a desirable working relationship among all the members of an organisation by dividing the organisational tasks into functions, positions, jobs and by defining the responsibility, accountability, authority for each job and its relation with other job/ personnel in the organisation.

3) To secure the integration of the individuals and groups with the organisation by reconciling individual/group goals with those of an organisation in such a manner that the employees feel a sense of involvement, commitment and loyalty towards it. The absence of this integration will allow development of frictions, personal jealousies and rivalries, prejudices, personnel conflicts, cliques, factions, favouritism and nepotism. These will produce inefficiency and result in failure of the organisation.

4) To generate maximum development of individuals/groups within an organisation by providing opportunities for advancement to employees through training and job education or by offering transfers or by providing retraining facilities.

5) To recognise and satisfy individual needs and group goals by offering an adequate and equitable remuneration, economic and social security in the form of monetary compensation, and protection against such hazards of life as illness, old age, disability, death, unemployment etc. With adequate compensation and security, employees work willingly and cooperate to achieve an organisation's goals.

6) To maintain high morale and better human relations inside an organisation by sustaining and improving the conditions so that employees may stick to their job for a longer period.

Activity 1

Think of the extent to which, according to your estimate, these objectives are being fulfilled by the personnel office in your organisation and write below the extent of such fulfilment, choosing on the following for each objective:

i) Adequately, ii) To some extent, iii) Not at all.

Objectives	**Extent**
1	.....
2	.....
3	.....
4	.....
5	.....
6	.....

Write below against each objective what more you would like to have done in your organisation:

	Objectives	Suggestions
1	.....	.....
2	.....	.....
3	.....	.....
4	.....	.....
5	.....	.....
6	.....	.....

2.3 RESPONSIBILITIES OF MANAGEMENT

Considering organisational objectives, you will agree that the objectives are in the best interests of all the stake holders i.e. owners of enterprise, the community, the consumers of its goods and services, and members of the organisation itself, including groups who may belong to unions.

For enabling the organisation to fulfil these objectives the top management has to create some conditions as the pre-requisites. These are described below:

1) Existence of capable people in the organisation picked up on the basis of their merits and not on other considerations. If people are selected on other considerations they will be misfits, creating all sorts of problems for the organisation and other employees.

2) Plans for effective utilisation of efforts and potentialities of individuals and groups for appreciation of work well done and for future advancement and training. If people are left on their own, nothing will be achieved. They have to be provided with necessary opportunities and means, and given encouragement.

3) Considering employees as co-workers rather than as subordinates. If this is not done employees will not consider it their responsibility or duty to fulfil the objectives of the organisation.

4) A proper division of tasks of an organisation in accordance with a sound plan into functions and positions, each indicating a clear-cut authority, responsibility and duties as also relationship of one position with another. In the absence of such a division, chaotic conditions will prevail and no work will be done properly or even done at all.

5) The presence of clearly defined and comprehensive objectives and proper communication to all concerned. If objectives are not clear and if people, who are expected to work for achieving these, do not know about these, they cannot be expected to achieve them.

6) The formulation of objectives in consultation with senior persons in the organisation and common understanding among managers at all levels of the objectives. If the senior staff or personnel have not participated in the formulation of objectives they may not feel any real responsibility for achieving these. If managers at any level do not understand the objectives, they will not know why they are doing a given work what is expected of them and as a result may now even do it properly.

Activity 2

a) On what basis are employees selected in your organisation and what weightage is given to each one of these bases?

	Basis	Weightage
1.	.....	.....
2.	.....	.....

Basis	Weightage
3.	.....
4.	.....
5.	.....

b) What is the prevailing attitude of superiors towards the employees in your organisation:

Empoyees work **for** them	Employees work **with** them
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

c) Assess the division of tasks in your organisation and write below if the authority, responsibility and duties of various functions and positions are clearly indicated:

For all ☐ For most of them ☐ For some of them ☐ For none ☐

d) Do you have a clear understanding of the objectives of your Organisation?

Yes ☐ No ☐

If yes, how are these communicated to you?

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2.4 THE MANAGEMENT PROCESSES

Management has been defined in ways that appear different but that have a strong underlying similarity. Some regard it as getting things done through people. Others consider it the process of reaching organisation goals by working with and through people and other resources. We define management in HSOs (Health Services Officers) as : *the process, composed of the set of interrelated social and technical functions and activities, occurring within a formal organisational setting for the purpose of accomplishing predetermined objectives through utilization of human and other resources.* The four main elements are that management:

- is a process—a set of interactive and interrelated, on-going functions and activities;
- involves accomplishing organisational goals or objectives;

- involves achieving these objectives through people and utilization of other resources; and
- occurs in a formal organisational settting.

The set of primary social and technical functions characteristic of the management process are planning, decision-making, organising, staffing, directing, and controlling. These functions represent the logical grouping of generic management activities. Others inherent in the management process include integrating, coordinating, change, and in some cases, representation. All health services managers engage in these functions and activities to some degree regardless of hierarchical level. Intensity and focus vary depending on the individual's degree of authority and scope of responsibility and work activities. Interrelationships of primary social/technical management functions are presented in Fig. 2.1.

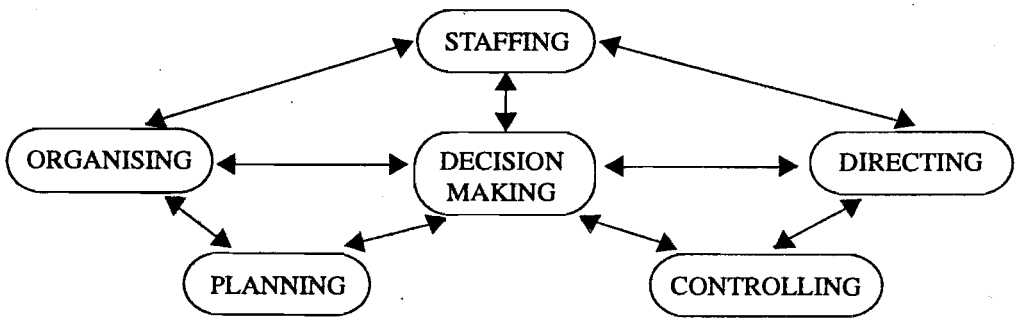

Fig. 2.1: Interrelationship of the management process functions.

Management Functions

The traditional classification system of management functions describes *how* managers do what they do—the activities they perform— to accomplish objectives (achieve work results) through people and utilization of other resources.

2.4.1 Planning

Planning is a technical managerial function that enables HSOs to deal with the present and anticipate the future. It involves deciding what to do, who, and how. It is also primary because the organising, staffing, directing, and controlling management functions are predicted on forecasts, objectives, strategies, and operational programmes developed through planning.

When planning, senior managers assess the organisation's external environment and how it will affect them, develop or redefine organisational and component objectives, determine specific means or strategies to accomplish objectives, and design operational plans and establish policy. When predetermined courses of actions are developed, necessary resources can be identified and acquired, and allocation can be made to give order and focus to organisation efforts. In short, the manager predetermines organisational arrangements for accomplishing objectives so that random haphazard activities are minimized or do not occur.

Although senior health services managers are typically concerned with the planning function activities of external environment assessment and objective and strategy formation for the organisation, middle-level and first-line managers similarly establish objectives for their specific area of responsibility. These objectives must be consistent with and suppportive of those established for the organisation as a whole. However, the planning done by these managers is typically focused on programme design and operation and procedures for performing them in their specific area of responsibility.

Planning implies:

i) **Making choices:** There can be any number of diversification opportunities to choose from. It is up to the management to choose the alternative which offers maximum potential for growth and profitability.

ii) **Committing resources:** The marketing manager who increases the amount earmarked for television promotion, and adds four more salesmen in each territory

with the objective of achieving higher sales, is committing scarce resources (money, people, etc.) which then are not available for any other use.

iii) **A time horizon:** Planning always refers to a specific time limit within which it must be completed. The field supervisor plans movements of each of his salesmen on a daily basis. The marketing manager plans promotion effort for the next three months, six months or twelve months. The top management may have a time perspective which may extend anywhere between 5 and 15 years.

Irrespective of the activity or level at which plans may be drawn, the critical factor is that they *focus on objectives* and are directed towards their achievement. They serve to channelise the energies of the company in the desired direction. The future is always uncertain and, therefore, risky. Stepping out of home on a cloudy day with an umbrella in hand is the way I cover my risk (of getting wet) against the anticipated but uncertain future rain. It may or may not rain but I am prepared. The umbrella is representive of the plan which a company draw up in *anticipation and preparation of the future opportunities and problems*. Planning implies not simply reacting to events but anticipating and preparing for them.

Planning ensures the most efficient use of scarce resources. Planning implies coordinated, inter-related effort towards achievement of the common objective rather than uncoordinated haphazard, arbitrary, overlapping action towards individual objectives. Joint, coordinated effort implies pooling of resources and their optimum allocation without any wastage.

Planning is the only way by which an organisation can *exercise control* to check that it is on the desired course of action. Only when there are objectives to work for, and plans to achieve these objectives, can the manager exercise his control to measure the performance of his organisation, department or subordinates. An organisation without plans and controls is like a raft marooned on high seas with no maps and compass to show the direction and no steering to manoeuvre with. Planning is needed at every level of management and in every activity and department of the company. Annual sales targets, cash-flow statements, budgets of each branch, individual career development blueprint, assembly line operations, scheduling of production over a number of machines in the factory are examples of plans.

To ensure that a plan is effective and succeeds in achieving its objectives, it must have the following components:

- Planning must start from the top. Objectives for the entire company are defined by the top management and then they percolate down throughout the organisation. Thus, logically, planning too must start at the top. For instance, one of the objectives of the top management of Beautiful Books Ltd. (a company specialising in publishing books on Indian culture and history) is to increase its turnover from Rs.1.15 crore to Rs.5 crore in 1987-88. The marketing director accordingly draws up a plan for increasing sale in existing markets and the new markets to be penetrated. From this overall plan, each area marketing manager will make his own annual, quarterly and monthly plans. And in turn each year sales supervisor will draw the plan for his entire sales team.

- Planning must be flexible. Planning is needed to anticipate and prepare for the unknown events of the future. To the extent that the future is uncertain and events may or may not occur, planning must be flexible. Flexibility implies ability to keep moving towards objectives despite unexpected occurrences. Flexibility is especially needed when there is high degree of uncertainty and risk, the lead time involved in implementing the plan is long, and cost of making mistakes is high. The R & D cell of a television manufacturing company designed a completely indigenous circuit for black and white television after 18 months of experimentation and used 100% more funds than were allocated to it. The success of the circuit is critical to the company as its entire marketing strategy for the coming 2-3 years is based on this. If the circuit is successful, the company will be able to establish its strong position in the market. However, if the circuit shows signs of failure the company is ready with its plans to airlift the circuits at a day's notice from its Japanese collaborator. Thus one way to allow for flexibility is by developing alternate or contingency plans.

- In the short-run, careful detailed planning without allowing for much flexibility will improve operational efficiency. But undue emphasis on inflexibility or rigidity may do more harm than good. Every manager has to find his own level of balance in allowing for flexibility.

  Short-term planning must be integrated with lone range planning. The long range plans, must be broken down into short-term plans on the basis of which the managers can take action. There can always be a difference of opinion on what constitutes the long and short-term. Some define five years as the long-term and anything up to one year as the short-term. In reality the definition will always vary according to the nature and scope of organisational activity for which planning is being undertaken. However, you may define the long and short-term, the point to remember is that the short-term plans must be derived from, and contribute to the long-term plans.

- Plans are good only if they are properly implemented by the people down the line. An effective wasy to ensure this is to involve the people responsible for implementation in the entire process of planning.

  However, despite all the above precautions, plans sometimes fail because of environmental and internal limitations. Government policies, regulations, laws, statutory obligations, and rapid social and technological changes pose external limitations on the company's planning effort. Within the company, cumbersome procedures, capital inflexibilities in terms of investments already made, inadequate or inaccurate information are the possible barriers which a company may face.

Activity 3

List the various activities for which your organisation undertakes the formal planning process. Evaluate these plans on the basis of what you have learnt about planning.

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If objectives of a Health Programme in a State, District or Primary Health Centre are to be achieved, certain basic management functions are to be carried out. These functions are basically (a) Planning, (b) Implementing and (c) Control. This is a modern approach to management functions.

The job functions of different cadre of health personnel in the district and peripheral Health Services structure and the managerial functions performed by them involves (or should involve) the following steps in order to initiate and carry out the managerial process successfully:

- Assessment of health situation as health status of people, health facilities, assessment of the resources, training facilities, health organisation;
- Projections of health situation over the plan period;
- Definition of nature of health problems and selection of priorities;
- Definition of goals and objectives of health sector plan as well as goals and objectives for each of the programmes for tackling particular health programmes;
- Programme planning and implementation i.e., formulation of plan for each health programme according to priorities and putting them into action;
- Monitoring of the programme, i.e., keeping track of the programme activites to see that they are going according to the plan; and
- Evaluation, meaning measurement of the outcome of a programme or activity against predetermined objectives.

The above seven steps contributing to the managerial process for delivery of PH Care could be viewed from three angles, namely:

- Programme Planning
- Programme Implementing and
- Controlling (Monitoring and Evaluation)

These programme components are performed in varied degrees at various levels by different cadre of health functionaries rendering primary health care services. The District Medical and Health Officer, a PHC Medical Officer or a Programme Officer, each one in rendering their assigned professional services also carry out, certain managerial functions which contribute to the total managerial process at the district level.

The Planning Process in Health

The essentials of planning in health lie in answering the following key questions:

1)	Where are we now?	(Situational Analysis)
2)	Where do we want to reach?	(Goals, Objectives, Priorities, targets and strategic decisions)
3)	How well we get there?	(Organisational constraint, resources and organisational structure, functions and management)
4)	How well we have done?	(Monitoring, evaluation and feedback)
5)	What new problems do we have?	(Replanning)

The steps for planning in health, like the planning process include the following:

1) Health situation analysis of the area to assess health problems. Health resources and opportunities for action by collecting data through available sources and conducting baseline surveys.
2) Establish health priorities of the area.
3) Identify key areas for action within national health plan objectives and programme objectives.
4) Setting targets for action.
5) Identify tasks to be performed.
6) Matching organisational inputs and resources with key tasks.
7) Draw implementation plan on programme objectives, inputs, time frame and outputs.
8) Develop a monitoring plan and built in feedback mechanisms. Detrmine indicators of monitoring and supervisory plan.
9) Evaluation
10) Replanning

Inadequacies in planning will directly contribute to inadequacies in monitoring. Hence:

1) The plans should identify key result areas and define how they will be measured.
2) The plans should prioritize activities so that they receive adequate emphasis during monitoring.
3) The plans should cater to local variations, otherwise monitoring would identify programme performance variations resulting from the local variations which do not require any action.

The monitoring process thus comprises of:

—Detecting deviations from plans

—Diagnosing causes for deviations

—Taking corrective action

1) Use of staff participation in the planning process to obtain their commitment for implementation;
2) Use of experts for advice;
3) Training to reinforce skills and commitment;
4) Use of personal, direct communication;
5) Strengthening of supervisory systems; and
6) Giving and receiving feedback of relevant information

2.4.2 Decision-making

Decision-making is a pervasive technical management function that is inherent in all others. Managers must be decision-makers. Health services managers make decision when they monitor and control work activities, and when they plan, establish, or change organisational arrangements and work design and content, acquire and assign personnel to particular jobs or tasks, and direct efforts of others.

Decision-making involves making choices from alternatives. It is a function performed by all managers. However, the scope and nature of decision-making techniques used, and importance of those decisions concerning structure-tasks-people relationships and their integration vary depending on the manager's position in the organisation, degree of authority, and scope of responsibility. Managerial decision-making also involves allocation and utilization of resources. Senior managers make policy decisions affecting the entire organisation and allocation of resources among departments, whereas first-line managers make decisions about the allocation and utilization of resources provided them by senior management.

Making a choice is making the decision. Follow up of the decision to ensure that it is properly carried out is very important. A decision which does not get implemented remains a decision only on paper and not in reality. The final step is to gather feedback on the impact generated by the decision.

Decision-making is so important because it implies commitment of resources, the desired outcome of which is never certain. Decisions are made under conditions of uncertainty and risk. Decisions made today have implications reaching into the future. The risk arises out of the fact that the manager never has complete facts and knowledge about the implications of his decision and there is always the chance that the wrong decision may be taken.

Many mathematical tools and theories have been developed to improve the quality of decisions which managers have to make under risky and uncertain conditions. Linear programming, queuing theory, probability and game theory, risk analysis, and decision trees are some of these tools. These will be discussed at length at a later stage.

Activity 4

Think of any decision which you may have made in the recent past. Write down the various alternatives which you considered, and the manner in which you evaluated them to arrive at the best choice.

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2.4.3 Organising

The management function of organising is technical in nature. It concerns the following: establishment of authority and responsibility relationships and formal structuring and reporting relationships; division of work, job design, and methods; work process flow; and coordination, information, and feedback systems within HSOs. It establishes the formal setting in which individual and group activity is carried out to accomplish work. Elements of concern are structure-technology-people relationships with an awareness of how each affects the other. Senior managers are typically concerned with broad aspects of organising, such as authority and responsibility relationships, departmentation of the organisation, and coordination of its components, whereas middle-level and first-line managers are concerned with specific tasks related to job design, work process flow, and work methods and procedures.

Organising refers to the formal *grouping* of people and activities to facilitate achievement of the firm's objectives. Issues for discussion here are the types of organisation structure, degree of centralisation, levels of management, span of control, delegation of authority, unity of command, line and staff relationship, and staffing.

Structure refers to the specific manner in which people are grouped. An organisation can group its people on the basis of the various functions (such as production, personnel, finance, marketing), geographical territories or around specific products or product lines (such as detergents, toiletries, basic chemicals, agro-products, as in case of Hindustan Lever Limited). The concept of matrix organisation is a recent evolution and combines the functional and product organisation. This type of organisation is especially useful in case of projects which require both specialists as well as functional experts to execute a project within a specified time frame. Another type of organisation is by the type of customers served. A company manufacturing and marketing computers has organised its sales department in two groups. One group sells to institutions such as offices, banks, schools, colleges, etc., while the other group sells to individuals. Many companies selling office equipment have organised separate marketing teams to cater to the private sector and the public sector because of the different cultures prevailing in them.

Centralisation refers to the point or level where all decision-making authority is concentrated. One-man enterprises, such as a small bread and butter stores, vegetable vendor, a self-employed car mechanic, are examples of complete centralisation. As the enterprise grows, it becomes increasingly difficult for one person to manage alone and he has to necessarily line up other poeple and give them authority to make some decisions. These decisions may be routine, programmable decisions, but complete centralisation is no longer possible. The decision-making authority is now vested in more than one individual. This is decentralisation.

You require information to make a decision. It is possible that information may be generated at one place but the decision is taken at another. A Bombay based multinational involved in making and selling ball bearings has its manufacturing facility at Pune. Every evening all information regarding the day's production, machine down time, inventory position is sent to the head office via the linked computer facility and all decisions regarding change in production scheduling are made at the head office. The introduction of real time information with the help of computers enables information generated at one place to be instantaneously transmitted thousands of miles away for making a decision. However, the real criterion for an organisation having a centralised or decentralised structure is a reflection of the top management's thinking and philosophy.

Closely related to the concept of centralisation are the concepts of levels of

management and span of control. Levels of management refers to the number of hierarchical levels under the control of a particular manager. Machine operator, foreman, floor manager and production manager represent the levels of management in a typical production department under the director. The machine operators report to the foreman, the foreman reports to the floor manager who in turn reports to the production manager who is accountable to the director. The number of machine operators who directly report to the foreman represents his span of control. There is a great deal of controversy regarding the ideal number of people that a manager can effectively control or the ideal span of control. Many management thinkers are of the view that three to seven is the ideal range. In practice, this may actually vary from one individual manager to another.

At each level of management, there is a reporting relationship between the manager and the workers. The fewer the number of people that a worker has to report to, the less will be the problem of conflict in instructions, and greater the feeling of responsibility for results. Similarly, the clearer the line of authority from the manager to the workers, the better the decision-making and communication.

The staff functionary reports directly to the top management and is not a part of the chain of command.

The company may draw up any number of ambitious plans, but if it does not have the right kind of poeple, it can never succeed in implementing these plans. One of the biggest challenges which a manager faces is matching the right people with the right jobs. The process of staffing starts with defining the job to be done and the necessary qualifications, skills and experience required to do it. The next step is to search for the persons with the desired background. The search may involve a number of complex steps such as advertising the job-through newspapers and specialised magazines, screening the applications received in response to the advertisement, conducting a selection process which may include a variety of techniques such as written test, group discussion, personal interview, etc. Before making the final selection, it is important to be sure that the candidate fits in well with the other people and the culture of the organisation.

Having found the right candidate, it is equally important that you are able to retain him. Among other things, motivation and leadership provided by the top management of organisation also plays an important role.

Activity 5

What is the basis for organising the various departments in your company?

Can you identify the various levels of management and the span of control at each level as well as the reporting relationships?

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2.4.4 Staffing

The management function of staffing encompasses activities concerned with acquiring and retaining human resources. It is both technical and social in nature. Technical aspects include manpower planning, job analysis, recruitment, testing, selection, performance appraisal, compensation and benefits administration, employee assistance, and safety and health. Social aspects include those activities that influence behaviour and performance of organisation members; training and development, promotions, counseling, and discipline. All managers engage to some degree in one or more staffing function activities; appraising subordinates, determining compensation changes and promotions, and disciplining. However, unlike other management functions, most staffing activities are centralized under one manager who has overall responsibility for human resource acquisition and retention for the entire organisation as well as for labour relations and collective bargaining.

2.4.5 Controlling

Planning and controlling go hand in hand. There can be no control without a plan and plans cannot be successfully implemented in the absence of controls. Controls provide a means of checking the progress of the plans and correcting any deviations that may occur along the way.

As each worker enters the factory premises in the morning, his time of arrival is electronically (or manually) punched on his card and every evening his departure time is similarly recorded. This simple control process is effective in checking the time spent by each worker in the factory and at the end of the month for calculating his wages and overtime. The mere act of recording makes each worker conscious of his late arrival and acts as a self-check on his timing. In contrast to this simple control, the annual budget for the subsidiary of a multi-location company requires a far more sophisticated process for controlling its many diverse activities.

The type of control required will vary according to the factors that are to be controlled, and the critical importance of the factors to the organisation's success. The more critical the factor the more complex is the control mechanisms needed to check its progress. Finance is a very critical area of management and most companies devise elaborate and sophisticated financial controls.

A control is meaningful only when there is clear cut responsibility for activities and results. It is meaningless to have a control process which simply points out deviations but cannot pinpoint the area in which they occurred and who is responsible for taking the corrective measures.

Control may be used to measure physical quantities (such as volume of output, number of man hours, number of units of raw material consumed per machine, etc.), monetary results (value of sale, capital expenditure, return on investment, earnings per share, etc.) or to evaluate intangibles such as employee loyalty, morale, and commitment to work. Obviously, the third kind of controls are the most difficult to design and implement. No quantitative measure can be used, but only a qualitative descriptive evaluation is possible.

There are three basic steps involved in designing a control process.

i) **Establishment of standards:** Controls are established on the basis of plans and so the first step is to have clear plans which in turn become the standards for controlling. The sales forecast plan which sets sales targets itself becomes the standard against which actual sale is measured. However, an effective control process focusses only on the critical variables rather than controlling all the variables. It also indicates the permissible range of deviation from the expected target. Only when the actual performance is outside this range, does it become a corrective action. Similarly, the marketing manager at the head office is interested in the sales figures achieved by each branch and not in the performance of individual salesman.

ii) **Measurement of performance:** Having set standards it is necessary to devise a system for measuring the performance of individuals, departments or the company against these standards. In some cases quantitative goals can be set, such as

number of units to be sold by each salesman, number of units to be produced per machine, or the profit to be generated by each branch office. However, evaluating performance in case of managers at the top level or those operating in areas such as personnel, public relations, and administration is far more difficult. The work output cannot be translated into quantifiable terms. Only a qualitative appraisal is possible.

iii) **Correcting deviations:** The ultimate objective of the control process is to pinpoint the occurrence outside the permissible range of action to allow management to take corrective action. The maximum number of rejects per machine per day is fixed. When the number of rejects increases beyong this acceptable level, it is time for the production supervisor to investigate and take suitable steps to correct the situation.

The successful control process hinges on the all important concept of feedback. This refers to the information on the critical control variable of the operation or activity which when fed back to the manager triggers off corrective action.

Except in a self-regulated, closed mechanical system where the corrective action is taken instantaneously and automatically, most activities within an organisation require human intervention. The finance manager must find out why profits have fallen below the established level and take suitable steps to remedy this. In some cases, only a minor corrective action is needed. But sometimes the situation requires drastic action, even scrapping a department or plant whose operation has become totally unprofitable.

Within the organisation, feedback usually implies a lag between the time when the event actually occurs and the time by which information about the event reaches the concerned manager. Sales figures for the preceding month may not be available to the manager before the 7th of the current month. The manager can only take note of what happened in the past and take measures to prevent its occurrence in the future. Too long a time lag prevents any meaningful control or corrective action. To overcome this problem of time lag, most companies generate daily reports of critical variables which provide early warning signals to the manager. But even daily reports may reach two days later when they have to travel a long distance from say Jaipur to Delhi. With the introduction of computers and real time information systems (instantaneous transmission of information) this problem can largely be overcome.

All control processes should reflect the plans that they are supposed to follow. However, to be truly effective the controls must highlight the critical variables in an objective manner, and be worth their cost in installing and operating.

Budget is a traditional and widely used control process. Apart from this a company may use historical statistical data, or break-even analysis to control its operations. By the use of mathematics, many sophisticated control techniques are also possible. These pertain to implementing control for inventory management, distribution logistics and project or programme management. Some of these such as Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM) will be dealt with in detail in the subsequent units.

Activitiy 6

What are the various control processes used in your organisation, and specifically in your department? Assess the effectiveness of these controls from the viewpoint of their ability to measure performance and highlight critical deviations.

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2.6 Motivating and Leading

Having established plans, controls, and an appropriate structure to achieve the organisational objectives, the manager now has to get his people to work. Motivation is that desire or feeling within an individual which prompts him to action. Every individual has needs, desires and drives, which we collectively call motives and which channelise all his or her behaviour and action towards achievement of some objectives. The manager's role is to influence each individual's behaviour and action towards achievement of common organisational objectives.

A great deal of research has been conducted in this area and there are many theories of motivation. It is not possible to explain all these theories here and we shall only briefly explain the various factors that can act as motivation.

Money is the most commonly used motivating factor in the form of salary, bonus, incentives, commissions and rewards. Salary or wage is of course the primary motivation, and the poorer the economic background of an individual the greater the motivational value of money. However, once a basic salary or wage is assured, to motivate people to work that little bit extra, achieve that ten percent higher sales figure, incentives and commissions come in handy. Most sales organisations pay salary plus incentives to their sales people. The incentives may be calculated on the basis of individual or team results, and may be linked to a sales target. Similar incentives can be offered to the production department. However, performance linked rewards are difficult to compute in areas such as finance, personnel, and administration where work output cannot be easily measured. A percentage of total profits can be distributed to these departments as incentive.

Man does not live by bread alone is an old saying. Man is a social animal and seeks recognition and status in society through his work. The status or position which an individual enjoys in the organisation, the number of people who work for him, the non-monetary benefits and perks which he enjoys are important motivational factors. In fact sometimes these are more important than the actual take-home pay packet.

Gupta started his career as a salesman in a medium sized company manufacturing and marketing stereo systems. Because of his analytical ability, capacity to work hard and achieve results, Gupta soon rose to be the area sales manager of North India. The owner of the company relied a great deal on Gupta's judgement and always consulted him on every important matter. Gupta was making good money, performing well and enjoyed the great confidence of the owner, yet he felt that there was no power or position in his job which could give him a better status in society. Therefore, when the opportunity arose, Gupta joined an American multinational as Divisional Manager, selling scientific laboratory glassware. It was the glamour, the power, and the status which the job conferred on him that motivated Gupta to join. However, two years with the multinational were enough for Gupta to realise that he had no authority to take any independent decisions and he was not deriving any satisfaction from his job. Gupta quit his job and went back to his previous employer. Thus satisfaction at work is an important motivating factor.

The lesson from Gupta's story is that the same individual will be motivated by different factors at different stages of his career. Generally as you move up the organisation to more important positions, the importance of money and monetary benefits as motivating factors decreases and intangible factors such as job satisfaction, confidence of the boss, good relationship with the boss, the status and respect commanded in the organisation, etc. become more important.

The physical working environment in which a person works also has tremendous motivational force. A pleasant, noise-free, well-lit room with comfortable temperature, and proper facitilies of telecommunication, secretarial assistance, canteen, transport, etc. is always conducive to work.

Different individuals are motivated by different factors. This is because each individual in the organisation comes from a different socio-econonic, cultural, religious, educational and family background, and each of these has a role in determining the degree to which he can be motivated by different factors.

In most Western countries, a great deal of emphasis is laid on leisure and individuals

may be motivated to take up that job which affords greater opportunity for leisure. Similary religious background and personal values are important influences on the effectiveness of motivating factors. No matter how attractive the salary, not many Hindus would like to work in a beef packing factory.

The manager's concern is to find a set of common factors which can motivate all his people coming from diverse and different backgrounds and working at different levels of management. The manager's task will be greatly simplified when he understands that motivational factors are present in, and can be used, in design of work, **rewards**, work **environment**, work **relationships** and work **content**. All monetary benefits and non-monetary advantages such as free medical cover, company car and driver, club membership, etc. are part of the work reward and are important motivators.

Work environment as a motivating factor, first and foremost, refers to the status of the organisation for which a person works and the mere fact of his working in that organisation gives him that status. Harvard University has the reputation of being amongst the best in the world and anyone who has graduated from Harvard is generally perceived to be at least above average, if not excellent. The actual physical factors present in the work environment also act as motivators.

Relationships developed at work, with the boss, colleagues and subordinates have an important motivating influence. The more congenial, friendly and supportive are these relationships, the greater their positive motivational value. In contrast, strained relationships which create tension and unhappiness are serious enough reasons for people to leave jobs which in all other respects seem very comfortable and attractive.

The design and content of the actual work to be done is in itself an important motivational factor. An element of freedom to experiment with new ideas within the parameters of the job fulfils the creative urge in every individual. Freedom to take decisions and assume responsibility for the results are factors which enhance an individual's self-confidence and feeling of self-esteem. The more such factors can be built into the job, the greater would be the job satisfaction of the individual performing the job. A happy, satisfied worker is a productive worker and a great asset to any organisation. If an individual is himself associated with designing the content and objectives of his job, there are greater chances that he will work his utmost to fulfil these objectives. This is the approach known as Management by Objectives (MBO) and has tremendous motivational potential.

The manager has not only to motivate his people but also provide them with leadership. To that extent every manager is a leader. A manager has to *inspire* and **influence** his people to willingly work towards achieving the organisational objectives.

Much research has been conducted in this field and different studies have emphasised different aspect in attempting to answer the question 'What makes an effective leader?' When put in a situation of leading, you must remember it is a role that you are performing, but that your personality has an important influence on your performance as does the situation in which you are expected to perform.

To be an effective leader, a manager must have a pleasing physical personality, ability to get along with people, qualities of honesty and integrity and be an excellent speaker. To command respect of others he must excel at his basic job whether it is operating a lather machine or managing the finances of a large company. The leader must first set an example by his own actions rather than by just making speeches. His actions must communicate to the people that he belongs to them. Only when he is able to generate this feeling of oneness will he be able to inspire confidence in his people.

Secondly, a manager must rememeber that he is only playing a role. However, to be able to perform effectively, the role demands that the manager be perfectly objective in all his judgements and decisions, and beguided only by the organisational objectives and have no other considerations. For a leader the interests of his people are of paramount importance and come first while personal benefits take second place.

Thirdly, the role must be moulded according to the unique situation in which the manager is placed. In our society, great emphasis is laid on personal relationships and contacts and managers are perceived to be father figures and are expected to have a paternalistic attitude towards their workers. In contrast, in the West, especially in

countries with a British colonial past, the relationships between manager and worker is only confined to the work. There, if a manager were to adopt a paternalistic approach, he would be totally ineffective. A manager who usually follows a consultative, participative approach, seeking the opinions and consensus of his subordinates before implementing any decision, in a crisis situation may adopt a very authoritarian approach and effectively manage the situation.

When Lee Iaccoca, took over the management of Chrysler Corporation, USA, it was an ailing automobile giant. To bring it out of the loss making situation, Iaccoca inspired tremendous confidence and loyalty in his workers by setting personal example of great hard work and accepting only a token wage. Under his leadership the company was soon able to turn its losses into profits.

Political leaders such as Gandhi who commanded the respect of millions of people are a model for managers to learn from. Gandhi's leadership style was so finely tuned to the moods of the people and the situation that his every word was law for the common man. His actions and life-style made the people feel he belonged to them.

Activity 7

How do you evaluate your boss as a leader on account of his personality, role play, and tuning to the requirements of the situation?

Briefly describe a situation in which you excelled as a leader. What do you think were the contributing factors to this performance?

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Senior Management Activities

The senior management activities shown in Fig. 2.2 are clearly policy in nature. They are concerned with overall scope and broad direction for the organisation and they are not detailed and operational. For example, the senior manager sets policy regarding staffing by determining department personnel levels; lower level managers operationalize and implement. Similarly, the senior manager sets policy on new services, which is a planning function activity, while the lower level manager is involved in specifics of design and implementation.

***PLANNING* (INTERNAL MANAGEMENT)**

- Defining the general course and goal priorities for the organisation
- Determining matters for the governing board or owner(s) to consider
- Determining new diagnostic, treatment, and non-professional services to be added, and new construction

***PLANNING* (ENVIRONMENTAL SURVEILLANCE)**

- Determining and establishing priorities for new services
- Determining what other organisations in the service area are doing and what services they are offering
- Interpreting how legislative and regulation trends might affect the organisation
- Interpreting how health services delivery and financing trends might affect the organisation

***ORGANISING* (INTERNAL MANAGEMENT)**

- Determining how authority and responsibility are divided among individuals and departments

- Determining formal communication patterns (and reporting relationships) within the organisation

STAFFING (INTERNAL MANAGEMENT)

- Determining departmental staffing levels
- Determining salary scales and fringe benefits for management personnel
- Evaluation, training, and development of management personnel

CONTROLLING (INTERNAL MANAGEMENT)

- Developing and improving management information systems and procedures to be fed back to operations
- Containing costs of professional services to patients and improving efficiency and productivity in non-professional departments
- Developing and improving accounting and budgeting practices
- Improving the accessibility of the organisation's patient care services and monitoring patient opinions about the care received

EXTERNAL RELATIONS

- Informing the community-at-large about the organisation
- Dealing with community leaders on matters about the organisation
- Influencing legislation and regulations
- Dealing with government licensing agencies

Fig. 2.2: Senior management activities (Source: Adapted from Ingrid K. Kuhl, *The Executive Role in Health Services Delivery Organisations*, Washington, D.C., Office of Applied Research, Association of University Programmes in Health Administration, 1977).

2.5 LET US SUM UP

In this unit we have tried to understand the basic rules and functions of the management. In an organisation basically planning, organising, decision-making, coordinating, controlling and motivating functions, are key processes to successfully run the organisation. This unit also deals in detail with various managerial functions at various levels and objectives thereof, which must match with the broader objectives of the organisation. Setting up objectives, and translating them into action for the desired results is a tedious process involving various managerial skills and tactics. Towards the end, this unit has dwelled upon in greater details about management processes which are essential for survival in a structured organisation namely planning, decision-making, organsing, staffing, controlling and motvating, and leading. Having gone through this unit you should be able to understand your day to day working and make it planned and organised in a more systematic and scientific way. These processes do work well if the system is working well or even the vice-versa is also true i.e. if the processes work well they may lead to better placed systems in the organisation.

2.6 KEY WORDS

Break-even Analysis : Comparison between sales and expenses to determine that volume of production where there is no profit and no loss.

Budget : Statement of plans expressed in quantitative and financial terms for the allocation and use of resources.

Environment : The universe in which the firm operates is known as its environment and includes all those economic, political, socio-cultural, legal, demographic and other factors which have a critical bearing on its operations.

Organisation, Firm or Company : These terms have been used interchangeably and refer to all types of formal bodies created for a specific purpose. These include all types of business organisations and non-commercial organisations such as hospitals, schools, charitable trusts, voluntary bodies, etc.

Organisational Objective(s) : The specific purposes, results and achievements sought by the organisation. In this lesson we have used this term in a broad sense to include both mission and objectives.

2.7 FURTHER READINGS

Hersey, Paul and Kenneth H., Blanchard (1980), *Management of Organisational Behaviour: Utilizing Human Resources*, Prentice Hall of India: New Delhi.

Kanter, Jerome (1984), *Management-oriented Management Information Systems*, Prentice Hall Incorporated: Englewood-Cliffs.

Koontz, Harold and Cyril O'Donnell (1976), *Management: A System and Contingency Analysis of Managerial Functions*, McGraw-Hill Kogakusha: Tokyo.

Newman, William H. Summer, Charles E. and Warren, E. Kirby (1974), *The Process of Management: Concepts, Behaviour and Practice*, Prentice Hall of India: New Delhi.

Richards, Max D. and William A. Nielander (ed.) (1967), *Readings in Management*, D.B. Taraporevala Sons and Company: Bombay.

Schein, Edgar, H. (1973), *Organisational Psychology*, Prentice Hall of India: New Delhi.

UNIT 3 MANAGEMENT TECHNIQUES

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the importance of management techniques;
- critically examine the role of management techniques in day to day management of the health-care system; and
- use various management techniques explained in this unit, to streamline the systems you are working in/operating.

3.1 INTRODUCTION

The main function of administrator is to take decision. Accurate data and information are the prerequisites for arriving at the correct decision. Decision making is a vital component of hospital management. There are various techniques, which are available to the manager and these can effectively be used in the field of Hospital Management. Hence, it is imperative that all health administrators have a conceptual knowledge of the following managerial techniques:

- The feedback loop
- Time series analysis
- Value analysis

- Break-even analysis
- Operations research
- PERT
- Strategic planning
- Forecasting
- Statistical quality control
- Management by Objectives
- Quality Circles
- Management problem solving methods
- Managerial skills
- Cost analysis
- Utilisation management

3.2 THE FEEDBACK LOOP

The hospital, in one way, can be described as a collection of functional service units. Each of the units perform some specialised function. The departmental organisational structure of units like Nursing, Dietary, Radiology, Laundry etc. are in fact designed on functional basis. In a typical hospital there may be more than twenty such functional units. The functions of the units vary widely and these may range from removal of waste and garbage to very specialised clinical functions. Nevertheless, from the point of view of the hospital manager each of these units can be functionally designed as a basic feedback loop to provide result expected information or goal achievement results (Fig. 3.1).

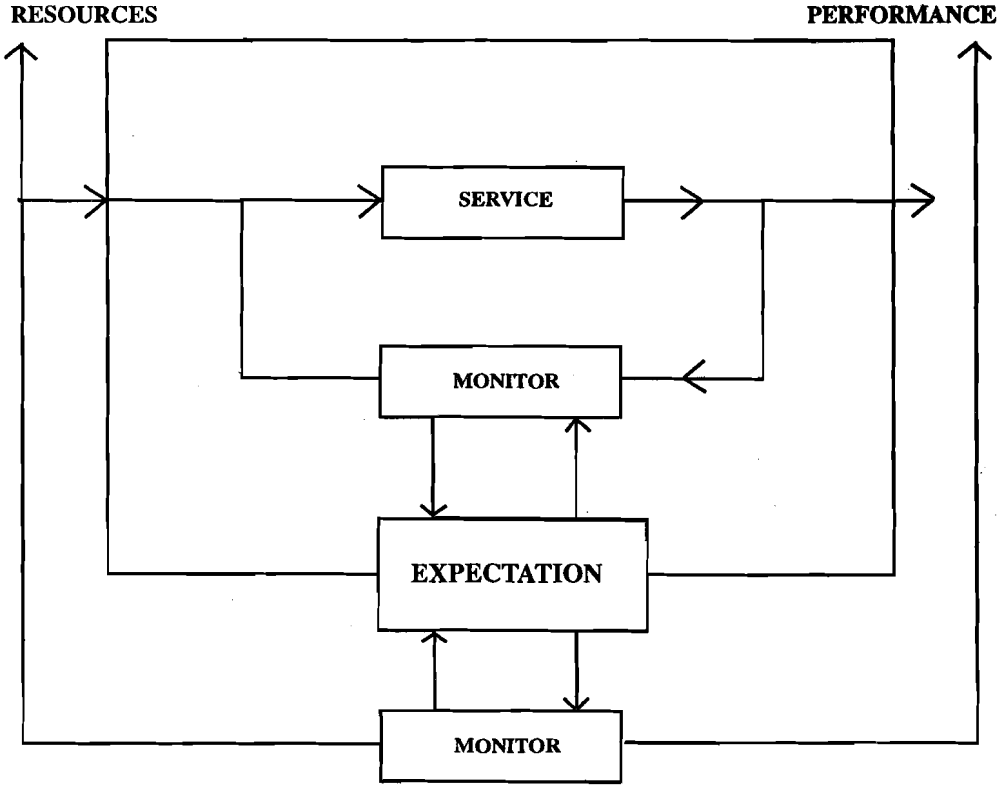


Fig. 3.1: Multiple feedback loop

No hospital function can be effectively performed in the absence of a demand for it. Demand in a hospital is generated by a process different from the functional services. The adjustment is required in various individual units, if the performance is expected at desirable level. Like a functional change of the Operation Theatre would need the back up of CSSD, Laundry, Blood Bank etc.

3.3 TIME SERIES ANALYSIS

Hospital is a place where most precesses are stochastic, i.e. subject to change variation when exact prediction is impossible. What must be substituted is probabilistic prediction, given an expected value and the probabilities of the chances of changes of given amounts around the expected value. The opposite of stochastic is deterministic, a process which always yields its expected value and is subject to no change fluctuation. The expected value is the mean or average of the distribution of possible values. A series of data for several historical periods in order is called a **Time Series.**

3.4 DECISION MAKING

Decision making is the essence of an administrator's job. While planning, organising, coordination/controlling, implementation and evaluation are the basic functions of management, each of these clearly involves deicisions. Decision making is the process of choosing between alternative courses of action. Making a decision involves four steps:

—Identifying the central problem

—Developing alternatives

—Analysing the alternatives, and

—Making the final decisions

Effective decision making requires several alternatives to choose from. Creativity and the effective use of groups are two important factors in developing alternatives.

Most widely used alternatives of analysis of techniques are:

- Capital budgeting
- Break-even analysis
- Operations Research
- PERT (Programme Evaluation Review Technique)

Capital budgeting is used to analyse alternative capital investments.

3.5 BREAK-EVEN ANALYSIS

Most fundamental quantitative technique available to administrators is BEA. This is a graphic representation between revenues and costs at various levels of output. The break-even point in the analysis is that point (level of output) at which total revenues will equal total costs, thus resulting in neither profit nor loss for the organisation. It indicates the quantity of output that must be achieved in order to cover total costs of oepration and also the point in output at which profits will begin to accrue.

$$\text{Break-even point} = \frac{\text{Fixed Costs}}{\text{Price per unit} - \text{variable cost per unit}}$$

This break-even analysis can be shown graphically also (Fig. 3.2).

3.6 OPERATIONS RESEARCH

Break-even analysis has been discussed in detail in Course II: Financial Management. Operations research is the application of scientific methods to management problems. It refers to a set of mathematical techniques through which a variety of organisational

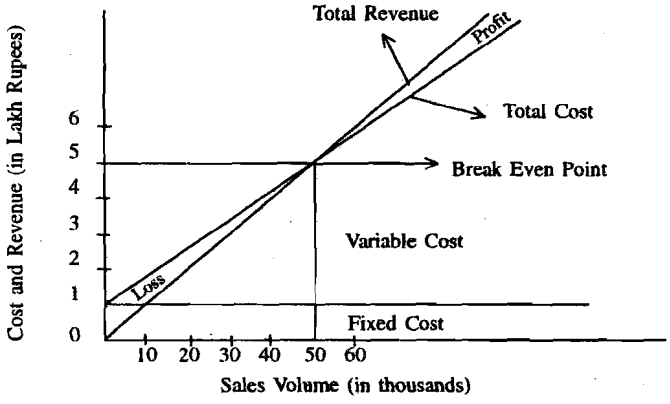


Fig. 3.2

problems can be analysed and solved. There are four steps in applying this scientific approach:

—Formulate and define the problem,

—Construct a mathematical model,

—Test the model and solution derived from it, and

—Put the solution to work (implementation).

Specific OR techniques include:

1) **Linear Programming:** A technique for determining the optimum combination of limited resources to obtain a desired goal. It is based upon the assumption that a linear, or straight line, relationship exists between variables and that the limits of variations can be determined. For example, in a production shop like laundry, the variables may be units of output per machine in a given time, direct labour costs or material cost per unit of output, number of operations per unit, and so forth. Most or all of these may have linear relationship, within certain limits, and by solving linear equations, the optimum in terms of cost, time, machine utilisation, or other objectives can be established. Therefore, it is useful in production planning, and the utilisation of production to acheive lowest overall costs.

2) **Computer Simulation:** Evaluation of alternative courses of action without direct experimentation.

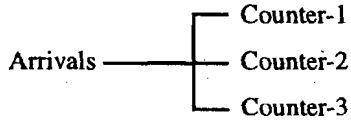
3) **Inventory Models:** Problems regarding storage capacity, quantities to be ordered, and when to be ordered can be attended by using inventory models.

4) **Work study:** Determining the standard time necessary to carry out an activity, developing effective and easy methods of work.

5) **Queuing Techniques (waiting times):** Determining waiting time, cost of waiting time and its reduction, identification of bottlenecks. This technique can be used to analyse alternatives and arrive at solutions to many of these problems. It is necessary to know how often patients arrive; how long it takes to service them, and the order in which arriving patients are served with these data the waiting time problem can be solved.

A simple method of studying a queue line is described below:

A multiserver queue in a service area is represented as:



The following observations are made at intervals of selected unit time:

Time (hrs/min)	Unit time	Queue length (persons waiting)	Number served in unit time	Number of counters open
	T	Q	N	C

From these observations following can be calculated

Individual service time (i.t) $\frac{T \times C}{N}$ (e.t.xc.)

Effective service time (e.t.) $\frac{T}{N}$ (minutes)

Waiting time (w.t) $Q \times e.t.$

Capacity (C) $\frac{60 \text{ min}}{e.t.}$

Those values depict the time spent by an individual at each counter and the capacity of the service point, which are useful in making decisions regarding allocation of time, personnel and equipment so that both idle periods and waiting time can be minimised. They also facilitate inter-service and inter-hospital comparisons.

The queueing technique can be applied in various patient care areas—Outpatient department, Radiodiagnosis and Imaging, Operations (Surgery) etc.

A) Prevalent system in OPD:

Consultation Chamber Number:	1	2	3	4	5
Patients:	1–8	9–17	18–26	27–35	36–43

B) Modified system in OPD:

Consultation Chamber Number:	1	2	3	4	5
Patients allotted as per arrival:	1	2	3	4	5
	6	7	8	9	10
	11	12	13	14	15

Activity 1

Do a small survey of hospitals and try to study the extent of use of OR techniques in the management of hospitals and supporting services. Prepare an evaluative document on the topic and discuss in the peer group regarding the strengths and weaknesses of the system.

3.7 PERT (PROGRAMMING EVALUATION REVIEW TECHNIQUE)

PERT is a technique of representing a project plan in a network form. It starts with the determination of objectives, specifying clearly as to what is to be achieved and ends with the completion of the project. Any project, therefore, has to be analysed in depth and inter-relationships of the steps in the project determined in details. This is then represented in a graphic form known as Network Diagram. Thus a network diagram of activities is the key feature of PERT and acts as a ROAD MAP to reach the objectives of the programme or project.

PERT helps in:

1) Defining clear cut objectives
2) Analysis of the strategy
3) Preparation of a detailed plan of action
4) Sequencing of events
5) Focussing on more important activities
6) Planning for time schedules
7) Continuous monitoring of the progress.

Example

Activity	Event
A—Prepare patient	Patient prepared
B—Give Anaesthesia	Anaesthesia given
C—Prepare instrument trolly	Instrument trolley laid
D—Perform operation	Operation performed.

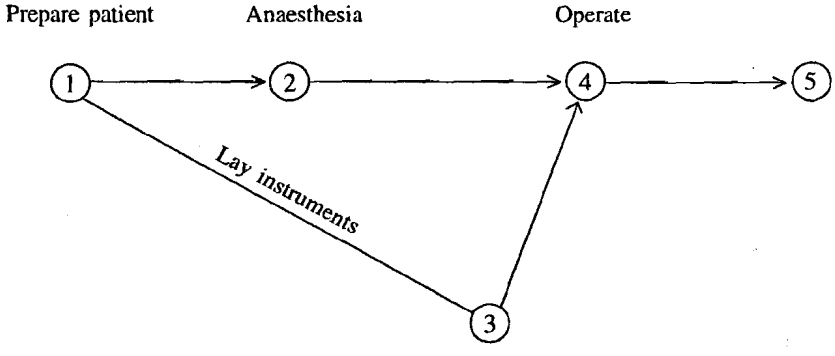


Fig. 3.3: PERT Activity Analysis

3.8 STRATEGIC PLANNING

Planning provides direction and a sense of purpose for the organisation. It also provides a unifying frame work of decision (–) making throughout the organisation. Planning helps to reveal future opportunities and threats and also facilitates control.

Planning usually involves at least two phases—Strategic Planning (aimed at developing the organisation's basic long-term plan, or strategy, and Action Planning (Short term objectives are developed for each department, short run forecasts are made, alternative action plans are developed and analysed, and specific ones are chosen).

Steps in developing a strategic plan include:

—Clarify the organisation's domain, in terms of services it offers and to whom,

—Make a strategic forecast

—Determine current strengths and weaknesses

—Develop alternatives and analyse each in terms of organisation's strengths, weaknesses, threats and opportunities.

—Set specific objectives, commence action planning.

The strategies of a hospital need to be well conceived, practical and commitment oriented. Strategic planning will help administrator to develop a better image for the hospital and that the hospital services will achieve the desired results for the community.

3.9 FORECASTING

It is a service whose purpose is to offer the best available basis for management expectations of the future and to help management understand the implications for alternative courses of action. Forecasting provides the basic premises or assumptions on which objectives, strategies and plans are built.

Forecasting techniques include:

- Economic forecasting
- Time series (exponential smoothing)
- Casual

  —multiple linear regression

  —econometrics
- Qualitative

  —judgement

  —delphi method (technological forecasting research

  —marketing

Activity 2

Please visit atleast two hospitals within your reach (one private and one public/ government) and try to find out what kind of forecasting is being practiced at the organisational level. Prepare a brief critical paper on the topic.

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3.10 VALUE ANALYSIS

Value analysis is a technique to provide various types of models to management for taking decision as to which service a hospital can offer and at what cost, and thus it helps in making decision regarding planning the facilities and services the hospital will offer. The hospital funds can be effectively allocated and better utilised for those services that can satisfy many patients with marginal change.

3.11 STATISTICAL QUALITY CONTROL

Hospital can generate a large number of individual statistics where each statistics is a measure of some limited aspect of quality or efficiency of the total process. An affective information-handling system must be able to process the incoming statistics. Almost any complex process will have some variability in the degree to which it achieve its goal. Thus, there should be three or more observations in each set. For each of these sets, the mean and standard deviation can be estimated according to the usual formula.

The end product of the hospital is "Patient Care" and the product being intangible does not lend itself to measurement easily. Lately, four criteria have been developed which are used for measurement:

Parient Care	:	Number of OPD Cases Number of admissions Number of operations Number of tests
Quality	:	Patients cured Improved Infection/Complication
Cost	:	Per day per patient (in-patient/out-patient)
Patients satisfaction	:	Random patient opinion/survey staff satisfaction etc.

Activity 3

Taking cue from the above illustration, conduct a small study of a hospital and examine the four group of services referred above regarding their quality control.

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3.12 MANAGEMENT BY OBJECTIVES (MBO)

MBO is a process whereby the superior and the subordinate managers of an organisation jointly identify its common goals, define each individual's major areas of responsibility in terms of the results expected of him, and use these measures as guides for operating the unit and assessing the contributions of each of its members.

The concept rests on a philosophy of management that emphasizes an integration between external control (by managers) and self-control (by subordinates).

The goals are jointly established and agreed upon in advance. This is then followed by a review of subordinated performance in relation to accepted goals at the end of the time period. Both superior and subordinate participate in this review.

3.13 QUALITY CIRCLES (QC)

QC is a people building philosophy capable of providing astonishing results. QC is a small group of people doing similar or related work who meet regularly to identify, analyse and solve quality, productivity, cost-reduction, safety and other problems in their work area, leading to improvement in their performance and enrichment of their worklife. Membership is voluntary (6-12 members) who meet on an average one hour once a week.

Objectives

—Cost reduction

—Reducing employee turnover

—Improving employee morale

—Greater efficiency of operations

—More effective scheduling

—Reduced absenteeism

—Improve nurse-clinician relations

—More accurate cost-allocations

Significance of QC's lies in utilising the education, experience and creativity of the staff in hospital problem solving and decision making. QC is an integrated programme made up of:

—The members themselves

—Circle leaders

—The facilitater

—The Co-ordinator

—Steering committee (group of key individuals selected from management, circle leaders and members of all major functional areas).

Process

—Problem identification

—Problem selection

—Problem analysis

—Implementation and recommendation to the management

Implementation

—Establish atmosphere

—Obtain commitment

—Select objectives

—Inform

—Voluntary

—Training

—Be open and positive

The key to success is a good implementation plan

The concept of QC envisages participatory management style with a "Bottom Up" approach.

Activity 4

As a professional in the health care management system, have you ever come across a quality circle. If yes, please evaluate critically its functioning and discuss in the professional group you belong to and prepare a short note.

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3.14 MANAGEMENT PROBLEM SOLVING METHODS

The organisational ability can be improved by the use of Management Problem Solving Methods (MAPS). The problem solving, the case study approach, involving actual or contingency situations is suitable for all management levels.

Units of Analysis:

1) Overall organisation
2) Resources flow
   —Personnel
   —Funds
   —Equipment
   —Information flow
   —Types of patients
   (infection rates, medication errors, patient waiting times)
3) Work group
4) Organisational environment
   (Including social, economic and technological factors)

With the analysis of data provided in these categories the organisation unit has available performance criteria which can be used to illustrate its percentage success in providing a service to the patient. This will show how efficiently organised the hospital is in providing a service to the patient. MAPS can be applied to organise hospital equipment maintenance.

3.15 MANAGERIAL SKILLS

There are three general categories of skills that managers must possess: technical skills, human skills, and conceptual skills.

Technical skill: Ability to use knowledge, methods techniques and equipment necessary for the performance of specific tasks acquired from experience, education and training.

Human skill: Ability and judgement in working with and through people, including an understanding of motivation and an application of effective leadership.

Conceptual skill: Ability to understand the complexities of the overall organisation and

where one's own oepration fits in the organisation. This knowledge permits one to act according to the objectives of the total organisation rather than only on the basis of the goals and needs of one's own immediate group.

Research has shown that managers at different levels require varying amounts of technical and conceptual skills in order to carry out their responsibilities effectively. Human skills are a constant at all levels and occupy the greater part of the management function.

3.16 COST ANALYSIS

The growing complexity of hospital operation both in size and volume, increase in demand for high standard of medical care services requires systematic use of hospital accounting system in general and cost accounting in particular (Fig. 3.4).

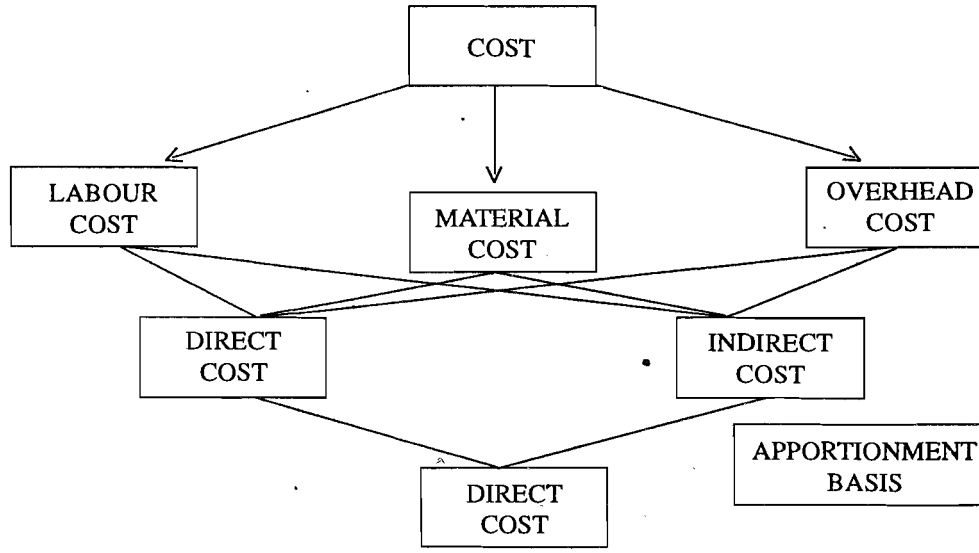

Fig. 3.4: Framework of the Cost Analysis

The process of cost analysis has become a resource tool for financial management in hospitals. The cost of operating different services are allocated to different cost centres. Costing also helps to assess the efficiency and effectiveness of functions and their cost implications with a view to contain cost. The exercise of unit costing involves the determination of the cost of single unit of any product or service. The approaches to unit costing are:

a) Standard costs (gives an estimate of what the costs should be i.e. it accumulates the costs incurred for all material and labour component of a product/service and provides allowance for any normal wastage. Scientific methods like time and motion studies can be used to compute the cost).

b) Average costs (indicates the actual average cost of providing one unit of service. This is a top down approach, where the total costs of the service centre are determined and divided in a rotational proportion among the different services offered—thereby deducing the cost of providing a unit of service. The wastage component cannot be determined by this method and hence there is no comparison standard).

3.17 UTILISATION MANAGEMENT

It is a hospital-wide multidisciplinary programme which helps a hospital to achieve its objectives for cost control and overall institutional management. It is a catalyst for coordinating quality assurance, utilisation review and risk management activities. Cost-effectiveness is accomplished through the judicious use of resources to control inappropriate in-patient admissions, length of stay and use of ancillary.

Utilisation review is the process of assessing medical care to ensure its quality, medical necessity, and appropriateness in terms of level of care and treatment setting. It has emerged as a key feature of cost management.

3.18 LET US SUM UP

Health care professionals must become effective managers and leaders in order to fulfil their responsibilities to themselves, to their patients, and to the professions. Existing environments, roles, educational programmes are expanding. In the changing environment hospital administrators will be called upon for creative strategies, disciplined and cost-controlled programmes, improving the quality, raising the standards, and the abilities to direct research and analyse systems critically, and chart growth.

Contents in this unit focus on increasing organisational effectiveness in service and practice by applying modern technique in hospital management. The educational process attends to the unique individual learner. A satisfied manager has a high probability of having staff members who are also satisfied; satisfied staff members have a high probability of having satisfied patients; a satisfied patient has a high probability of reaching full health potential.

3.19 SELF-ASSESSMENT TEST

Having gone through this unit, you should talk to some of your professional colleagues who are operating their own health care organisations and find out the following:

1) Do they know about the management techniques, which we have talked about in this unit?
2) In case they know, how useful are they in their day to day management?
3) What else would they like to know about management techniques?

or

What are their needs and work out yourself as to what more do they require to know?

Prepare a brief account of your findings and discuss among peers, either in classroom situation or at professional gathering.

3.20 FURTHER READINGS

Abel-Smith, Brian (1994), *An Introduction to Health, Policy, Planning and Financing*, Longman Publishing: New York.

Barnum, H. (1993), *Public Hospitals in Developing Countries: Resource, Use Cost, Financing*, The Johns Hopkins University Press: Baltimore, USA.

Koontz, Harold (1990), *Essentials of Management*, 5th ed. McGraw-Hill series in Management: Singapore.

La Monica EL, Margan P.I. (1994), *Management in Health Care: A Theoretical and Experiential Approach*, The Macmillan Press Ltd.: London.

Macaulay, S.H.M.C.: *Hospital Planning and Administration*; WHO.

Monograph Series No. 54 (1964), World Health Organisation: Geneva.

Morgan, C., Murgatroyd S. (1995), *Total Quality Management in the Public Sector: An International Perspective*, Open University Press: Buckingham, UK.

Norman, Vetter (1996), *The Hospital : From Centre of Excellence to Community Support*, Champan & Hall: London.

Paul, Hersey and Kenneth H. Blanchard (1992), *Management of Organisational Behaviour: Utilising Human Resources*, 5th ed., Prentice Hall Pvt. Ltd.

Rowland, H.S., Rowland, B.L. (1984), *Hospital Administration Handbook*, An Aspen Publication: Maryland, USA.

Schulz, R., Johnson A.C. (1989), *Management of Hospitals*, 3rd ed. McGraw-Hill Book Co.: New York.

World Health Organisation (1974), *Modern Management Methods and the Organisation of Health Services*, Public Health Papers No. 55, WHO: Geneva.

UNIT 4 ORGANISATION STRUCTURE AND DESIGN

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- appreciate the basic elements of an organisation structure;
- differentiate between formal and informal organisation structures;
- explain various factors impinging upon the design of an organisation;
- evaluate the advantages and disadvantages of the various types of organisational structures; and
- understand the issues involved in designing a service organisation.

4.1 INTRODUCTION

Organising is the formal grouping of activities and resources for facilitating attainment of specific organisational objectives. It is possible to achieve objectives without formally organising, but there is likely to be great wastage of resources and time. Organising ensures that objectives are achieved in the shortest possible time, in an orderly manner, with maximum utilisation of the given resources.

In the context of a firm, its people, machines, building, factories, money and credit available for use are the resources at its disposal. All these resources are limited. Your role as a manager is to organise all these resources, so that there is no confusion, conflict, duplication or wastage in achieving your organisation's objectives. You will be required to allocate to each person his role, designation and position in the organisation, his responsibility for achieving specific objectives and authority for utilising the resources assigned to him, and the higher authority to whom he has to periodically

report his progress. In this unit, we will take up all these issues for discussion, dwelling at some length on the various types of organisation structure that you can choose from to suit your company's specific objectives.

4.2 ORGANISATION STRUCTURE AND CHART

Organisation structure refers to the formal, established pattern of relationships amongst the various parts of a firm or any organisation. The fact that these relationships are formal implies that they are deliberately specified and adopted and do not evolve on their own. Of course, it may sometimes happen that given an unusual situation, new working relationships may evolve and which may later be adopted as representing the formal structure.

The second key word in our definition of structure is 'established'. Only when relationships are clearly spelled out and accepted by everyone, can they be considered as constituting a structure. However, this does not mean that once established, there can be no change in these relationships. Changes may be necessary with passage of time and change of circumstances, but frequent and erratic changes are to be avoided. A structure can be based on relationships only if they exhibit a certain degree of durability and stability.

The structure of a hospital is of extreme importance, because the objectives of the hospital are achieved with the help of the available medical technology by the administrator through the organisational structure of the hospital. Structure may be considered as the established pattern of relationships among the components or parts of the organisation. As suggested earlier, hospital as an organisation has a lot of components namely emergency department, outpatient department, wards, nursing services, pharmacy, lab and pathology services, radiology department etc. The larger the hospital is, the more complex will be the relationship between these different components. In order that the hospital administrator is able to plan, coordinate and supervise the activities of these components, it is important that their relationships are properly established and an authority-responsibility-accountability system is provided for each of these components.

Structure is frequently defined in terms of (1) an organisation chart and job description, i.e. formal relationship of people in the organisation and their duties; (2) the way by which various activities or responsibilities are assigned to departments or people in the organisation; (3) the way by which these activities are coordinated; (4) the power and hierarchical relationships and (5) the planned or formalised policies or procedures and controls that guide the activities and relationships of people in the hospsital. This is generally called the formal organisation. Apart from this, many informal, unplanned and spontaneous relationships occur in a hospital where the formal structure is not strictly followed. This is called the informal organisation.

Structure provides a very important work for authority relationships. In other words it defines as to who has the authority to give instructions to whom, when, and where and who should take instructions from whom and be accountable to whom, when and where. Thus the authority structure provides the basis of assigning tasks to the various elements of the hospital and to develop a control mechanism to ensure these tasks are performed according to the plan. So in a hospital the administrator assigns specific tasks to each of these units or departments and the heads of these departments in turn assign duties and responsibilities to the members of their units. The authority vested in each position in the structure is impersonal and it goes with the position rather than with the person. The heads of the various units have the right to evoke compliance by subordinates on the basis of formal position, and control over rewards and sanctions. The person with certain responsibilities to carry out an activity is also given the necessary authority. This is the basis for supervisor-supervisee relationship or the boss-subordinate relationship.

The formal relationships in an organisation are those as described in an organisation chart. Fig. 4.1 represents a typical chart for a health care organisation. The boxes in the chart represent the various important positions in the organisation. The title of the position indicates the activities involved at that level. The distance of the box from the

top indicates its position in the hierarchy. The closer the position the higher its status and vice-versa. The lines joining the various positions represent the formal reporting relationships usually between a superior and a subordinate. Fig. 4.1 represents the organisation chart of **National Leprosy Eradication Programme.**

National Leprosy Control Programme was launched in 1955 with monotherapy. The leprosy cases, however, kept on increasing and in 1981 there were 4 million cases in India out of the 12 million patients estimated throughout the world. National Leprosy Eradication Programme (NLEP), with the introduction of multi-drug therapy in 1981, was redesigned in 1983. NLEP has shown the result as an efficient organisation and the prevalance rate of leprosy decreased from 57 per 10,000 in 1981 to 10.5 per 10,000 in 1994. The ultimate goal of NLEP is to reduce the prevalence rate to less than 1 per 10,000 by the year 2000 A.D. The organisation chart of NLEP as shown in Fig. 4.1, therefore, has been working well and proved to be effective.

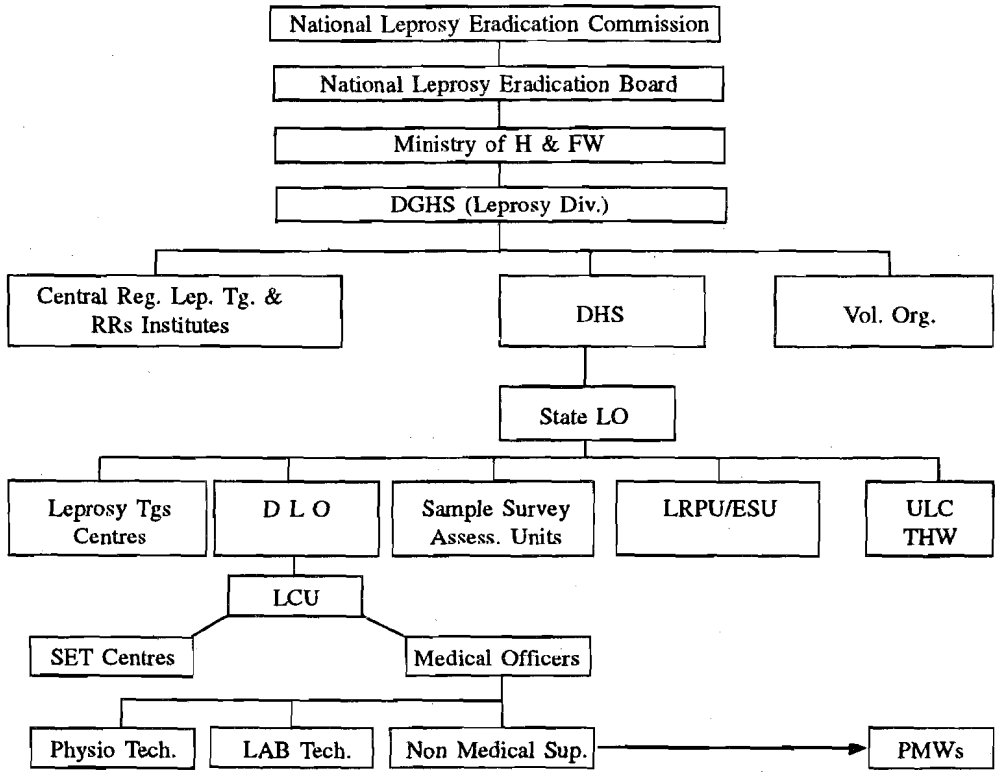

Fig. 4.1: Organisation Chart of National Leprosy Eradication Programme (NLEP)

The organisation chart is a rather abstract illustration of the structure. To get a more complete picture, the chart may be supplemented by job descriptions of each position. The job description gives in detail the activities and responsibilities expected of the person occupying the position.

Both the organisation chart and job description are simplified abstractions of the actual situation. In reality there are many more positions and relationships than indicated in the organisation chart. The degree of authority a superior has over his subordinate is also not indicated in the chart; nor is the relationship between two managers at an equal level reflected in the organisation chart.

Despite all these limitations, the organisation chart is an extremely useful tool in understanding and designing the structure. The structure of an organisation, unlike that of a physical, mechanical or biological system, is not visible. Therefore, it can only be understood by a representative model and by observing its behaviour.

Activity 1

Draw the organisation chart of your organisation. Clearly mark your position in the structure and draw the lines depicting the reporting relationships between you and your immediate boss and immediate subordinate.

The elements of an organisation structure are:

i) the network of formal relationships and duties, i.e. the organisation chart plus the job descriptions,

ii) the manner in which various tasks and activities are assigned to different people and departments (differentiation),

iii) the manner in which the separate activities and tasks are coordinated (integration),

iv) the power, status, and hierarchical relationships within the organisation (authority system),

v) the planned and formalised policies, procedures and controls that guide the activities and relationships (administrative system), and

vi) the flow of information and communication network.

The network of formal relationships has already been discussed. Before we get into a detailed description of the specific elements of an organisation structure, it would be useful to differentiate between formal and informal organisations and the factors affecting the design of structure.

4.3 FORMAL AND INFORMAL ORGANISATIONS

If you and your colleagues decide to meet every Saturday evening for one hour and form a recreation club to play chess and carrom, you are meeting in an informal organisation. However, when the same group of your colleagues meets to review the last quarter's performance and plan for the next three months it is in the context of a formal organisation. Thus, while the informal organisation is spontaneous, the formal organisation is the result of a deliberate and planned effort to pattern activities and relationships in a specific manner to facilitate achieving the specified objectives. A formal organisation is the result of explicit decision-making, deciding how people and activities should be related to one another, However, there is no such decision-making involved in an informal organisation which may simply evolve over time.

In the context of a business organisation, both the formal and the informal organisations operate together to form the total organisation. The formal structure delineates specific departments, activities, people and their reporting relationships. The informal structure refers to the social groups or friendships which people working together may form.

A most important aspect of the informal organisation is the informal communication network or 'grapevine' as it is more commonly known. If you analyse the communication network in your organisation, you would realise the amount of information you gather from official circulars, memos and speeches is rather insignificant compared to what you unofficially learn from your colleagues, your subordinates and even your peons. The grapevine constitutes an extremely important component of the organisational information system. How often you have been able to avert a crisis much before it actually erupted because the information about the impending crisis was conveyed to you by the grapevine?

Besides the grapevine, the other manifestation of the informal organisation is the formation of groups which may spontaneously evolve when the formal organisation is slow to respond to changing external and internal forces. But sometimes these informal groups may also work against the formal organisation. This may happen when an informal group of workers may force other workers to lay down tools, or work to rule or generally pose impediments in the path of progress.

Sometimes the norms and work ethics evolved by the informal organisation take precedence over the official norms. The head of the market research division of a large multi-national company involved in manufacturing and marketing a wide range of consumer products, would always spend three to four hours every Saturday morning in office, even though Saturday was officially a holiday. Observing that the departmental head worked on a holiday, his immediate subordinates also felt obliged to be in office every Saturday. The manager did not expect it from his subordinates, but the latter felt that by doing so they would be creating a favourable image for themselves in the eyes of their boss which would help them in their promotion within the formal organisation.

Similarly, you would find informally evolved values operating within the parameters of the formal organisation. These values may relate to dress, employment of women, employment of members of a minority community, etc. in understanding the structure of an organisation, you must understand the important role played by the informal organisation within the formal organisation.

Activity 2

List all the informal organisations in which you regularly participate. What are the activities undertaken by these informal organisations?

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4.4 FACTORS INFLUENCING THE CHOICE OF STRUCTURE

As a manager, it is your job to design a structure that will best suit the specific requirements of your organisation. Designing an organisation structure is a continuous process. What seems to be the ideal design today may tomorrow prove to be totally ineffective. It is your task as a manager to be continually improving the structure of your organisation. Any change in factors which impinge upon the design of an organisation will necessitate a change in the structure to suit the new conditions.

Impact of Environment

The first factor affecting the design of your organisation structure is the environment. An organisation is continuously interacting with its environment in terms of drawing inputs from it and providing it its outputs. All organisations operate within an environment which comprises economic, social, cultural, political and legal sub-systems. A change in any of these sub-systems may force you to change the design of your structure. Change in Government regulations regarding foreign equity

participation in India made it imperative for the most foreign owned companies to dilute their holdings and become more national in character. Increasing awareness about personal rights and social pressure on maintaining the natural state of environment have forced many companies to set up Personnel Welfare Departments and instal expensive equipment to neutralise the toxic effluents generated in their manufacturing process. You might have noticed that banks have instituted a process by which public complaints can be tackled at the highest level. Some of the bank managers and chairmen even set aside specific timings when they give a personal hearing to individual grievances.

The Environment of the Hospital

The hospital as a system, being part of the total environment, receives its objectives from the environment. With the help of the resources (inputs like medically trained and qualified personnel, equipments, buildings, tools, medicine etc.) the hospitals are expected to help the environment meet the objectives of curing and preventing diseases in the society. Each hospital is expected to cater to the health care needs of a particular area. It is this boundary that the hospital unit caters to and exists for. At the same time, the health care unit also receives input from the entire environmental supra system, which is the society at large, through the governmental machinery.

But the boundaries of a hospital cannot be specifically determined because quite often people who are far away from the catchment area of that hospital may also seek the services of that particular hospital for strictly personal preferences or because of greater specialisation or expertise of the hospital.

So the immediate task of the hospital administrator is to try to get to know the characteristics of the environment of the hospital in relations to its health needs and to get ready to meet these needs to the extent of the facilities available to him. This is where the hospital administrator will be able to plan and be ready for the likely emergencies which might develop at any time. He might be interested in the morbidity pattern of the area, the infant and adult mortality rates, the availability of other health care units (private or voluntary), access to more than specialised hospitals nearby, possibility of importation of communicable diseases etc. When these are compared with the resources at the disposal of the hospital, the administrator will be in a position to seek additional help from the higher authorities, voluntary agencies and the community at large, in order that the expectations placed on the hospital by the environment can be adequately met.

Goals

Hospitals like any other organisations have specific goals to achieve, or tasks to accomplish. These goals are the very foundation of the hospitals. These goals are, as indicated above, set forth by the environment and are placed on these hospitals. Quite often these goals are broad. These are to be narrowed down in the form of achievable, specific goals, so that the administrator can make plans to achieve these goals. So when a hospital is expected to cure and prevent diseases, it would mean (1) a very efficient casualty department to take care of emergencies, (2) a highly effective outpatient department to treat common diseases, (3) necessary in-patient facilities to cater for the needs of those who require longer treatment with greater personal care and with necessary lab services and other para medical services. Thus the broad objectives are now divided into the specific objectives of the various units or sub-divisions of the hospital. This will lead to the administrator to set specific objectives for the units. When all these objectives of the sub-units are properly achieve, that would mean that the objectives placed on the hospital by the environment are achieved. The successful administrator of a hospsital is one who is able to view things in this line and to develop his style accordingly. This would mean that the cure ratio of the hospital goes up and the rate of prevention of communicable diseases is very high. Thus achievements of the set goals would be the best criteria in evaluating the performance of the various categories of medical and paramedical staff in the hospsital, the hospital administrator as a manager, and the hospital as an organisation.

Impact of Technology

The second factor affecting the structure of your organisation is the technology that you have adopted. To begin with, each pair of shoes was made by a single cobbler who probably spent four to five days on the entire process. With the concept of specialisation and division of work, organisations, instead of being designed around individual craftsmen, were structured on the basis of different people doing only a specialised part of the entire process of shoe-making. This concept was further refined with the introduction of automation and assembly lines. Now with the introduction of computerisation and robots, new structural designs are once again emerging. Entire plants are manned by a single operator who controls the operations through computers. Major human inputs are needed in designing computer controls and software rather than in performing repetitive jobs.

Once the environmental forces are clearly understood and the organisational and individual goals are set, it is important to understand that in order for the objectives to be achieved the organisation is expected to use a broad set of technology. By technology is meant that organisation and adaptation of scientific knowledge for practical purposes. So in a hospital, technology includes not only stethoscope, forceps, syringes, needles, x-ray machines etc., but also diagnostic techniques and processes used in identifying and curing the sick. Thus even though the technology used in the hospital may be broadly called medical technology, it includes various techniques and tools in preventing a patient from getting worse or controlling the basic causes of a disease and completely curing the patient. This is why even psychological counselling or a psychotherapy are considered to be part of the overall medical technology.

But this does not mean that all health care units are using all the different types of medical technologies available. The technology selected depends on the environment of the hospital, the morbidity pattern and the mortality rates, the available resources like tools, equipments and other physical facilities, the qualification and experience of medical personnel available etc. This is where the role of the hospital administrator as a full-fledged manager comes up. He is able to adapt the available technology to meet the particular cases which are brought to his hospital, and those which he is not able to treat because of the resource pattern, are referred to the nearest better equiped hospitals. It is worth mentioning here that the determination of the goals or objectives (achievable objectives) of a hospital to a very great extent depends on the available technology.

Impact of Psychosocial Characteristics

The changing psychosocial characteristics of the workers is the third factor impinging upon the design of the organisation structure. Greater demand for leisure time led to the introduction of the five, and in some places, even the four-day week. Our country has also recently adopted a five-day week. Greater awareness about worker rights and use of more militant means to earn those rights have led to the widespread formation of trade unions in almost every organisation. Some companies have had to redesign their structure in order to give a formal recognition to the unions.

The three factors that we have discussed so far are external to the organisation and its management. However, there are some attitudes and values of the management which have a critical bearing on the structure of an organisation. Most important of these are the management's attitude towards the issues of decentralisation and delegation of authority and the role and function of line and staff personnel. Also affecting the organisation structure are the scalar principle and span of control.

4.5 DEGREE OF DECENTRALISATION

Centralisation refers to the concentration of authority and decision-making in one single position in the organisation. In a one-man enterprise, the entrepreneur makes all the decisions and all the authority and decision-making power is vested in him. With the expansion of business, it may no longer be possible for one man to control all the operations and may become necessary for him to delegate some responsibility and authority to another person. Delegation implies that you are acting on behalf of your boss by virtue of the power which he has given to you. The greater the delegation of power the greater is the extent of decentralisation in the organisation.

You will find that some companies, even though physically very large, have highly centralised structures. All decisions are taken by the top management, with the middle and operating level managers having little or no say in running the show. On the other hand, you may find that even in a relatively small organisation, there is greater delegation of power and the structure is very decentralised. The degree of decentralisation in an organisation is partly a manifestation of the top management's attitude. Some managers do not like to delegate even the smallest task to their subordinates. There may be a variety of reasons for this. Doing all the tasks himself may give the manager a great sense of power, or he may feel that the subordinate is incompetent and may commit mistakes.

Total centralisation, however, is never desirable as it may bog down the manager in routine, trivial tasks and leave him no time for planning the company's future. An effective manager would decide the issue of centralisation versus decentralisation on the basis of the requirements of the situation rather than his own personal bias.

Decentralisation is effective when:

- conditions in each market are so different that only a high degree of adaptation to local conditions will lead to success. Multi-national companies with subsidiaries in many different countries are a typical example.
- success depends on the quick response to the information and conditions generated at the local level. Companies dealing in stocks and shares or international currencies require speedy response to the fluctuating prices for getting the best returns
- active participation of people in the planning and implementation of objectives is conducive to good performance. An engineering company manufacturing electrical switching equipment sells mainly to the State Electricity Boards (SEB) through the tender system. Each tender requires close monitoring and personal follow up at each stage till the final award is made. Realising that personal rapport with individual SEB is important, the company has fully decentralised local offices in each city where the SEB is located.

The introduction of computers and real time information has influenced the concept of centralisation in an organisation. Information may be generated at the factory, but it is instantaneously transmitted to the decision-maker (even if he is located 10,000 kms away) for suitable action, information may be processed and used at the place where it is generated or it may simply be passed on to another location for use in decision-making. Real time information can lead to greater centralisation or decentralisation.

The degree to which a firm decentralises its structure depends on the requirement of its unique situation. Also, a firm may not decentralise all its operations, but go in for only partial decentralisation. Functions which facilitate local adaptation, quick decision-making in response to local changes and strengthen worker participation should certainly be decentralised. On the other hand, functions involving economies of scale, utilisation of specialised knowledge and involving huge sums of money may remain centralised. Finally, the degree of decentralisation also depends on the availability of competent and reliable people to head the independent operations.

4.6 LINE AND STAFF RELATIONSHIPS

The role of line and staff personnel is the other issue to be decided in the context of designing your organisation structure. Traditionally, any function which directly contributed to the organisation's objectives was viewed as a line function. Staff functions were those which helped line functions to perform more effectively. However, an important point to note about line and staff is that in the former there is a direct relationship of command from superior to subordinate while in the latter the relationship is more advisory in nature. There are some traditional principles which have greatly influenced the concept of organisation structures. The most important of these are specialisation of work, scalar principle and span of control.

Activity 3

Evaluate critically your organisation in terms of whether it is a highly centralised or decentralised structure. If you were made the head/CEO of the organisation what kind

of a structure would you adopt? Describe in detail the functions which you would centralise and those you would decentralise.

4.7 SPECIALISATION OF WORK

A very basic and traditional principle of organising is to break down a task or process into smaller, more manageable tasks which call for utilisation of special skills. This concept of work specialisation and division of labour was the forerunner of assembly lines. This is indeed a useful principle in so far as it allows a worker to concentrate on that activity at which he is most proficient. But in many situations, this concept has been carried too far and jobs of workers have become so fragmented and trivial that a worker's job may be reduced to putting a screw on a bolt and simply tightening it.

Scalar Principle

Scalar principle and unity of command are two closely related principles. The scalar principle states that authority should flow in a straight line from the superior to the subordinate in a hierarchical manner. The principle of unity of command states that ideally each subordinate should have only one superior. These two principles establish the basic hierarchical nature of an organisation.

4.8 SPAN OF CONTROL AND LEVELS OF MANAGEMENT

Closely related to the concept of hierarchical structure are the concepts of span of control and levels of management. Let us understand these with the help of an example.

In 1975 Mrs. Das, a housewife living in Bombay, started making garlic chilly sauce at home and selling it to her close friends, relatives and neighbours. The sauce became quite popular and Mrs. Das began receiving many orders, including two from the nearby Chinese restaurants. Unable to cope with so much work she hired Indrani as an assistant. This was the first step in delegating authority and creating another level of management. Existing customers now had to deal with Indrani as Mrs. Das herself concentrated on preparing the sauce and tapping potential new customers.

A year later Mrs. Das hired one girl to help in the kitchen, two girls to assist her in making sales calls and one office assistant for Indrani. Now authority had to be delegated in the kitchen as well as in making sales calls and hence two levels of

management were created in the kitchen and sales. The new office assistant reported only to Indrani, who in turn reported to Mis. Das and thus there were three levels of management in administration. Span of control refers to the number of people a manager has to control. Now Mrs. Das's span of control extended to four people (Indrani, one kitchen assistant, two sales assistants) and Indrani's span of control was restricted to only one. By 1980, the small sauce making enterprise had shifted to a shed in the near v industrial estate, with a full-fledged production facility consisting of 10 people and a sales team of 16 girls, divided into 4 territorial teams supervised by a sales manager and an office administration set up of 25 people.

Mrs. Das's organisation as it evolved is shown in Figs. 4.2-4.5.

EVOLUTION OF AN ORGANISATION

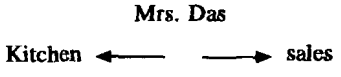

Fig. 4.2: Flat Structure

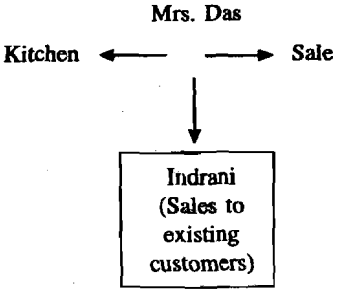

Fig. 4.3: Level Structure

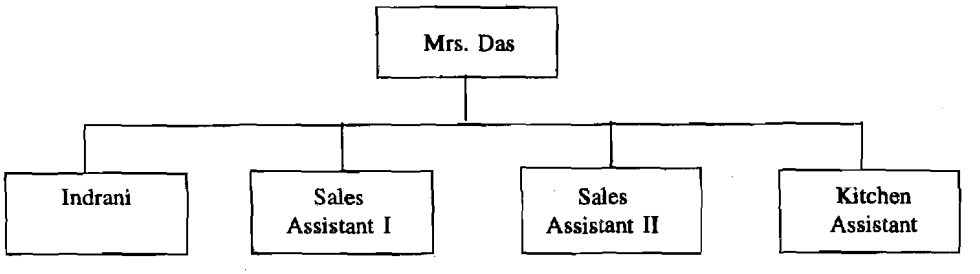

Fig. 4.4: Growing Structure

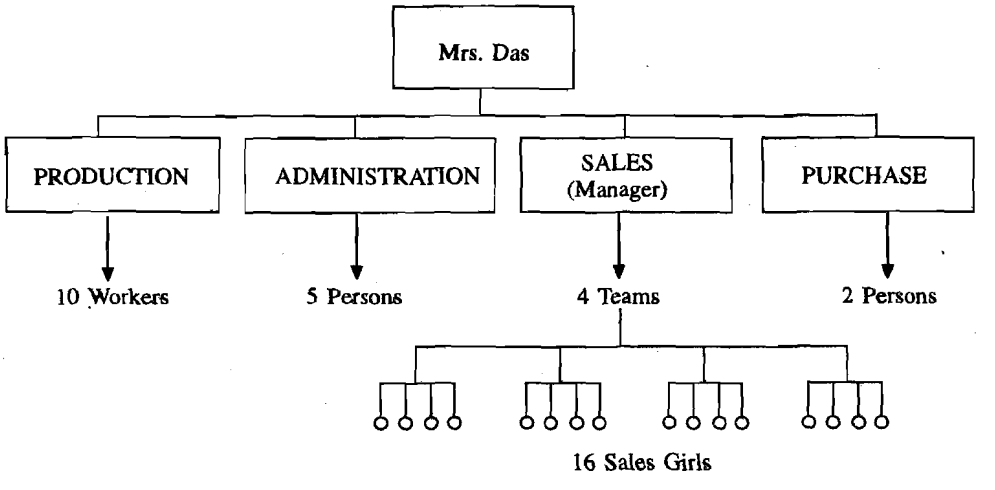

Fig. 4.5: Vertical Structure

Starting out with a relatively flat organisation where Mrs. Das was in direct contact with all her customers and suppliers, her organisation had acquired many levels of management and a vertical structure by 1980.

As an organisation adds on levels of management it becomes vertical and the span of control at each level becomes narrow. In a flat organisation, the span of control is relatively wider and levels of management are few. The flow of information in a flat organisation is fast and there is greater individual satisfaction and it is the ideal structure for conducting research and development and new product development groups.

There is a great deal of controversy regarding the optimum number of people a manager can effectively manage or the ideal span of control. The important factor is not the number of people whose work a manager has to control but the number of people he actually has to work with. On paper the marketing president may have 35 area sales managers under his span of control. But since he does not have to interact with them individually more than once in six months, and all other interactions including the regular reports are through the vice-president (sales), the system works well. In practice, there is no 'ideal' span, it will vary from individual to individual and from one organisation to another.

Similarly there is no hard and fast rule governing the levels of management. Too many levels only add unnecessary complexity because decisions, information and instructions must go through too many channels. Each organisation has to find its own ideal balance.

4.9 MATRIX STRUCTURE

The matrix structure is a combination of the product and functional organisation and is usually created for executing a project which requires the skilled services of a functional man as well as the specialised knowledge of a product man. Large turn-key projects in specialised fields require a matrix structure. Fig. 4.6 illustrates a matrix structure.

The distinguishing characteristic of a matrix structure is that it operates under a dual authority. A person is accountable to two bosses at the same time, one his usual boss and the other his boss for the duration of the project (e.g. Ward Management). Obviously the problems emanating from this type of structure relate to conflicting roles and authority arising out of an ambiguous demarcation of authority and responsibility.

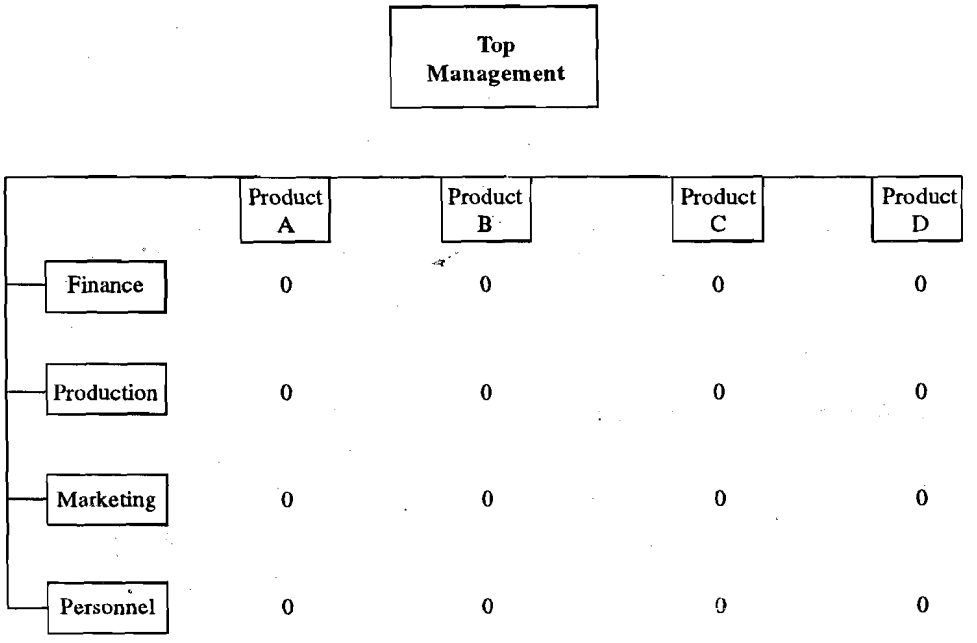

Fig. 4.6: Matrix Organisation

4.10 NETWORK STRUCTURE

When an organisation needs to control other organisations or agencies whose participation is essential to the success, a network structure is organised. In this, the main organisation creates a network of relevant agencies and it influences in different ways.

Network structure is mostly used in non-business organisations which have socio-political objectives. For instance, the State Industrial Development Corporation (SIDC) may resort to a network structure in their objective to establish an industrial estate. In this the SIDC may act as the lead agency and involve the State Electricity Board, Local Municipal Authorities, Land Development Authority, Authorities for Water & Sewage Control, P&T Department for communication facilities, appropriate authorities for building roads etc. The SIDC would also need to establish a network with people who would ultimately be using the industrial estate to know their requirements in terms of specification and special needs. It would also use the services of an advertising agency to promote the industrial estate and attract maximum number of entrepreneurs. For the construction of sheds and factories the SIDC may have to utilise the services of private construction agencies.

Thus, a network structure envisages the utilisation of a number of different services offered by different agencies. There is need to coordinate the different inputs and synchronise them towards the ultimate objective.

Activity 4

What is the basis of differentiation of tasks and activities in your organisation? On the basis of the above discussion, can you suggest three definite improvements in the organisation structure which would enhance its effectiveness?

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4.11 INTEGRATION OF ORGANISATIONAL TASKS AND ACTIVITIES

Having designed your organisation's structure to suit the specific needs of your company and its environment on the basis of most efficient grouping, you now have to ensure that these differentiated groups are integrated towards the common organisational objectives. Generally speaking, the more differentiated and specialised are the activities, the greater the need for coordination and integration. This is because there is danger of these specialised groups getting isolated and start viewing each other as rivals rather than companions in pursuit of the same goal.

Have you ever witnessed a situation where departments belonging to the same organisation vigorously fight each other over the allocation of annual funds? Think of our country as one big organisation and the States and Union Territories as its differentiated groups. Do you think they are well integrated towards the common goal of national economic development?

The basis for integration is provided by the three elements of an organisational structure, namely authority, administration and communication network.

Integration through Authority

The hierarchical relationships in an organisation define the status of each position in relation to the others and the power that goes with that position. The basis for the hierarchical relationship is that the superior has authority over the subordinate in terms of assigning him work and the latter, in turn, is obliged to obey the superior.

Hierarchical relationships facilitate integration because they ensure that all activities are ultimately placed under one authority and thus are linked together. The top position becomes the centre for all coordination. In a small organisation, with a single product line, integration and coordination from one central position is certainly feasible. But if you consider large organisations with operations spread over many geographical areas, product lines running into hundreds and employing thousands of people, it is no longer physically possible for one person to coordinate all the tasks and activities. In such situations, the hierarchical structure has to be supported by the administrative structure and communication network.

Integration through Administration

Every organisation has its own administrative procedures and systems. These relate to almost every aspect of organisational life. The procedure for selecting new recruits, calculation and mode of overtime, travel, medical and other allowances, the system of memos and movement of a file from one department to another for decision-making are all illustrations of administrative procedures. The larger the organisation, generally, the more formally prescribed and numerous are its administrative procedures.

How administrative procedures help in integrating different departments and different levels within an organisation can easily be understood by an illustration. In a typical organisation, at the end of the corporate year, each individual, say a salesman, would fill his own assessment of his performance. The salesman's immediate boss would fill in a Confidential Report (CR) on his performance. The salesman's own assessment and the CR would both be given over to the Personnel Department which may add information from its records on the number of years the salesman has been with the company, his starting salary and designation, number of promotions and increments and bonus received, any loans outstanding against his name etc. This complete file would then go to the manager marketing, who would in consultation with the general manager decide on the salesman's next promotion and increment in accordance with the established salary structure.

Thus, the administrative procedure for deciding promotions involves sharing of information between different levels in the same department (Marketing) and between different departments (Marketing, Personnel and General Administration).

Integration through Communication

In the previous illustration, the bases for taking a decision about the salesman's promotion were his own assessment report and his boss' Confidential Report (CR). Both these are representatives of the means of communication used in an organisation. Minutes of meetings, circulars, notices, progress reports, monthly in-house newsletters are all specific tools of the communication network of an organisation.

Just as manpower, raw material and machines are the resources of an organisation, so is information. Information regarding the development of a new technology by a rival company, or the introduction of a new model of refrigerator are vital pieces of information which can drastically affect the future course of action for a company. But information is highly perishable. If not communicated to the right person at the right time it has little value.

Information may be received at one level in the organisation but utilised at another. Salesmen and other field staff are usually the eyes and ears of any organisation. They gather bits and pieces of vital information. But to be useful, these disjointed information pieces must be immediately communicated to the 'brain' of the organisation

i.e. the managers who will analyse and act upon the information. Just as market information moves upwards within the organisation, decisions have to be communicated downwards. A decision regarding change in the distribution network is made at the top, but implemented by people in the field. Therefore, there is need for communication networks which provide for transmission of information both up and down the hierarchical structure. Similarly, networks should be available for exchange of information at the horizontal level.

Computers and many other technical improvements have resulted in organisation's increased ability to collect, process, analyse and transmit vast amounts of information. Organisations today have greater access to an almost unbelievable array of information.

In the final analysis, however, it is not so much the access to sophisticated technology which an organisation has that determines the efficiency or efficacy of its communication network but rather the stance and attitude of the top management in encouraging its people to talk with each other and share more information.

Activity 5

List the various official means of communicating information in your organisation. How effective are these in integrating the various departments and different levels of management? Can you think of some more such means of communication which your organisation can adopt?

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4.12 DESIGING STRUCTURE FOR A SERVICE ORGANISATION

The distinguishing characteristic of a service organisation is that it does not produce any physical or tangible product, but instead it provides a service which may in some cases be almost totally intangible. Dry-cleaning, after sales maintenance for your TV and air-conditioner, health clubs, municipal corporations, banks, universities etc. are all organisation which provide service. A health club's service can be described in terms of tangible and specific gadgets and equipment which it has. However, the behaviour of the staff towards its clients also forms an extremely important part of health club's service, but is intangible. In many cases, it is the intangible part which is more important in attracting and retaining customers.

In dealing with service organisations, therefore, you should lay emphasis on efficient service as well as friendly and courteous behaviour. In highly undifferentiated organisations such as Nationalised Banks, personalised and friendly service can become a basis for distinguishing the organisation.

The other important variable in organising service institution is to correctly identify the service which the organisation is providing to the customer and the activities need to be undertaken to maintain and improve the service.

4.13 LET US SUM UP

In this unit we have discussed various issues involved in structuring the organisation. You have a variety of designs to choose from, but no one design as it is, can prove to be a perfect fit for an organisation. You would always need to modify and adopt a structural design according to the specific objectives of your organisation, the environmental factors such as political, legal, cultural and social conditions, and your own attitude as a manager towards the issues of centralisation of power and delegation of responsibility.

Whatever be the structure you decide upon for your organisation, you must always keep in mind the basic principles of defining and describing jobs, differentiating them to form manageable parts, and then integrating them to achieve the common goals.

4.14 KEY WORDS

Centralisation : The concentration of power and authority. This may be concentrated in a person or a group of persons in the organisation.

Delegation : The sharing or handing over of authority and responsibility to a subordinate.

Differentiation : The process by which the tasks and activities of an organisation are segmented into smaller groups. The basis for differentiation may be function, product, location or customer.

Environment : The business environment of a firm comprising economic, social, political, cultural, legal and geographic factors which critically affect the working of organisation.

Functional Structure : The organisation structure wherein activities and tasks are observed into smaller groups on the basis of their belonging or contributing to a particular function such as manufacturing, marketing, finance etc.

Geographical Structure : The organisation structure in which activities and tasks are grouped together on the basis of their location in a geographical zone or territory.

Integration : The process by which differentiated groups are pulled together to contribute towards the common organisational objectives. Hierarchical control, administrative procedures and communication networks are the processes used for integration.

Line Functions : Those functions in an organisation which are perceived to be directly contributing to the organisation's objectives.

Matrix Structure : Used generally for project execution which requires the services of skilled functional people and the specialised knowledge of product specialists. Matrix structure is a combination of the functional and product structures and its distinguishing characteristic is dual authority.

Network Structure : A structure in which one organisation acts as the 'lead' organisation and creates a network of many other external organisations whose services the lead organisation utilises in fulfilment of its objectives.

Organisation Chart : The depiction of specific positions in an organisation, their states within the organisation and the reporting relationship between a subordinate and his superior.

Principle of Division of Work : That principle by which work is organised into smaller jobs allowing people to undertake only specialised activities thus ensuring efficiency in the use of labour.

Principle of Span of Control : The principle which states that there is a limit in each managerial position on the number of persons which can be effectively controlled.

Product Structure : An organisation in which activities and tasks are grouped on the basis of individual products or product lines.

Scaler Principle : The chain of direct authority relationship from superior to subordinate within the organisation.

Staff Functions : Functions which are advisory or auxiliary in nature but do not directly contribute towards the organisational objectives.

Structure : Formal and established pattern of relationship in an organisation. The relationship includes people, tasks and activities.

4.15 FURTHER READINGS

Kast, F.E. and Rosenweig, J.E. (1985), *Organisation and Management: A System and Contingency Approach*, McGraw-Hill Book Company: New York.

Koontz, H. and O'Donnell, C. (1976), *Management: A System and Contingency Analysis of Managerial Function.* McGraw-Hill, Kogakusha Ltd.: Tokyo.

Paul, S. (1983), 'Strategic Management of Development Programmes', *Management Development Services No. 19*, International Labour Organisation: Geneva.

NOTES

UNIT 1 HUMAN RESOURCE PLANNING

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- examine the purpose and process of human resource planning;
- study the methods and techniques for projecting human resource supply and demand; and
- review the key concerns in developing a human resource strategy.

1.1 INTRODUCTION

Manpower planning is an integral part of corporate planning. 'Manpower' may be thought to be as "the total knowledge, skills, creative abilities, talents and aptitudes of an organisation's workforce, as well as the values, attitudes and benefits of an individual involved.

Manpower planning may be defined as a strategy for the acquisition, utilisation, improvement and preservation of the human resources of an enterprise. It is the activity of the management which is aimed at coordinating the requirements for and the availability of different types of employees. This involves ensuring that the firm has enough of the right kind of people at the right time and also adjusting the requirements to the available supply.

1.2 HUMAN RESOURCE PLANNING: ACTIVITIES

The major activities of manpower planning include:

Forecasting future manpower requirements either in terms of mathematical projections of trends in the economy and developments in the industry or of judgemental estimates based upon specific future plans of the company.

Inventorying present manpower resources and analysing the degree to which these resources are employed optimally.

Anticipating manpower problems by projecting present resources into the future and comparing them with the forecast of requirements to determine their adequacy, both quantitatively and qualitatively.

Planning the necessary programmes of recruitment, selection, training, development, motivation, and compensation so that future manpower requirements will be met.

Human resource planning is a double-edged weapon. If used properly, it leads to the maximum utilisation of human resources, reduces excessive labour turnover and high absenteeism: improves productivity and aids in achieving the objectives of an organisation. Faultily used, it leads to disruption in the flow of work, lower production, less job satisfaction, high cost of production and constant headaches for the management personnel. Therefore, for the success of an enterprise, human resource planning is a very important function, which can be neglected only at its own peril. It is as necessary as planning for production, marketing, or capital investment.

For an individual, it is important because it helps him to improve his skills and utilize his capabilities and potential to the utmost. For an organisation, it is important because it improves its efficiency and productivity. It is only through initial human manpower planning that capable hands are available for promotion in the future.

In simple words, Human Resource Planning is understood as the process of forecasting an organisation's future demand for, and supply of the right type of people in the right numbers. It is only after this that the HRM department can initiate a recruitment and selection process. HRP is a sub-system in the total organisational planning. Organisational planning includes managerial activities that set the company's objectives for the future and determine the appropriate means for achieving those objectives. HRP facilitates the realisation of the company's objectives by providing the right type and the right number of personnel. HRP, then, is like materials planning that estimates the type and quality of the materials and supplies needed to facilitate the manufacturing activities of the organisation. HRP is also called manpower planning, personnel planning or employment planning.

A few definitions of HRP are worth quoting here:

1) HRP "includes the estimation of how many qualified people are necessary to carry out the assigned activities, how many people will be available, and what, if anything, must be done to ensure that personnel supply equals personnel demand at the appropriate point in the future."

2) "Specifically, human resource planning is the process by which an organisation ensures that it has the right number and kinds of people, at the right place, at the right time, capable of effectively and efficiently completing those tasks that will help the organisation achieve its overall objectives. Human resource planning, then, translates the organisation's objectives and plans into the number of workers needed to meet those objectives. Without a clear-cut planning, estimation of an organisation's human resource need is reduced to mere guesswork."

The manpower plan is a part of the corporate plan. Without a corporate plan, there can be no manpower plan. If there are several imponderables and unpredictables in the corporate plan, there will be difficulties in manpower planning. Whether or not the manpower plan meets the requirements and is in tune with reality depends on clarity in goals and validity of the stated assumptions. The other important point is the time frame in defining the 'future'. In manpower planning, the future can be classified into three periods: (a) the short-range or immediate future; (b) the mid-range; and (c) the long-range future.

None of these three can be spelt out in terms of set number of days, months or years. The "immediate future" may refer to the current situation and experiences and even concern issues such as overtime and replacements. If there has been previous planning for manpower, the plans may serve as a guide in the immediate future. If not, a beginning should be made at once.

The mid-range future has a different time span in various companies. It can be as short as a few months or as long as several years. Perhaps, most would agree that 2-3 years period as a mid-range.

The long-range could be 5 years, while 10 to 15 years span could be used for a perspective plan. Long range plans must be made on the basis of various trends in the economy and in the labour market, and on long-term trends of production in the company. Long-range plans are general rather than specific, flexible rather than rigid.

Nevertheless, a plan can be extremely useful in identifying factors and trends that need to be reckoned with for early warning of possible problems. The long lead time provides the opportunity and resilience to meet exigencies and make necessary adjustments. More complete plans can be had as time slowly brings the long-range into short-range.

Activity 1

As part of this activity you are required to identify and tabulate the number of personnel at various levels and departments in your organisation. Compare your tabulation with the levels of personnel mentioned in the manpower plan of your organisation. Are there any major differences? Please find the reasons.

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1.3 OBJECTIVES OF HUMAN RESOURCE PLANNING

Human resource planning is deemed necessary for all organisations for one or the other of the following reasons:

i) To carry on its work, each organisation needs personnel with the necessary qualifications, skills, knowledge, work experience and aptitude for work. These are provided through effective manpower planning.

ii) Since a large number of persons have to be replaced who have grown old, or who retire, die or become incapacitated because of physical or mental ailments, there is a constant need for replacing such personnel. Otherwise, the work would suffer.

iii) Human resource planning is essential because of frequent labour turnover which is unavoidable and even beneficial because it arises from factors which are socially and economically sound such as voluntary quits, discharges, marriage, promotions; or factors such as seasonal and cyclical fluctuations in business which cause a constant ebb and flow in the work force in many organisations.

iv) In order to meet the needs of expansion programmes (which become necessary because of increase in the demand for goods and services by a growing population, a rising standard of living—which calls for larger quantities of the same goods and services as also for new goods; the competitive position of firm which brings it more business arising from improvements effected in the slump period; and the rate of growth of the organisation), human resource planning is unavoidable.

v) The nature of the present work force in relation to its changing needs also necessitates the recruitment of new labour. To meet the challenge of a new and changing technology and new techniques of production, existing employees need to be trained or new blood injected in an organisation.

vi) Manpower planning is also needed in order to identify areas of surplus personnel or areas in which there is a shortage of personnel. If there is a surplus, it can be redeployed; and if there is shortage, it may be made good.

The objective of human resource planning is to maintain and improve the organisation's ability to achieve its goal by developing strategies that will result in optimum contribution of human resources.

The objectives of manpower planning are mainly:

a) To ensure optimum use of human resources currently employed

b) To assess or forecast future skill requirements

c) To provide control measures to ensure that necessary resources are available as and when required

d) A number of specific **reasons** for attaching importance to manpower planning and forecasting exercise are to:

- link manpower planning with organisational planning
- determine recruitment levels
- anticipate redundancies
- determine optimum training levels
- provide a basis for management development programmes
- cost the manpower in new projects
- assist productivitiy bargaining
- assess future accommodation requirements
- study the cost of overheads and value of service functions
- decide whether certain activities need to be subcontracted, etc.

1.4 HUMAN RESOURCE PLANNING PROCESS

The manpower plan influences the corporate strategy and is in turn influenced by it. The manpower planning process may incorporate all the stages shown in Fig.1.1. The planning process may not always give exact forecasts. To be effective it should be a **continuous** process with provision for control and review.

The first step in the manpower planning process is the establishment of a planning horizon. One should know the period for which the manpower plan will apply. Then, the specific corporate objectives and strategies should be clear. Based on these, estimates or projections for demand and supply manpower can be made using the approach and methods suggested in the next unit. The difference between the estimates of demand for and supply of manpower is often referred to as the 'manpower gap' and one of the main components of the manpower strategy is to formulate plans for closing it—perhaps by recruitment and training (if the demand is positive, i.e., demand exceeds supply) or by planned redundancy (if the gap is negative).

1.5 PROJECTING MANPOWER SUPPLY AND DEMAND AT ORGANISATIONAL LEVEL

The paradox in manpower projections is that while the techniques are easy and simple, applying them successfully is enormously complex and difficult. Manpower projections are not an academic exercise or an end unto themselves. Their value lies in extending the range of other phases of manpower planning and, indeed of planning for other company functions.

Forecasts of manpower supplies and demands are of two types, estimates and projections. Estimates are educated guesses based on experience while projections are mathematical extensions of data on manpower into the future. Most forecasts involve both projections and estimates.

Forecasting Techniques

We shall now attempt to look at the aspect of forecasting future requirements. This can be done through various techniques.

The process of estimating manpower demand consists of four steps:

- an approach
- a basic factor
- a method
- a technique

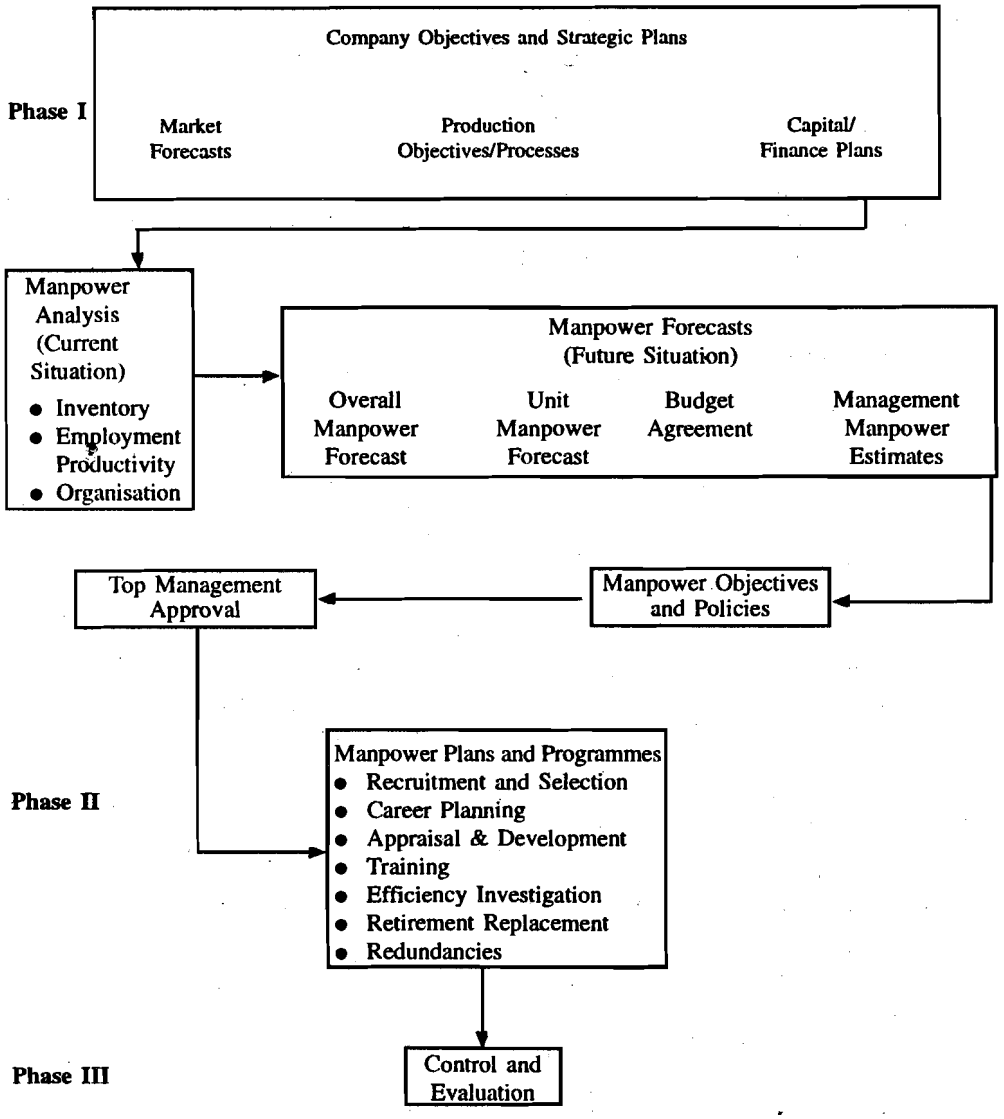

Fig. 1.1: The Manpower Planning Process

Approach

There are eight possible approaches:

1) Subjective
2) Objective
3) Global
4) Component
5) Techno-economic
6) Non-economic
7) Deterministic
8) Probabilistic

The order in which they are mentioned suggests the formation of four groups, each of which comprises two mutually exclusive approaches e.g. (i) Subective or Objective, (ii) Global or Component etc.

The groups, between themselves, are not quite mutually exclusive.

A subjective approach to manpower demand estimation uses intuition, impression or judgement. Opposed to this, the objective approach tries to justify the estimate of demand on the basis of certain factors or logical explanations.

A global approach would try to estimate manpower demand as an overall figure, directly for the entire problem under consideration, whereas a component approach would first estimate the demand for segments of the problem and then aggregate it.

The techno-economic approach combines the technological, economic and organisational considerations mentioned earlier, whereas the non-economic approach utilises only socio-political and other considerations.

Basic Factor

A basic factor means a variable to which manpower demand can be related. The choice depends upon the number of considerations which together constitute the multi-dimensional framework of the particular problem facing us.

Methods

According to Gareth Steiner, statements about the future can be made in two senses:

What will occur?

What should occur?

According to Steiner, what is more significant than the time element is the way in which the change in one phenomenon i.e. manpower, is associated with change in another (basic factor, which was mentioned earlier).

The rate at which the change takes place exerts an influence on the frequency of measurement and forecasting required and affects the need for different kinds of feedback. In practice, what managers see as desirable will be influenced by past experiences. All these assessments involve making assumptions about managerial capacity, manpower utilisation or the rate of change in manpower.

According to Steiner, the major advantages of manpower forecating are:

a) It corresponds to the way managers commonly think and talk about manpower.

b) It encourages the recognition that, even where output is not readily measurable, we can still make good forecasts of manpower, provided we can quantify work done in some way.

c) It highlights the way in which we have to control the effect by other inputs such as capital on manpower requirements.

Techniques

In this context therefore, one can outline a few specific techniques of manpower demand forecasting.

Subjective

The forecast here is made on the basis of estimates by experienced people whose experience has taught them what types of changes are important and the rates of change involved. Implicitly however, subjective techniques involve subjective estimation of workload and manpower utilisation and their rate of change.

The advantage lies in that the data collection is required and intangible factors like social opinion, fashion, etc. can be built in. However, the disadvantage lies in the errors of the human mind which can be perpetuated while carrying out the exercise of demand of estimation for manpower. Forecasts based entirely on subjective assessment are unlikely to give very good results. However, supplementing objective techniques with subjective estiamtes can be useful e.g. through using subjective probabilities.

Time Series Analysis

The time series extrapolation is a good method where it is sometimes not possible to take an overall view of a group of staff, to base a forecast on estimates for workload and manpower utilisation.

There are four elements of the time series method:

Trend (T_1)

Cyclicat effect (C_1)

Seasonal effect (S_t)

Random effect (R_t)

These veing multiplicative, we can get:

$V_t = T_t \times C_t \times S_t \times R_t$

Projections or extrapolations can be done on the basis of moving averages or exponential smoothing.

Work Study Method

The work study technique uses time and motion studies to analyse the work being done. This method is useful for repetitive jobs which have a high degree of manual content and where job methods do not change frequently.

Accuracy of Techniques

No method of forecasting can be entirely without error. Some changes are unique (such as new legislation or a decision to close down an establishment) and hence are more or less unpredictable as to timing. Such errors as are due to these unique changes are unavoidable. There are also errors that are partly avoidable since they stem from inaccurate information or inappropriate techniques. Even where errors are theoretically avoidable, it unrealistic to expect more than a proportion of error to be actually avoidable.

However, a forecast, or any resulting objective, must be modified as soon as it seems that it no longer represents the most likely occurrence. Unfortunately, the poeple become emotionally attached to forecasts. We must remember, however, that errors have a cumulative effect over time.

Taking the above factors into consideration, a corporate approach to manpower planning is to be developed. In doing so certain **key considerations** such as the following emerge:

a) What positions and individuals are to be included in the planning effort? A simple rule of thumb is to include all positions which are critical to corporate performance and profits and/or pose recruitment poroblems.

b) What is the appropriate manpower planning horizon? Experience shows that it can extend up to 4 to 5 years. Beyond 5 years, technical manpower forecasts have doubtful value due to pervasive imponderables and unpredictables in the environment. Within the planning period, there should be a formal method of review and assessment at least once every year.

c) With what business factors will manpower needs be related? For a company producing fertiliser, it could be tons of fertiliser, for an automobile unit, it could be the number of cars and trucks. For a retailer, it could be the rupee value fo sales. To be useful, the predictor should meet at least two requirements: (a) it should be directly related to the essential nature of the business; and (b) changes in the selected factor be proportional to changes in the manpower required.

Selecting a Proper Predictor

For instance, while relating manpower needs with rupee value of turnover, appropriate indexation for inflation is called for. Multi-product firms need to evolve appropriate conversion factors to have a common base. Alternatively, they can have separate forecasts for each of the products, particularly if the products differ not only in terms of numbers required, but also in the types of skills needed. Some firms find it necessary to select several factors, one for each of different segments of the work force. In a refinery, for instance, production workers may be related to one factor, the sales force to another, management to a third, and the professional work force to still a fourth.

Firms which build up complete sets of historical records on various related aspects can make quite accurate projections against those which lack adequate data base. Now firms rely on the existing norms in the industry and make adjustment for the unique features of the firms vis-a-vis the other firms in the industry on such aspects as technologies, management culture, compensation, etc.

Simple arithmetical projections based on historical data may lead to disastrous consequences. While using historical data for projections due regard should be given to change in plans and programmes, technology, environment, etc. The staff specialists in manpower planning would do well to seek the assistance of experienced operating managers to interpret reasons for past changes or anticipating future changes.

Projections for Particular Groups of Employees

As already mentioned, total manpower needs of an organisation can be built up from projections made for specific segments of their work force. Different work groups relate differently to various predictors and thus have different productivity ratios. In each case the following process is followed: find the appropriate business factor, draw up the historical record of that factor in relation to manpower employed, compute the productivity ratios, determine the trend, make the necessary adjustments in the trend, past and future, and project to the target year.

Organisations may adopt a functional framework by viewing positions according to functional activities than by grouping them into separate organisational units. The purpose of grouping positions similar in content, regardless of their location in the organisational structure is to recognise that each of these different groups of jobs require different knowledge, skills and characteristics and are involved in different career ladders. Such knowledge about different groups in itself is useful. Experience shows that in any organisation 6 to 12 job or skill groups would meet the major activities in all functional areas.

Some firms develop the total projection for the work force at the operating level and work out the projections at various responsibility levels in each job/skill group by means of ratios. Firms may discover a stable relationship between the total number of workmen and foremen. Depending upon the number of levels in hierarchy—it usually varies from 5 to 15—and assumptions about span of control, nature of work, technology and historical data, projections are made.

Projecting Labour Costs

Manpower projections emphasise the number of employees. But firms are interested in the labour costs also. The share of labour costs to total costs range from about two per cent in process industries to around 60 per cent in the nationalised coal industry. The labour costs can be projected by examining the trends in labour productivity, proposed change in work technology, union wage agreements, inflation, government rules, etc. Some companies have been able to maintain the labour cost component in total cost static over a period of say, five years, even though in the intervening period the average emoluments of the employees have gone up by one-third. Companies like ITC Ltd. and Premier Automobiles Ltd. could do this through productivity bargaining as part of wage negotiations whereby workers will not only get more than what they were earning before, but also turn out higher levels of performance. In such companies, it becomes possible to produce more output than before with the existing manpower.

Projecting the Source of Supply

Projecting the number, type and level of employees tells only half the story in manpower planning. Every organisation will have two major sources of supply: internal and external. In unionised firms, up to a level, agreements determine the ratio of external and internal sources of supply.

Internal Sources: Proper manpower planning and information system enables the organisation to know the profile of the employees—age, sex, education, training experience, job level, performance, and potential.

Manpower requirements arise out of growth or diversification or because of the movement of the employees on account of transfer, promotion, job rotation, voluntary retirement, resignation, retirement, dismissal discharge or death. In either case, as and when vacancies arise, organisation can match the skill and level requirements with the profile of the employees and meet the requirements. While some of the internal changes and external supply could be predicted such as growth opportunities, transfer and promotions, retirements, etc., others are not easy to predict. But, as elsewhere, past

experience and historical data may be of some help. The companies which have systematised personnel records and information systems and which have well established career and succession plans find it easier to project internal sources of supply relatively accurately.

External Sources: When the company grows rapidly, diversifies into newer areas of operations or when it is not able to find the people internally to fill the vacancies, it has to resort to outside recruitment. To the extent a firm is able to anticipate its outside recruitment needs and scans the possible sources of supply with a feel for the labour market conditions, its problems in recruiting the right number with right skills in the right time would become easier.

If both supply and demand projections are made in time or if there are any problems such as shortage of skills, appropriate steps can be taken to overcome them. For example, several companies started apprentice training programmes when they predicted a shortage for certain types of skills. When major manufacturing projects are planned to be located in hitherto backward areas, such problems are felt more acurately. For instance, there is the case of paper mill in the eastern region not being able to reach even 10 per cent capacity utilisation, several years after it was commissioned, because of shortage of people with appropriate skills to run the paper mill.

Accuracy of Projections

The accuracy of the projections is based on the following factors:

a) The predictability of the industry, i.e., whether the business conditions are generally stable or not.

b) The degree of integration on manpower planning with other company planning efforts, and the amount of experience that the company has with all types of planning. If a company plans very far into the future, it may be sacrificing accuracy and flexibility.

c) Historical data about manpower levels and about the selected business factors with which manpower projections are related. Even the experience of operating managers is not useful in making projects and estimates in the absence of good manpower records. The projections, at best, can be as good as the data base.

d) The knowledge, experience and outlook of the operating managers. When manpower projections are made as part of the total planning process, even when the forecasts are not accurate, they atleast succeed in providing warning of possible problems.

e) The framework for manpower utilisation for the forecast period.

Activity 2

Visit a hospital, you have known or access to and do the following:

a) Assess and identify the objectives of manpower planning in the hospital.

b) Identify the critical areas and the extent of manpower shortages and the reasons for such shortages.

c) Identify manpower surpluses and reasons thereof.

d) Identify and fix forward targets for manpower development.

e) Identify the major manpower problems and their causes and interrelationship.

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1.6 DEVELOPING MANPOWER STRATEGY: KEY CONCERNS

In this section certain key concerns in developing manpower strategies are briefly considered.

Approach

While assessing future requirements, the estimates depend mostly upon the nature of manpower assumptions in the organisation. Corporate strategy can influence manpower strategy and vice-versa. Here we may consider three approaches: the zero budgeting approach, the ideal, and the realistic.

Zero budgeting, as the name implies, is an approach in which one forces unit/division managers to justify their total operation from zero. The objective is to encourage managers to seriously think about their current activities. Given the restrictions posed by law and unions, the practicability of this approach for ongoing organisations in manpower planning is doubtful.

It is only new units that can start thinking about manpower planning in terms of what might constitute an 'ideal' approach. Any decisions on sub-contracting, off-loading some functions like maintenance production-technology, etc., may depend on the perceived notions of what constitutes an ideal for the organisation.

Organisations can proceed on a realistic approach using existing information. A company which operates on a three-year planning cycle may record manpower levels in subunits or division in such a way that it is easy to monitor and hold managers responsible (see Fig. 1.2). Organisations which choose to supplement manpower plans with different business parameters and manpower ratios. (e.g. gross value added per employee, capital employed per employee) have to be varied about the fact that the future may not follow the past and ajustments may have to be made for variations.

Item	Current year	Forecast	Forecast
	Year 1	Year 2	
Stock as on January			
Manpower increases			
• Business Activity			
• Capital Expenditure			
• Takeover/merger			
Manpower decreases			
• Business activity			
• Capital expenditure			
• Disinvestment			
• Productivity improvement			

Fig. 1.2: Monitoring Manpower Levels

Personnel Policies Affecting Manpower Supply

Manpower supply in undertaking is affected by the personnel policies ranging from recruitment to retirement. As shown in Fig. 1.3, manpower flows in and out of an organisation due to a variety of reasons. Policies affecting each of these aspects need to be reviewed regularly to assess their possible effects on manpower supplies to meet the gap between supply and demand.

Strategic Decisions Affecting Manpower Demand

Organisations operate in a changing environment. Therefore, they do not remain static. Manpower structures also do not remain static. Questions on the activities and roles of persons at different levels and studies on organisation and methods of work may provide useful insights and opportunities to revise manpower structures that change the estimates about manpower required.

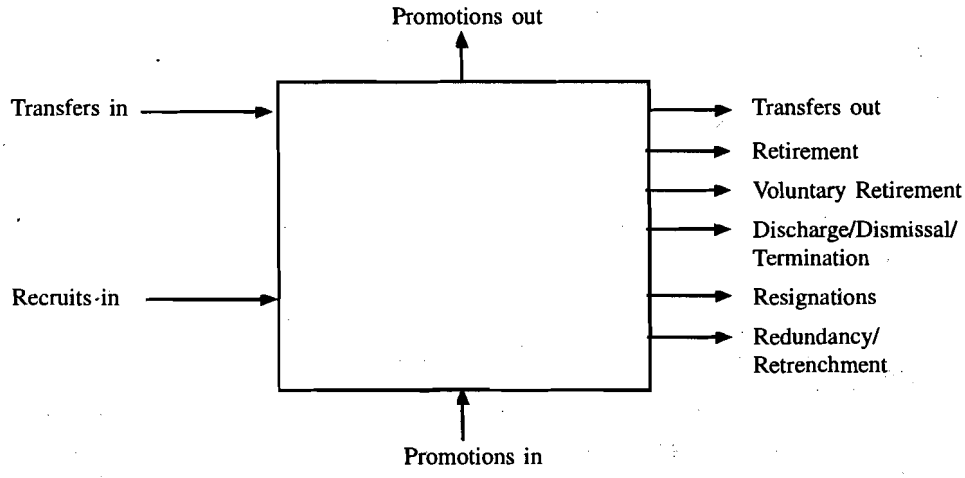

Fig. 1.3: Forces of Manpower Flow in an Organisation

Change in production methods, union agreements on productivity, off-loading maintenance, sub-contracting, etc. are some of the strategic decisions that help organisations to significantly alter their manpower needs without affecting the volume of business.

Personnel Information Systems

Most organisations do not have adequate information on manpower. Several of those do not have proper retrieval systems. There are understandable difficulties in resolving the issues and complexities in design, definition and creation in computerised personnel information systems for effective manpower planning and utilisation. Even the current technologies and knowledge in this respect is not put to use optimally. This is strategic disadvantage.

Activity 3

Managing a large/medium size hospital with special setting of the environmental factors of developing countries and the great demands placed on the hospitals by the public, make it essential for the hospitals to take whatever measures possible to see that its effectiveness is demonstrated to the greatest possible extent. This involves careful planning of various activities of the hospital.

Based on the contents discussed in this unit do the survey of hospital to understand manpower planning and prepare brief notes broadly on the lines given below:

1) Hospital manpower situation report on existing manpower and services.
2) Manpower requirements, availability and distribution at various levels.
3) Future supply of manpower from training schools and institutions
4) Mismatches between supply and requirement
5) Solving mismatches
6) Organisational and managerial problems
7) Manpower strategy and outline plan
8) Detailed plan
9) Implementation of the plan.
10) Monitoring

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1.7 LET US SUM UP

Manpower planning affects organisation strategies and vice-versa. We have reviewed the concept of manpower planning and studied the objectives and reasons for current interest in the subject. There are three stages in manpower planning process. We examined the techniques and special problems of manpower supply and demand at organisational level. Finally, we have considered certain key concerns in developing manpower strategies.

1.8 SELF-ASSESSMENT TEST

1) What is the purpose of manpower planning? Explain the process.

2) Examine the reasons for the current interest in manpower planning.

3) Briefly review the forecasting techniques.

1.9 FURTHER READINGS

Beach, D.S. (1967), *Management of People at Work.*

Bennison, Malcolm and Jonathan Casson (1983), *The Manpower Planning Handbook,* McGraw-Hill: London.

Edwards, John *et al.* (1983), *Manpower Planning*, John Wiley, New York.

Flippo, E.B. (1980), *Personnel Management*, Fifth edition, p. 110.

Mammoria, C.B., *Personnel Management.*

Wilbert and Schnider (1985), *The Dartnell Personnel Administration Handbook,* Dartnell: Chicago.

Yoder, D. (1972), *Personnel Management and Industrial Relations,* p. 210.

UNIT 2 RECRUITMENT, SELECTION AND INDUCTION

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- spell out the importance of job specifications in the selection process;
- explain various processes of recruitment;
- explain the importance and need of each of the stages of recruitment and selection processes;
- comprehend the need for various psychological tests in the process;
- evaluate the purpose of induction and the processes involved therein; and
- identify the care and caution warranted in the whole process.

2.1 INTRODUCTION

People in the organisation who are not selected on merit but on other considerations would be misfit and create all sorts of problems for the organisation and the other employees. Recruitment forms the first stage in the process which continues with selection and ceases with the placement of the candidate. Recruitment is the next step in the procurement function, the first being the manpower planning. Recruitment makes it possible to acquire the number and types of people required for the organisation. Recruiting involves discovering potential applicants for actual or anticipated organisational vacancies.

As Yoder and others point out, "Recruitment is a process to discover the sources of manpower to meet the requirements of the staffing schedule and to employ efffective measures for attracting that manpower in adequate numbers to facilitate effective selection of an efficient working force." Accordingly, the purpose of recruitment is to locate sources of manpower to meet job requirements and job specifications.

2.2 DEFINITIONS

Recruitment

Recruitment is the process of identifying the prospective employees, stimulating and encouraging them to apply for a particular job or jobs in an organisation. It is a positive action as it involves inviting people to apply. The purpose is to have an inventory of eligible persons from amongst whom proper selection of the most suitable person can be made.

Selection

Selection is the process of examining the applicants with regard to their suitability for the given job or jobs, and choosing the best from the suitable candidates and rejecting the others. Thus, you will notice that this process is negative in nature in the sense that rejection of candidates is involved.

Placement

Placement is the determination of the job for which a selected candidate is best suited and assigning that job to him. The ideal situation is 'the right man for the right job'. A proper placement of a worker reduces employee turnover, absenteeism, accident rates, etc., and improves morale, motivation, work etc.

Induction

Induction is introducing an employee to the job and to the organisation. The primary purpose of induction is to 'sell' the company to the new employee so that he may feel proud of his association with the company. This is called 'orientation' or 'indoctrination'.

Their Inter-relationship

The above are the four steps taken in the order given before a person starts his training for the job to which he/she is assigned. First he is recruited, that is, his attention is drawn to the existence of a possible opening for him and he is invited to apply for it. In the next stage of selection all the applicants are screened to find their suitability for the job and the best one is selected. The third step of placement follows selection and a particular job is assigned to the selected person. After that he is introduced to his job and to his organisation so that he may understand the environment in which he has to work.

Job Analysis

It is the process of studying and collecting information relating to the operations and responsibilities of the specific job. Job analysis is based on job description, job specification and job classification.

Job Description

A description will contain:

- The job title
- A job summary which gives a short definition or picture of the job
- Comprehensive and concise list of duties to be performed
- Supervision received and given
- Working conditions
- Relating to other jobs
- Qualities required i.e. education, technical knowledge, experience if any, degree of responsibility etc.

Job Specification

Job specification is a "statement of the minimum acceptable human qualities necessary

to perform a job properly." Job specification tells what education is required or what special machines or equipment shall be needed for the purpose.

Job Classification

It is the grouping of positions having a sufficient number of common characteristics to enable them to be grouped into a unit, e.g. laboratory aid, nursing aid, pharmacy aid, clerical group etc. The job classification helps in evolving different job grades and fitting them into the main organisational structure.

2.3 RECRUITMENT AND SELECTION

Recruitment has been regarded as the most important function of personnel administration, because unless the right type of people are hired, even the best plans, organisation charts and control systems would not do much good. Flippo views recruitment both as 'positive' and 'negative' activity. He says: "It is a process of searching for prospective employees and stimulating and encouraging them to apply for jobs in an organisation. It is often termed positive in that it stimulates people to apply for jobs to increase the 'hiring ratios', i.e. the number of applicants for a job. Selection, on the other hand tends to be negative because it rejects a good number of those who apply, leaving only the best to be hired."

Recruitment policy should take into account that high calibre personnel are essential to have but hard to find. Recruitment and selection are not synonymous. Recruitment means announcing job opportunities to the public in such a way that maximum number of suitable people may come across. Selection means choosing from that number, those applicants who are most likely to succeed in the jobs. An interview is the most widely used technique for selection.

Selection is a process of weeding out the unsuitable candidates and finally arriving at the most suitable one. In this sense, recruitment is a positive process while selection is a negative process of rejecting most of the candidates, leaving only a few who are considered suitable.

In India the organisational practices in selection vary widely. The private and public sector organisations differ in their selection practices. Selection for public sector undertakings is done through Public Service Commission, Banking Service Commission, Subordinate Services Commission etc.

Despite tremendous unemployment, it is not easy to find the right type of personnel. In the expanding industrial economy of India, the demand for top management, technical and scientific personnel is expanding at a fast rate with the result that an all-round shortage of such personnel is being felt. Many organisations indulge in attracting executives from similar organisations on higher salaries. But this does not, in any way, expand the supply of such personnel. Therefore, a sound recruitment policy has to be based on a comprehensive programme of management development.

Recruitment needs can be classified into three broad categories—planned, anticipated and unexpected. The planned needs arise out of changes in organisational decisions and superannuation policies, unexpected needs arise from individuals' decisions to leave organisation and from accidents or deaths. The anticipated category comprises those jobs which the organisation, by studying the trends within and outside the organisation can predict.

In India careful recruitment of employees is particularly important for basically two reasons: first, under the existing legal conditions, when an industrial worker is discharged, an industrial dispute can be made by the employee in regard to such discharge and the Tribunal would determine whether the termination of service was justified and to order reinstatement if the order was not appropriate. Secondly, the chances of mismatching the job and the person are much higher in India. Matching the job with the suitable applicant is naturally a two-way process i.e. the employee's choice and suitability matching with employer's requirements.

2.4 THE RECRUITMENT PROCESS

The Recruitment Process

There are two dimensions of the recruitment process. One is that in all cases recruitment involves locating and attracting adequate human resources to fill existing vacancies and the other is that recruitment is a critical management activity. The right people are the future of the organisation. No organisation can survive in the absence of human resources.

Vacancies in an organisation occur through someone leaving or as a result of expansion. Recruiting a new employee though may be the most obvious step when a vacancy occurs but some other options may also be appropriate depending on the situational needs. Jobs may be rearranged so that the total amount of work in a section is done by the remaining employees. Extra output can be achieved by using overtime. The work of the employee can be mechanised, though it is not easily feasible to mechanise a single vacancy—replacing full-time jobs with part-time jobs. Sub-contract the work and using another strategy is to use an agency is to provide temporary personnel, who is not a permanent liability to the organisation.

Preparation for Recruitment

Before you think of inviting people to apply for a job you have to decide what types of persons are to be invited and what their characteristics should be. This calls for fixing the 'job specifications' which may also be called 'man specifications'.

Job specifications are based on job description which is dependent upon the nature and requirements of a job. Thus, job specification will be different for each job.

We shall explain below the various elements of job specification:

Physical Specifications: For certain jobs, some special physical features may be required. For example, for assembly of a TV set or some other electronic equipment good vision is required, for a typing job you need finger dexterity, for a heavy job you need a strong, heavy and thick-set body. The particular physical abilities and skills necessary for a given job have to be specified. These may refer to height, weight, vision, finger dexterity, voice, poise, hand and foot coordination, motor coordination, colour discrimination, age-range, etc.

Mental Specifications: These include intelligence, memory, judgement, ability to plan, ability to estimate, to read, to write, to think and concentrate, scientific faculties, arithmetical abilities, etc. Different jobs require different degrees of such abilities and the more important ones should be specified.

Emotional and Social Specifications: These include characteristics which will affect his working with others, like personal appearance, manners, emotional stability, aggressiveness or submissiveness, extroversion or introversion, leadership cooperativeness, initiative and drive, skill in dealing with others, social adaptability, etc.

Behavioural Specifications: Certain management personnel at higher levels of management are expected to behave in a particular manner. These are not formally listed but have to be kept in mind during the process of recruitment, selection and placement.

Activity 1

Please describe below your job as carefully and precisely as you can.

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Please give below the ten most important elements of your job specification. Also evaluate yourself in respect of each element and write against it whether you meet it (a) fully, (b) substantially, (c) to some extent, or (d) not at all.

Element	Extent of meeting (a), (b), (c), (d)
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Sources of Manpower

There are two categories of sources of supply of manpower—Internal and External.

Internal Sources: These include personnel already on the pay-roll of the organisation as also those who were once on the pay-roll of the company but who plan to return, or whom the company would like to rehire. These include those would quit voluntarily or those on production lay-offs.

External Sources: These sources lie outside the organisation, like the new entrant to the labour force without experience. These include college students, the unemployed with a wider range of skills and abilities, the retired experienced persons, and others not in the labour force, like married women.

A policy of preferring people from within is advantageous as it improves the morale of the employees and promotes loyalty among them towards the organisation. This also helps employers as they are in a better position to evaluate those already with them and as these people require no induction.

The policy of preferring internal candidates, however, suffers from some disadvantages. It may lead to inbreeding, discouraging new blood from entering an organisation. If promotion is based on seniority, the real capable hands may be left out.

Likewise, there are good and bad points about external sources. These sources provide a wide market and the best selection considering skill, training and education. It also helps to bring new ideas into the organisation. Moreover, this source never 'dries up'. In respect of people selected under this system, however, one has to take chances with the selected persons regarding their loyalty and desire to continue. The organisation has to make larger investments in their training and induction.

You will realise now that dependence on just one of the sources is not in the interest of an organisation. It must depend on both in a ratio to be fixed considering various factors.

Some of these factors are described below:

1) **Effect of the policy on the attitude and actions of all employees**

Employees no doubt, feel more secure and identify their own long-term interest with that of the organisation when they can anticipate first charge at job opportunities. The general application of the 'promotion from within' policy may encourage mediocre performance. The point to be considered here by the organisation is, how important is the loyalty of the employees to it, balancing the risk of mediocre performance.

2) **The level of specialisation required of employees**

The principal source in many organisations may be the ranks of the present employees who have received specialised training.

3) **The degree of emphasis on participation by employees at all levels**

New employees from outside, with no experience in the firm, may not know enough about its service or product or processes to participate effectively, for some time at least.

4) **The need for and availability of originality and initiative within the organisation**

If the organisation feels that it is training its people for these qualities it may prefer its own people; if not, new people with different ideas may be taken from outside.

5) **Acceptance of seniority principle**

The policy or promotion from within will succeed only if management and employees accept the seniority principle with or without suitable modifications for promotion. If it is not accepted, selection may better be done on an open basis.

Methods of Recruitment

All methods of recruitment can be put into three categories: (a) Direct Methods, (b) Indirect Methods, and (c) Third-Party Methods.

a) **Direct Methods:** Direct methods include sending recruiters to educational and professional institutions, employee contacts with public, manned exhibits and waiting lists.

Schools and Colleges: For clerical, labour and apprenticeship help, high schools can be extensively used. For technical, managerial and professional jobs, colleges, university departments and specialised institutes, like the IITs and IIMs, are used. These institutions usually have a placement officer or a teacher-in-charge of placement, who normally provides help in attracting employers arranging interviews, furnishing space and other facilities and providing student resumes. The companies maintain a list of such institutions, keep in touch with them, send their brochures indicating job openings, future prospects, etc. On the basis of these students who want to be considered for the given job(s) are referred to the company recruiter.

Employees' Contact with the Public: The employees of the organisation are told about the existence of particular vacancies and they bring this to the notice of their relatives, friends and acquaintances.

Manned Exhibits: The organisations send recruiters to conventions and seminars, setting up exhibits at fairs, and using mobile offices to go to the desired centres.

Waiting Lists: Many firms lean heavily on their own application files. These record list individuals who have indicated their interest in jobs, either after visiting the organisation's employment office or making enquiries by mail or phone. Such records prove a very useful source if they are kept up-to-date.

b) **Indirect Methods:** Indirect methods cover advertising in newspapers, on the radio, in trade and professional journals, technical journals and brochures.

When qualified and experienced persons are not available through other sources, advertising in newspapers and professional and technical journals is made. Whereas all types of advertisements can be made in newspapers and magazines, only particular types of posts should be advertised in the professional and technical journals, e.g. only engineering jobs should be inserted in journals of engineering.

A well thought-out and planned advertisement for an appointment reduces the possibility of unqualified people applying. If the advertisement is clear and to the point, candidates can assess their abilities and suitability for the position and only those who possess the requisite qualifications will apply.

c) **Third-Party Methods:** Various agencies are used for recruitment under these

methods. These include commercial and private employment agencies, state agencies, placement offices of schools, colleges and professional associations, recruiting firms, management consulting firms, indoctrination seminars for college professors, friends and relatives.

Private Employment Agencies: These agencies specialise in specific occupation like general office help, salesmen, technical workers, accountants, computer staff, engineers and executives, etc. These agencies bring together the employers and suitable persons available for a job. Because of their specialisation, they can interpret the needs of their clients and seek out particular types of persons.

State or Public Employment Agencies: These agencies also known as Employment or Labour Exchanges, are the main agencies for public employment. They also provide a wide range of services, like counselling, assistance in getting jobs, information about the labour market, labour and wage rates, etc.

Executive Search Agencies: These agencies maintain complete information records about employed executives and recommend persons of high calibre for managerial, marketing and production engineers' posts. These agencies are looked upon as 'head hunters', 'raiders', and 'pirates'.

Indoctrination Seminars for College Professors: These are arranged to discuss the problems of companies to which professors are invited. Visits and banquets are arranged so that professors may be favourably impressed and later speak well of the company and help in getting required personnel.

Friends and Relatives of Present Employees: These constitute a good source from which employees may be drawn. This, however, is likely to encourage nepotism, i.e. persons of one's own community or caste may only be employed. This may create problems for the organisation.

Trade Unions: Trade Unions are often called on by the employers to supply whatever additional employees may be needed. Unions may be asked for recommendations largely as a matter of courtesy and an evidence of goodwill and cooperation.

Professional Societies: Professional Societies may provide leads and clues in providing promising candidates for engineering, technical and management positions. Some of these maintain mail order placement services.

Temporary Help Agencies: Employ their own labour force, both full-time and part-time and make them available to their client organisations for temporary needs.

Casual Labour Source is one which presents itself daily at the factory gate or employment office. Most industrial units rely to some extent on this source. This source, you will realise, is the most uncertain of all sources.

Deputation: Persons possessing certain abilities useful to another organisation are sometimes deputed for a specified duration. Ready expertise is available but, you can guess, such employees do not easily become part of the organisation.

Activity 2

a) Recall your first appointment to the present organisation and write below which of the above mentioned sources of recruitment was used by the organisation.

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b) Think of the various sources tapped by your organisation in getting employees for your Section/Department and write below in order of importance the first five.

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RECRUITMENT
THE EMERGING CHALLENGES

- Attract people with multi-dimensional experiences and skills
- Induct outsiders with a new perspective to lead the company
- Infuse fresh blood at every level of the organisation
- Develop a culture that attracts people to the company
- Locate people whose personalities fit the company's values
- Devise methodologies for assessing psychological traits
- Seek out unconventional development grounds of talent
- Search for talent globally, and not just within the country
- Design entry pay that competes on quality, and not quantum
- Anticipate and find people for positions that do not exist yet

Source: *Business Today*, January 7-21, p. 55, 1996.

2.5 SELECTION

Selection, as you have seen earlier, is the process of securing relevant information about an applicant to evaluate his qualifications, experience and other qualities with a view to matching these with the requirements of a job. It is essentially a process (picking out the man or men best suited for the organisation's requirements).

The Selection Process, you would recall that selection process involves rejection of unsuitable or less suitable applicants. This may be done at any of the successive hurdles which an applicant must cross. These hurdles act as screens designed to eliminate an unqualified applicant at any point in the process. This technique is known as the 'successive hurdles technique'. Fig. 2.1 gives these hurdles.

Yoder calls these hurdles 'go, no-go' gauges. Those who qualify a hurdle go to the next one, those who do not qualify are dropped out. Not all selection processes, however, include these hurdles. The complexity of the process usually increases the level and responsibility of the position to be filled. Moreover, these hurdles need not necessarily be placed in the same order. Their arrangement may differ from organisation to organisation.

Initial Screening or Preliminary Interview

This is a sorting process in which prospective applicants are given the necessary information about the nature of the job and also, necessary information is elicited from the candidates about their education, experience, skill, salary expected, etc. If the candidate is found to be suitable, he is selected for further process and, if not, he is eliminated: This is a crude screening and can be done across the counter in the

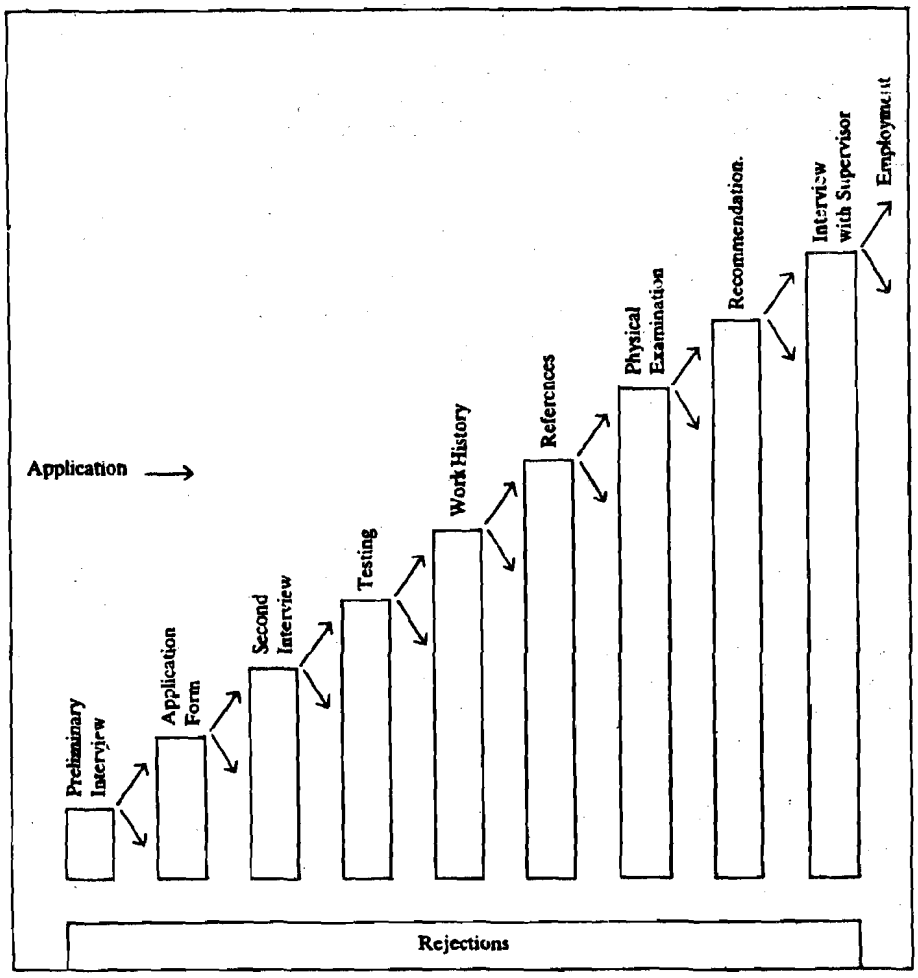

Fig. 2.1: Successive Hurdles in the Selection Process

organisation's employment offices. This is done by a junior executive in the personnel department. Due care should be taken so that suitable candidates are not turned down in a hurry. Since this provides personal contact for an individual with the company, the interviewer should be courteous, kind, receptive and informal.

When a candidate is found suitable, an application form is given to him to fill in and submit.

Application Scrutiny

You might have seen that sometimes applications are asked on a plain sheet. This is done where no application forms are designed. The applicant is asked to give details about age, marital status, educational qualifications, work experience and references. Different types of application forms may be used by the same organisation for different types of employees, e.g., one for managers, the other for supervisors and a third for other employees. Some forms are simple, general and easily answerable, while others may require elaborate, complex and detailed information. Reference to nationality, race, caste, religion and place of birth has been regarded as evidence of discriminatory attitudes and should be avoided. An application form should be designed to serve as a highly effective preliminary screening device, particularly, when applications are received in direct response to an advertisement and without any preliminary interview.

The application can be used in two ways: (i) to find out on the basis of information contained therein as to the chances of success of the candidate in the job for which he is applying, and (ii) to provide a starting point for the interview.

It is often possible to reject candidates on the basis of scrutiny of the application as they are found to be lacking in educational standards, experience or some other relevant eligibility and traits.

Selection Strategy

Consideration of selection strategy emphasizes (i) vacancy ratio (number of candidates available for the vacancy) and (ii) the probable cost of appointing an unsuitable candidate as the two most relevant parameters. These may be regarded as independent issues and can therefore be represented as the vertical and horizontal axis of a diagram as follows:

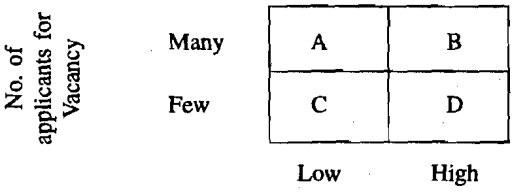

Fig. 2.2 : Selection Strategy

Probable cost of selecting unsuitable candidates: Four situations – A, B, C, D are represented in Fig. 2.2 given above. Now we consider probable solutions for each.

Situation A: In this situation there are many applicants and the cost of wrong selection is low, e.g., little investment is needed to train the recruits. The obvious strategy here would be to apply screening devices, such as application blank, short interview etc. which involve minimum cost.

Situation B: In this situation there are many applicants and the cost of wrong selection is very high. The right selection strategy would be tests, medical examination and series of interviews to prevent wrong selection.

Situation C: Here we find very few candidates but the cost of wrong selection is low; the strategy here would be, take of them (if there are so many vacancies) and see how they turn out.

Situation D: Here we find few candidates but the cost of wrong choice is very high. There is no obvious strategy. The management has to depend upon experience for guidance.

2.6 SELECTION TESTS

A test is a sample of an aspect of an individual's behaviour, performance or attitude. It can also be a systematic procedure for comparing the behaviour of two or more persons.

Purpose of Tests: The basic assumption underlying the use of tests in personnel selection is that individuals are different in their job-related abilities and skills and that these skills can be adequately and accurately measured.

Tests seek to eliminate the possibility of prejudice on the part of the interviewer or supervisor. Potential ability only will govern selection decisions.

The other major advantage is that the tests may uncover qualifications and talents that would not be detected by interviews or by listing of education and job experience.

Types of Tests: The various tests used in selection can be put into four categories:
(a) Achievement or Intelligence Tests, (b) Aptitude or Potential Ability Tests,
(c) Personality Tests, and (d) Interest Tests.

These tests and what they measure are described below.

a) **Achievement or Intelligence Tests**

These are also called 'proficiency tests'. These measure the skill or knowledge which is acquired as a result of a training programme and on the job experience. These measure what the applicant can do. These are of two types:

Test for Measuring Job Knowledge: These are known as 'Trade Tests'. These are administered to determine knowledge of typing, shorthand and in operating calculators, adding machines, dictating and transcribing machines or simple mechanical equipment. These are primarily oral tests consisting of a series of questions which are believed to be satisfactorily answered only by those who know and thoroughly understand the trade or occupation. Oral tests may be supplemented by written, picture or performance types.

Work Sample Tests: These measure the proficiency with which equipment can be handled by the candidate. This is done by giving him a piece of work to judge how efficiently he does it. For example, a typing test would provide the material to be typed and note the time taken and mistakes committed.

b) **Aptitude or Potential Ability Tests**

These tests measure the talent or ability of a candidate to learn a new job or skill. Through these tests you can detect peculiarity or defects in a person's sensory or intellectual capacity. These focus attention on particular types of talent such as learning, reasoning and mechanical or musical aptitude. 'Instruments' used are variously described as tests of 'intelligence', 'mental ability','mental alertness', or simply as 'personnel tests'. These are of three types:

Mental Tests: These measure the overall intellectual ability or the intelligence quotient (I.Q.) of a person and enable us to know whether he has the mental capacity to deal with new problems. These determine an employee's fluency in language, memory, induction, reasoning, speed of perception; and spatial visualisation.

Mechanical Aptitude Tests: These measure the capacity of a person to learn a particular type of mechanical work. These are useful when apprentices, machinists, mechanics, maintenance workers, and mechanical technicians are to be selected.

Psychomotor or Skill Tests: These measure a person's ability to do a specific job. These are administered to determine mental dexterity or motor ability and similar attributes involving muscular movement, control and coordination. These are primarily used in the selection of workers who have to perform semi-skilled and repetitive jobs, like assembly work, packing, testing, inspection and so on.

c) **Personality Tests**

These discover clues to an individual's value system, his emotional reactions, maturity and his characteristic mood. The tests help in assessing a person's motivation, his ability to adjust himself to the stresses of everyday life and his capacity for inter-personal relations and for projecting an impressive image of himself. They are expressed in terms of the relative significance of such traits of a person as self-confidence, ambition, tact, emotional control, optimism, decisiveness, sociability, conformity, objectivity, patience, fear, distrust, initiative, judgement, dominance, impulsiveness, sympathy, integrity, and stability. These tests are given to predict potential performance and success for supervisory or managerial jobs.

The personality tests are basically of three types:

Objective Tests: These measure neurotic tendencies, self-sufficiency, dominance, submission and self-confidence.

Projective Tests: In these tests, a candidate is asked to project his own interpretation onto certain standard stimuli. The way in which he responds to these stimuli depends on his own values, motives and personality.

Situation Tests: These measure an applicant's reaction when he is placed in a peculiar situation, his ability to undergo stress and his demonstration of ingenuity under pressure. These tests usually relate to a leaderless group situation, in which some problems are posed to a group and its members are asked to reach some conclusions without the help of a leader.

d) **Interest Tests**

These tests are designed to discover a person's areas of interest and to identify the kind of work that will satisfy him. The interest tests are used for vocational guidance, and are assessed in the form of answers to a well-prepared questionnaire.

Limitations of Selection Tests: From the basic description of tests described above, one should not conclude that a hundred per cent prediction of an individual's on-the-job success can be made through these tests. These tests, at best, reveal that candidates who have scored above the predetermined cut-off points are likely to be more successful than those who have scored below the cut-off point.

Tests are useful when the number of applicants is large. Moreover, tests will serve no useful purpose if they are not properly constructed or selected or administered.

Precautions in using Selection Tests: Test results can help in selecting the best candidates if the following precautions are taken:

i) Norms should be developed as a source of reference on all tests used in selection and on a representative sample of people on a given job in the same organisation. This is necessary even though 'standard' tests are available now under each of the above categories. Norms developed elsewhere should not be blindly used because companies differ in their requirements, culture, organisation structure and philosophy.

ii) Some'Warm up' should be provided to candidates either by giving samples of test, and/or answering queries before the test begins.

iii) Tests should first be validated for a given organisation and then administered for selection of personnel to the organisation.

iv) Each test used should be assigned a weightage in the selection.

v) Test scoring, administration and interpretation should be done by persons having technical competence and training in testing.

Activity 3

a) Was any psychological test administered to you for selection or promotion?

Yes ☐ No ☐

b) If yes, can you recall at what stage of your career was it given and what were you required to do?

.....

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.....

.....

c) Can you fit it into one of the above mentioned categories?

Stage	Required to do	Category of Test
First Selection as.....	.....	.....
.....	.....	.....
.....	.....	.....
Later promotion to.....	.....	.....
.....	.....	.....
.....	.....	.....

2.7 INTERVIEW

We shall now discuss the post application form interview and not the preliminary interview.

Personal interview is the most universally used tool in any selection process.

Meaning and Purpose

An interview is a conversation with a purpose between one person on one side and another person or persons on the other. An employment interview should serve three purposes, viz., (i) obtaining information, (ii) giving information, and (iii) motivation. It should provide an appraisal of personality by obtaining relevant information about the prospective employee's background, training work history, education and interests. The

candidate should be given information about the company, the specific job and the personnel policies. It should also help in establishing a friendly relationship between the employer and the applicant and motivate the satisfactory applicant to want to work for the company or organisation.

In practice, however, it may turn out to be a one-sided affair. It helps only in obtaining information about the candidate. The other two purposes are generally not served.

Types of Interviews

Informal Interview: This may take place anywhere. The employer or a manager in the personnel department, may ask a few questions, like name, place of birth, previous experience, etc. It is not planned and is used widely when the labour market is tight and you need workers very badly. A friend or a relative of the employer may take a candidate to the house of the employer or manager where this type of interview may be conducted.

Formal Interview: This is held in a more formal atmosphere in the employment office by the employment officer with the help of well-structured questions. The time and place of the interview are stipulated by the employment office.

Planned Interview: This is a formal interview carefully planned. The interviewer has a plan of action worked out in relation to time to be devoted to each candidate, type of information to be sought, information to be given, the modality of interview and so on. He may use the plan with some amount of flexibility.

Patterned Interview: This is also a planned interview but planned to a higher degree of accuracy, precision and exactitude. A list of questions and areas is carefully prepared. The interviewer goes down the list of questions, asking them one after another.

Non-directive Interview: This is designed to let the interviewee speak his mind freely. The interviewer is a careful and patient listener, prodding whenever the candidate is silent. The idea is to give the candidate complete freedom to 'sell' himself without encumberances of the interviewer's questions.

Depth Interview: This is designed to intensively examine the candidate's background and thinking and to go into considerable detail on a particular subject of special interest to the candidate. The theory behind it is that if the candidate is found good in his area of special interest, the chances are high that if given a job he would take serious interest in it.

Stress Interview: This is designed to test the candidate and his conduct and behaviour by putting him under conditions of stress and strain. This is very useful to test the behaviour of individuals under disagreeable and trying situations.

Group Interview: This is designed to see how the candidates react to and against each other. All the candidates may be brought together in the office and they may be interviewed. The candidates may, alternatively, be given a topic for discussion and be observed as to who will lead the discussion, how they will participate in the discussion, how each will make his presentation and how they will react to each other's views and presentation.

Panel Interview: This is done by members of the interview board or a selection committee. This is done usually for supervisory and managerial positions. It pools the collective judgement and wisdom of members of the panel. The candidate may be asked to meet the panel individually for a fairly lengthy interview.

Interview Rating

Important aspects of personality can be categorised under the following seven main headings:

- *Physical Make-up:* Health, physique, age, appearance, bearing, speech.
- *Attainments:* Education, occupational training and experience.
- *Intelligence:* Basic and 'effective'.
- *Special Aptitudes:* Written and oral fluency of expression, numerary, organisational ability, administrative skill.

- *Interests:* Intellectual, practical, physically active, social, artistic
- *Disposition:* Self-reliance, nature, motivation, acceptability.
- *Circumstances:* Domestic, social background and experience, future prospect.

This is called 'The Seven Point Plan'. The importance of each of these points will vary from organisation to organisation and from job to job. Hence, these should be assigned weightage according to their degree of importance for the job.

On the basis of information gathered through an interview, each candidate should be rated in respect of each point given above as (i) outstanding, (ii) good, (iii) above average, (iv) below average, or (v) unsatisfactory. Marks should be allotted to each of these, and the score for each point is arrived at by multiplying it by weights and the total of all these will determine the final position of a candidate at the interview.

Limitations of Interviews

Interviews have their own limitations in matters of selection. Some of these are mentioned below:

- Subjective judgement of the interviewer may be based on his prejudices, likes, dislikes, biases, etc.
- One prominent characteristic of a candidate may be allowed to dominate appraisal of the entire personality.
- The interviewer's experience may have created a close association between some particular trait and a distinctive type of personality.
- Some managers believe that they are good at character analysis based on some pseudo scientific methods and are guided by their own abilities at it.

Qualities of 'Good' Interviewers

A good interviewer should have the following qualities:

- Knowledge of the job or other things with which interviews are concerned.
- Emotional maturity and a stable personality.
- Sensitivity to the interviewee's feelings and a sympathetic attitude.
- Extrovert behaviour and considerable physical and mental stamina.

Guidelines for Improving Interviews

Not all interviews are effective. Their effectiveness can be improved if the following points are kept in mind by an interviewer:

- An interview should have a definite time schedule with ample time for interview. It should not be hurried.
- The impersonal approach should be avoided.
- Interview should have the necessary element of privacy.
- The interviewer should listen carefully to what the applicant says and the information collected should be carefully recorded either while the interview is going on or immediately thereafter.
- Attention should be paid not just to the words spoken, but also to the facial expressions and mannerisms of the interviewee.
- The interview should end when sufficient information has been gathered.
- The interviewee should be told where he stands—whether he will be contacted later, whether he is to visit another person, or it appears that the organisation will not be able to use his abilities.

Pseudo-Scientific Methods of Selection

In the past, and to some extent even now, stereotyped impressions of personality and characteristics were used as a basis of selection. These impressions were gathered through pseudo-scientific methods, like phrenology, physiognomy and graphology.

We shall briefly describe below these methods for your background knowledge only:

Phrenology: Here it is believed that the strength of each faculty is indicated by prominent bumps on certain parts of the skull.

Physiognomy: Here it is believed that there is a definite correlation between facial features and psychological functions and behaviour, e.g., thin lips indicate determination, broad jaws signify tenacity and so on.

Graphology: Here it is believed that there is a close relationship between handwriting and personality.

Activity 4

Please find out from your Personnel Department which of the above mentioned t) of interviews they use for the purpose of selection. What do they aim to judge through each of these interviews and for selection of what level of employees are these used? Write below the information you collect.

Types of interviews	Points to be judged	Level of employees
1.	.....	.....
2.	.....	.....
3.	.....	.....
4.	.....	.....
5.	.....	.....

2.7 PHYSICAL EXAMINATION

Applicants who get over one or more of the preliminary hurdles, are sent for a physical examination either to the organisation's physician or to a medical officer approved for the purpose.

Purposes: A physical examination serves the following purposes:

i) It gives an indication regarding fitness of a candidate for the job concerned.

ii) It discovers existing disabilities and obtains a record thereof, which may be helpful later in deciding the company's responsibility in the event of a workman's compensation claim.

iii) It helps in preventing employment of those suffering from some type of contagious diseases.

iv) It helps in placing those who are otherwise employable but whose physical handicaps may necessitate assignment only to specified jobs.

Contents of Physical Examination: Physical examination covers the following:

- The applicant's medical history.
- His physical measurements—height, weight, etc.
- General examination—skin, musculature and joints.
- Special senses—visual and auditory activity.
- Clinical examination—eyes, ears, nose, throat and teeth.
- Examination of chest and lungs.
- Check-up of blood pressure and heart.
- Pathological tests of urine, blood etc.
- X-ray examination of chest and other parts of the body.
- Neuro-psychiatric examination, particularly when medical history or a physician's observations indicate an adjustment problem.

You would realise that the importance of these characteristics varies from job to job and, therefore, different weightages have to be given to each for an overall evaluation.

2.9 REFERENCE CHECKS AND FINAL DECISION

The applicant is asked to mention in his application the names and addresses of, usually, three such persons who know him well. These may be his previous employers, friends, or professional colleagues. They are approached by mail or telephone and requested to furnish their frank opinion, without incurring any liability, about the candidate either on specified points or in general. They are assured that all information supplied would be kept confidential. Yet, often either no response is received or it is generally a favourable response. Applicants who cross all the hurdles are finally considered. If there are more persons than the number required for a job the best ones, i.e., those with the highest scores are finally selected.

2.10 PLACEMENT

Sometimes a particular person is selected for a given job. Often more than one person may be selected for the jobs of similar nature. In the second case, individual employees have to be put under individual supervisors with the approval of the latter. In the first case also his approval is also necessary but it should be done early in the selection process.

A proper placement reduces employee turnover, absenteeism and accident rates and improves morale.

2.11 INDUCTION, ORIENTATION OR INDOCTRINATION

This is the last activity in relation to a newly employed person before he is trained for his job.

Meaning

As explained earlier, it is introduction of an employee to the job and the organisation. The primary purpose is to 'sell' the company to the new employee so that he may feel proud of his association with the company.

Purpose and Need

An employee has to work with fellow employees and his supervisor. For this he must know them, the way they work and also the policies and practices of the organisation so that he may integrate himself with the enterprise. Any neglect in the area of induction and orientation may lead to high labour turnover, confusion, wasted time and expenditure.

Induction Programme

A good induction programme should cover the following:

- The company, its history and products, process of production and major operations involved in his job.
- The significance of the job with all necessary information about it including job training and job hazards.
- Structure of the organisation and the functions of various departments.
- Employee's own department and job, and how he fits into the organisation.
- Personnel policy and sources of information.
- Company policies, practices, objectives and regulations.
- Terms and conditions of service, amenities and welfare facilities.
- Rules and regulations governing hours of work and over-time, safety and accident prevention, holidays and vacations, methods of reporting, tardiness and absenteeism.
- Grievances procedure and discipline handling.

- Social benefits and recreation services.
- Opportunities, promotions, transfer, suggestion schemes and job satisfaction.

An induction programme consists primarily of three steps:

General orientation by the staff: It gives necessary general information about the history and the operations of the firm. The purpose is to help an employee to build up some pride and interest in the organisation.

Specific orientation by the job supervisor: The employee is shown the department and his place of work; the location of facilities and is told about the organisation's specific practices and customs. The purpose is to enable the employee to adjust with his work and environment.

Follow-up orientation by either the personnel department or the supervisor: This is conducted within one week to six months of the initial induction and by a foreman or a specialist.

The purpose is to find out whether the employee is reasonably well satisfied with him. Through personal talks, guidance and counselling efforts are made to remove the difficulties experienced by the newcomer.

2.12 LET US SUM UP

This unit has helped you to follow the process of selection in an organisation right from the conception of an idea that a suitable person is to be put on a given job to the point of ultimately selecting the most suitable person for it, putting him at ease and making him feel at home with his fellow employees, his supervisor and the organisation as a whole. It has helped you to understand the various activities involved in the process and the order in which these are carried out. It has given you insight into the various alternatives and methods of various activities and under what circumstances each is advisable. It has also helped you to realise the various precautions to be taken so that your efforts under each activity bring desired results.

2.13 SELF-ASSESSMENT TEST

Take each of the objectives stated at the beginning of the Unit and regard it as a question. Working from memory, write not more than half a page on each so that you may assess whether you can recall the main points contained in the unit.

2.14 FURTHER READINGS

Fear, Richard A. (1984), *The Evaluation Interview*, McGraw-Hill: New York.

Maier, Norman R.F. (1982), *Psychology in Industrial Organisation*, Houghton Mifflin Co.: New York.

Monappa, Arun and Saiyaddain, Mirza S. (1983), *Personnel Management*, Tata McGraw-Hill: Bombay.

Pigors, P. and Charles A. Myers (1981), *Personnel Administration—A Viewpoint and a Method*, McGraw-Hill: London.

Yoder, Dale and Paul D. Staudohar. (1982), *Personnel Management and Industrial Relations*, Prentice-Hall: Englewood-Cliffs.

UNIT 3 TRAINING AND DEVELOPMENT

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the reluctance of training in improving the job performance of the employees of the hospital in providing a better quality of patient care;
- decide the job responsibilities for the employees with the help of their respective supervisors and divide them into tasks;
- identify the deficiencies in job performance of all the categories of employees which can be rectified by training;
- list the principles of adult learning;
- select the trainees centred and trainer centred approach appropriately;
- prepare a training curriculum for rectifying their gaps in performance, in collaboration with the trainers;
- evaluate the training i.e. the training course, improvement in the job performance of employees, its impact on the improvement of patient care and the cost benefit of training; and
- chalk out a training plan—short-term and long-term for hospital.

3.1 INTRODUCTION

The primary aim of a hospital is to provide good quality patient care. The patient/ client attending the hospital should be given top priority. This care can be imparted by the qualified and trained staff only.

The key being the staff delivering the services, due emphasis should be given in the planning of the staff requirement alongwith the skills required by them. The qualified staff will remain in the organisation if there are good promotional avenues and the sincere workers are rewarded. This requires career planning and a fair performance appraisal and personnel policies.

Competent personnel can be appointed only if there is a rational and fair process of recruitment and selection. Further, the personnel appointed should be placed in the right job. There should be no square pegs in round holes. This is discussed in Unit 2.

A worker can do his job best when the job expected out of him is crystal clear to him and he possesses the knowledge, attitude and skills required for the job. This will necessitate imparting tailor made, need based training. The planning, implementing and evaluating the training necessary for the staff of the hospital is being discussed in this Unit.

3.2 RELEVANCE OF TRAINING

- We invariably send the most hard working employees for training especially foreign training as an appreciation of their good work. This is a common reply that most administrators give as the criteria used for nominating employees for training.
- Now that you have had a nice time you might as well get down to work. This is the welcome given to the employee when he returns from a foreign training and presents a bottle of scotch brought from the duty free shop to the administrator after profusely thanking him to give an opportunity to tour abroad.
- Training is a waste of money. There are no changes in performance when the employees come back to work. Lament most administrators.

We bet you will agree with that these situations are common and not few and far between. Our questions to you is: Are you one of these administrators? You need not answer this question but just think over it for a few minutes.

We admit training is not a panacea for all the ailments in your set up but any such attitude by the administrator will ensure that the training is not effective at all. Training may not do wonder but will definitely improve the performance. The investigations in the laboratories are not very reliable at times not only because the employees are not sincere but also because the technicians are not fully skilled on the equipment they are using and the supervisors lack supervisory skills particularly skills for supportive supervision.

Training if imparted objectively to the right person will definitely improve performance provided the deficiency in performance is not due to inappropriate instruments or managerial problems. Don't you find the performance of your doctors improve after they go and learn a new technique. The same applies to all the employees of your hospital. A properly chalked training plan over a period of couple of years will result in not just improvement in the technical performance of the employees but surprisingly also their inter-personal communication behaviour, motivation and even their ability to take right decisions and shoulder more responsibilities.

An administrator's job is not just limited to nominate the right employee for training or holding consultation with the trainers to conduct need based training. To make the employees perform upto the mark has to plan and innovate changes in the atmosphere where the employees are given more independence to take decisions and shoulder responsibilities (under supervision of course which may be covertly or overtly done). Training should always be reviewed and planned as a long-term strategy taking the goals and proposed future developments of the hospital.

You will be learning about training from the administrators' point of view in this unit and not from the trainers' point of view. The aim is not to make you a trainer but enable you to guide the trainer you appoint about what is expected out of him. Further, you will be able to evaluate the training being conducted, the trainers trained and find out the cost-benefit or even cost effectiveness (if possible).

3.3 TRAINING NEED ASSESSMENT

I hope by now you realize that the performance of individuals can be improved by carefully designed need based training. So we proceed towards designing need based training. However, if you are not convinced that training will improve performance will request you to critically observe those employees who are not performing up to the desired level. Are all of them not interested in work with a 'Chalta hai' attitude? I am sure that is not the case. (In fact, motivational levels can also be increased by training.) Some would be lacking in the requisite clinical or technical skills (we arrogantly call them as not intelligent enough). Some may be having problems, managing their jobs properly or not being able to take appropriate decisions. (We call them as disorganized and confused.) Some would have problems in communicating with people especially interpersonal communication. (We call them as insensitive people or as outright rude.) Now what do you think if they are given specific training keeping their deficiencies in mind? Won't their performance improve? I bet you will agree with me. In case you do, you have arrived at the first step of training — i.e. the training should be need based.

Before proceeding further let's make the ground rules clear so as to be on the same wavelength. In this unit 1 will be considering you as an administrator or manager who is planning the training in the hospital and holding discussion and advising the trainers and not conducting the training himself.

Once we have agreed that the training will be effective if it is need based, then the next question is how do we diagnose that elusive 'Training need'. Before proceeding to 'how' let's first examine 'what' that training needs is. As an administrator your primary aim is that the employees should work well or perform their duties well. In other words they should perform their duties at the desired level. This desired level of performance is decided by you. If may or may not be described in concrete terms or not even explained to the employee.

3.3.1 Job Responsibilities and Task Analysis

The first step which you will have to perform even before attempting to assess the training needs is the identification of the job responsibilities or job description of every employee. This will involve analysing his job and what is expected out of him. Numerically it will come to the responsibilities he has generally got to perform and duties he has got to perform sometimes. Once these responsibilities have been listed out the next step would be do a task analysis.

Task Analysis

Each duty which an employee performs when analysed in detail would show us that it comprises a number of smaller tasks which have to be performed. A duty like immunizing a child would comprise a number of tasks like:

i) determining the age of the child,

ii) determining the immunization status of the child,

iii) enquiring about the reaction to previous immunization,

iv) setting up of the immunization clinic,

v) packing of the vaccine carrier or proper storage of vaccine in the refrigerator,

vi) determining the correct dose of the vaccine,

vii) administrating the vaccine by the correct route, and

viii) maintaining appropriate records to show that the vaccine has been administered.

Once the task analysis has been done, the standard of performance has to be determined. This standard may be different for different level of workers. For instance suturing is done by nurses, doctors, surgeons and plastic surgeons. The standard of performance would be different. A very good suture by a nurse may be labelled as poor by a plastic surgeon. The administrator has to decide the level of performance for his organisation. Once this is done we know exactly the desired level of performance of all the employees.

3.3.2 Determining Training Needs

The next step is determining the present level of performance of each task. I am sure you must have guessed it that the best way to determine the level of performance is by observing the employee. This is easier than done as it is generally not feasible to observe a large number of employees performing a variety of jobs. So other simple methods are adopted to simplify them. They are:

1) Interviewing the employees and also asking them to fill questionnaires to know their knowledge and determine some of their's attitudes.
2) Interviewing their supervisors, peers and sometimes their subordinates to identify the gap in their performance.
3) Reviewing of their performance appraisal reports and personal records.
4) Self-appraisal of the employees.
5) Determining client satisfaction.

Using an optimum mix of one or more methods would tell us about the actual level of performance of the employee (Y). This discrepancy in performance (X-Y) will give us a list of tasks which need to be improved upon. From this list we examine and eliminate the non-training interventions (Z). Finally, we will get a list of tasks which can be improved upon by training (X-Y-Z).

These tasks will then be prioritized. To this we will add the future needs of the employees based on the future plans of the hospital.

These are the training needs of the employees.

Macro Needs and Micro Needs

Macro needs are those needs, which exists for a large number of employees. Supposing the laboratories in your hospital has recently acquired computerized auto analysers. May be all your technicians will be required to undergo training. This is the macro need. Micro needs would be some specific training needs of some employees.

3.4 PRINCIPLES OF ADULT LEARNING

All of us went to school when we listened attentively to our teachers (at least those whom we liked) and tried to absorb every word they spoke. Whatever the teacher spoke was taken as the gospel truth with a firm faith that the acquired knowledge would do wonders in our lives. Do we still exhibit that behaviour? I don't think so. If we have changed over the years others must also have changed. So we must organise course in a manner conducive for the adults to learn.

Research shows us that the ability to learn remains unimpaired throughout life though they may underestimate their ability to learn and therefore have a lack of confidence in their learning. The trainer has a responsibility in trying to restore that lost confidence.

Adults display interest in learning those things which may help them in their lives or in their job. Hence the need for designing a need based training course. The learning process is related to and makes use of the experience of the learners. The trainer should conduct training in a manner where the experiences of the learners is exploited to the maximum. This may involve methods as discussion, role playing, case method etc. The new learning should be applied to their experiences to make learning more meaningful.

The adults are over cautious of their status and scared of embarrassing situations. The training should be made in a manner that they are comfortable. The in breaking games are very helpful and the time spent on them is actually helpful in making the atmosphere conducive to learning. Their self-esteem should be respected and at no point should they be put in embarrassing situations. They should not be snubbed even if they are obviously wrong. Their statements should be rephrased and told in a polite manner. The participation of the trainees should be high. They should be given plenty of practice along with feedback. The feedback provided should be positive helping them to convert themselves and improve their knowledge and skills. Negative feedback is considered to be counter productive.

Maintaining a high motivational level helps the learning process. This can be done by quoting work related problems and providing a clear performance target. Treating them with respect and giving them responsibility and providing variety in training keeps the trainees motivated. This physical environment viz., the seating pattern, lighting, temperature if conducive also motivates the learners.

Last and perhaps the most important as the course progresses; the dependency of the trainee on trainer should decrease and he should assume increasing responsibility for planning their own learning. The best course is one where at the end the trainee says that he "Learnt everything himself".

3.5 APPROACHES TO TRAINING

As we have already seen learning is best when the trainee is well motivated and is actively involved in taking the responsibility of learning on himself. This is possible when the trainer creates an atmosphere when the trainee individually or in groups works towards achievement of the goals and objectives of training and the trainer acts as a facilitator helping the process of learning. There is active learning by the trainee. This is known as the 'Trainee Centred Approach'. This has been found most effective in the training of adults and the training methods selected by the trained should fit with this approach.

However in hospitals, especially when it comes to clinical practice or the use of sophisticated equipment there is only one correct way of doing the things. For example, there is only one way of inserting Ryles tube and giving Ryles tube feeding. There is only one way of incubating a child. These tasks which can be done only in one way are known as "Reproductive Tasks'. In training personnel in such tasks there is only one way the training can be imparted. In such tasks the trainer demonstrates to the trainees what is expected out of him i.e. how to perform the task and assess the performance on the level of achievement by the trainee using a checklist. (This is explained in the sub-unit on Evaluation.) This is the Trainer Centred Approach and to make it effective after efforts should be made to have active participation and practice by the trainees. In imparting knowledge by lecture method the learning is passive. Efforts may be made to involve the trainees by asking questions or making the 'didactic lecture' a 'lecture discussion'. Active learning is more effective than passive learning and efforts should be made to reduce the latter in training.

3.5.1 Types of Training

Induction Training

Induction training as the name implies is the training imparted to the new employees 'inducted' in the organisation. Induction training helps in orienting the new recruit towards organisation and its goals. Few examples of good induction training are Lal Bahadur Shastri National Academy of Administration, Mussoori for the IAS Officers and Indian Military Academy for the Officers Recruited in the defence services. Induction training is especially important when we have people from different educational schemes for the same job.

Placement Training

Placement training is training imparted to an individual before he is 'placed' in a new section or department. It is something like a smaller version of induction training.

Inservice Training

Inservice training is the training imparted to the employees during their service with the aim of acquiring the new skills and brushing up the old ones. A well planned need based inservice training course improves the motivation and morale of the staff along with their job performance. It may be on or off the job, off the job is normally institutional training.

On-the-job Training (OJT)

In on-the-job training the trainer comes to the place of work of the trainee. The trainer is observing the trainee, guiding him and removing his faults. OJT is perhaps the best form of need based practical skill based training. The trainee can relate it to his job immediately and put it in practical use. This is perhaps the best form of training possible especially for the lower level workers.

Promotional Training

A surgeon is promoted to the post of HOD Surgery. The new job involves a lot of administrative work alongwith the planning for the future. If justice has to be done to this additional work time will have to be devoted. The total time in a day is constant, so time has to be taken out from other activities—in this case clinical and surgical. A well designed promotional training is able to bring to focus the change in job requirements of the employee after promotion as well as give skills to perform it well.

3.6 OBJECTIVES OF TRAINING

The objective of training is to achieve a clearly defined performance. It describes what a trainee should be able to do at the end of training that they would not do before hand. They may be also called as 'Learning Objectives' as opposed to 'Teaching Objectives'. They define what the trainee, not the trainer, should be able to do.

The aims are directed towards the trainer while the general and specific objectives are directed towards the trainers. A training course is the process of providing learning experience for trainees and results in desired end products called learning outcomes. These outcomes are what the trainees have learnt and can do.

Elements of a specific educational objective:

Act Contents Condition	Task
and Criteria	

Act: It is the description of the task aimed at, expressed by an active verb.

Content: It specifies the subject, the theme or substance in relation to which the act is to be performed.

Condition: It is the description of the circumstances in which the act must take place.

Criterion: It is the desired level of performance expected from the trainee.

The specific objective should be relevant, logical, feasible, observable and most importantly measurable.

It should always state what the trainee must be able to do at the end of training. At the end of the training the trainee will be able to weigh the child on a spring balance upto an accuracy of 100 gms.

Weigh	—	Act
The child	—	Content
On a spring balance	—	Conditions
Accuracy of 100 gms	—	Criteria

Check Your Progress 1

Which of the two objectives are written in performance or behavioural terms.

a) The trainee will be able to autoclave syringes and needles in a pressure cooker.

b) The trainee will be able to understand how to autoclave syringes and needles in a pressure cooker.

The act of writing down an objective is merely that what was once a secret is now open for inspection and improvement.

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3.7 TRAINING METHODS

The outcome an inservice training programme depends not only on the knowledge and information imparted but also on the skills of presentation i.e. the training method used. In the recent past the main emphasis in the context of training method has been on:

i) Reduction in didactic teaching.

ii) Promotion of participatory approach in training.

The classical method of 'chalk and talk' through, has its own place in the scheme of things, yet it has been replaced by what has been called as 'experiential learning'. The shift of focus can be discerned by a schematic diagram given below:

Minimum participation of trainers				Maximum participation of trainees including experiences	
Learned Paper	Pure Lecture	Lecture and Q	Lecture discussion	Pure discussion workshop	Case method role play brainstorming counselling

The basic contention in participatory training methods is that it is usually easier to change the attitudes and behaviour of people by making them learn through discussion, activity and experiences.

3.7.1 Lecture Method

A classical lecture is a situation where an expert gives a talk on a subject to a large audience and 'information' is communicated to others. It has limited involvement of the participants and also doesn't ensure that the participants have 'learnt' what was 'taught'. In inservice training the lecture should provide the trainees specific job related information. Therefore, the effort is to involve the trainees in session for their maximal benefit and the term 'lecture discussion' is used differentiating of it from 'didactic' lecture.

The structure of a lecture normally is:

Introduction

The objective of the lecture is stated and the learners are explained what they should expect and how they are expected to participate.

Development

It is during this period that the information is communicated and to be effective, it should be organised. Some planning guidelines are that people learn best by moving from the

—known to the unknown

—simple to the complex

—concrete to the abstract

—observation to the theory

—general to the particular

Questions should be asked to assess if the information is being acquired by the trainees. Key points should be repeatedly emphasised. The contents may be decided on the basis of the objectives as what the trainees 'must' know, 'should' know and 'could' know.

Summary

The major points of the lecture are summarised. This helps the trainees to remember the 'must know' portion of the session. Questions may be asked to know the level of achievement of performance. The trainees should be guided for further reading and trainees be thanked in the end.

Perhaps the oldest method of training, jokingly it is said that it has survived because the trainer teaches what he wants to teach and the learner listens to what he wants to listen. So no complaints. This is precisely the greatest drawback of this method. We have already discussed that learning is best when there is active participation and intense activity by the learner. The learner here is just a passive listener. Further studies have shown that the concentration of the learner starts dipping after 20-25 minutes even if the lecture is interesting. The method can be made more effective (we cannot do away with it) by making it more interactive in an informal and supportive atmosphere and the effective use of audio visual aids.

3.7.2 Role Play

The trainees assume a role and enact it in front of the group. It helps in developing insight into the behaviour of self and others. The role player can examine delicate problems in human or inter-personal relation.

Role play is an effective training method when the objective is an attitudinal change dealing with feelings and emotion. For example, how to communicate to the mother about the death of her child on the operation table may be demonstrated very accurately through a role play. A lecture may not be able to explain the verbal and non-verbal gestures so easily displayed through a role play. Similarly for teaching counselling skills role play again is perhaps the best method. However, a role play may be successfully used for training skills like history taking, filling of ANC card etc.

In a role play the script (verbal statement) along with the feelings associated are given to all the role players which they enact in front of the audience. Such role plays are known as structured role plays. On the other extreme the situation is explained to the actors and the script is open. These are unstructured or spontaneous role plays. In the middle come semi structured role plays. Spontaneous role plays bring out the feelings very well and are very useful in imparting training in communication and counselling skills. Structured role plays are used in management training especially for negotiation skills.

Steps in Designing a Role Play

Once the trainer has specified the objectives and decided upon role play as the method of training he devises a scenario. It may require a writing brief introduction about setting the scenario. The roles are then identified. Depending on the type of role play conducted the script for the roles may need to be written. The role players may then have to be explained about the situation and their role either in groups or individually (depending upon how the role play is conceived). The role play is then enacted in front of the other trainees. It is followed by debriefing or past role play discussion. The views of the audience and the players is sought after which the trainer sums up. This debriefing is very important and the outcome of the role play is largely dependent on this. This should never be 'hurried up' as this is a sure way of ensuring that the

role play is not useful to the participants. One rule of the thumb is that the time taken in debriefing should be equal to the time taken in running the role play. Few don'ts about the role play are that as a rule the players performance should never be criticised. The advise and assistance by the trainer should never be withheld and the debriefing should not be crammed with an inadequate time.

Advantages of role play are that it is a highly stimulating trainee centred method of training allowing them to practice social skills and the skills of articulating and empathizing along with the skills of decision making, problem solving and negotiating. It provides a real life situation in the classroom along with immediate feedback which can effect attitude changes for the better. Feelings and emotions are given free rein.

The disadvantages of a role play are that the results can be unpredictable. It may not be regarded as a serious form of training by other trainers. It may give the trainees an impression of perfect understanding when the real life situation is more complex. It may be a wasteful of time if the method is used with inadequate preparation or wrong selection.

3.7.3 Case Method

Case method is an experiential method of learning. Learning follows experience. It comes from learner himself. Every individual's experience is unique to himself. None can tell him what he is to learn or gain from any activity. Learning can be devised but it is for the participant to validate for himself.

Case method uses a description of a real life situation, records for use in a training session as material for discussions and learning. Case leads upto a problem but gives no answer of any kind; no one right answer is obvious. The case method is particularly suitable for developing multiple ways of thinking because it forces a trainee to think in terms of particulars. The method through group discussion produces a wide range in opinions. The trainer merely acts as a facilitator than as a speaker. He listens to the discussions but remains quite during the discussion phase and only very occasionally shares his personal perceptions of the matter, that too to keep the level of the discussion high and going. In the end he rephrases and clarifies viewpoints on the basis of available information and knowledge on the theme.

Objectives of the Case Method

—To give trainees the feel of real life situations.

—To impart greater knowledge and understanding of man and matters.

—To help trainees discover for themselves facts and ideas which are meaningful in a particular situation.

—To sharpen the power to think logically about certain facts, analyse them and arrange them in order of priority.

—To help in discovering and defining the vital questions and finding out answers to these questions.

—To develop problem solving abilities.

—To develop the ability to appreciate other people's feelings and arrangements and modify conclusions in the light of the discussions with others.

—To help the trainees to understand that there can be more than one solution to a problem and acquire fresh ideas from the experience of others.

—To enable the trainees to learn principles and ideas which have applicability in the real situations.

Types of Cases

—Fabricated cases

—Audio-visual cases

—Line cases

—Role play cases

—Actual situations

The Incident Process

—Only a bare incident is reported to the group

—Involves merely a statement

—Key information is withheld

—Case reconstructed by asking questions WHO? WHAT? HOW? WHERE? WHEN?

—Discussion follows

Methodology

a) **Case Study Analysis**

—What is going on here?

—Is there a problem at all?

—What precisely is the problem?

—What has caused it?

—Are we looking at causes or symptoms?

—What are the main issues?

—Why are these issues important?

—Whose problem is it?

—What precisely are his objectives?

—What should he try to do now?

—What possible courses of action are open?

—How realistic is each of the actions/solutions proposed?

—What are their possible effects?

b) **Case Discussion**

The case is discussed by all the course members, the case leader functioning as a discussion leader. He helps trainees to think for themselves in a non-directive way. The discussion involves free interchange of opinions and free give and take of views in an informal atmosphere. The participation and involvement of all the group members is essential not only to ensure that all participants have the advantage of obtaining training in decision making but also bringing to light different aspects of the situation. The case discussion enables the participants to develop practical skills and appropriate attitude, relevant to an administrator. For instance,

i) it develops ability of clear communication while arguing;

ii) it develops sensitizing of others viewpoints as well as insight into one's own bahaviour during social interaction.

iii) develops skills of problem solving and decision making.

Writing a Case

—Select the type of problem and organisation from which the material will be obtained.

—Observe and collect the data

—Write the case with objectivity

a) Select the detail

b) Set the scene quickly

c) Write in the past tense

d) Decide on disguises

—Clear the case

—Confirm the usefulness of the case as teaching material.

3.7.4 Group Discussion

Group discussion is an effective method when the trainees have considerable experience and maturity and a lecture is not desirable. It may also be used after a lecture to apply the concepts in their place of work.

The group discussion is initiated by a leader who introduces the topic and clarifies the purpose. Then by putting forward key questions he starts the discussion rolling. The leader is supposed to stimulate interest, ensure that all the members participate in discussion, stick to time and sequence, be impartial and be a source of information. The leader should stimulate generation of ideas by asking high order questions i.e. those having more than one answers and develop teamwork within the group. The leader should summarise the discussion and delegate action points to members if requested.

The trainer before deciding on group discussion as a method of training should consider the number of learners, their likely behaviour, the learning environment, facilities available, the time constraints and the possible learning outcome. The sitting management is very important. The advantages of a group discussion are that it is learner centred learning. Enables skills to be practised, takes into problem solving situations and the trainer acts as a coach/monitor. Further in a group the trainees give their best if the atmosphere is conducive.

The disadvantages are that it requires careful planning, the outcome is difficult to predict and dependent on learner attitude.

3.7.5 Competency Based Training

Competency based training (CBT) is distinctly different from traditional education processes. CBT is learning by doing. It is based on social learning theory which states that when conditions are ideal, a person learns more rapidly and effectively from watching someone (model) perform a skill or activity.

CBT provides health care workers with those competencies vital to the successful performance of their jobs. Unlike traditional teaching which emphasizes evaluation of what information the participant has learned, CBT emphasises evaluation of how the participants perform i.e. a combination of knowledge, attitudes, and most important skills. Terms used to describe the levels of clinical skill performance.

Skill Acquisition

The trainee knows the steps and their sequence (if necessary) to perform the required skill or activity but needs assistance.

Skills Competency

The trainee knows the steps and their sequence (if necessary) and 'can perform' the required skill or activity.

Skill Proficiency

The trainee knows the steps and their sequence (if necessary) and 'efficiently perform' the required skill or activity.

The criteria for efficiently performing the skill is standardized and is judged by using a checklist when the trainee performs. The coaching process ensures that the trainee receives feedback regarding performance.

—Before practice

—During practice

—After practice

3.7.6 Brainstorming

Brainstorming is a creative group work in which members produce large number of ideas quickly for subsequent evaluation and action. Generation of ideas in a group is more effective than trying to generate ideas individually. It can be conducted with a group ranging from 1 to 20 participants through the optimal size is about a dozen participants. Communication is directed towards the trainer or the participants who is assisting in writing the ideas on a flip chart. Short mutual conversation or consultation among the participants is permitted. Each participation in term gives his ideas. Other participants are free to develop or modify the ideas of other participants.

Some Rules/Principles

1) Do not evaluate any of the ideas stated.
2) Accept ideas as they are expressed even if they appear to be ridiculous or useless or stupid.
3) Allow free flow of ideas. Just let participant's ideas go.
4) Never mind the quality of ideas, it is quantity that counts.
5) Consider ideas produced as a common pool. Any one could pick any idea expressed by the other and change or develop on that.
6) Enjoy the session. There could be a lot of laughter or wit. Let it be work with fun.
7) Ensure that every one participates. Allow each one to call out his ideas when those occur to him.
8) Continue the process till all ideas are exhausted and members on their turn having no idea just say 'Pass'.
9) Trainer/Leader helps in summarising an idea statement and guide members in clarity of expression.
10) List down all the ideas.

Steps of Brainstorming Session/Structure of the Session

a) **Introduction:** The trainer explains broadly the rules to be followed and emphasises on each one's participation, non evaluatory nature of the exercise and generation of as many ideas as possible by them.

b) **Warming up:** To prepare the participants for real problem at hand it is essential that they may be given some practice in free flow of ideas for 3 minutes by asking them to given different uses of any day to day object. It helps to induce them to think divergently.

c) **Define/State the Problem:** The trainer states the theme/issue/problem on which he intends to have the brainstorming.

d) **Focussing the Problem:** The trainer asks the participants to give various suggestions on the stated problems by asking How do you do this? It helps to make up a series of focus statements out of which he later chooses one or two focus statements that have potential for generating further ideas.

e) **Brainstorming:** Call for the ideas pertaining to any one selected focus statement. These ideas are classified as 'Developments' and noted down under that heading on the flip chart by one of the participant who has been assigned the responsibility.

The exercise is started by signalling the participants to start. Periodic stimulation to come out with ideas is there. He may ask them to be active. He may suggest to look at any idea and ask for any extension or elaboration or variation on that. Having exhaused on 'F' statement 1, the focus statement FS2 could be taken up depending upon the time and purpose. All the ideas are recorded. Care is taken as to allow free flow of ideas without any inhibition. Questions based on five Ws (WHO, WHY, WHEN, WHERE, WHAT) and How help flow of ideas.

f) **Daftest Suggestion:** Pick the craziest suggestion from the list of developments. Ask how it can be converted into a sensible or useful idea. Write the suggestions separately not under development.

g) **Evaluation and Summary:** Trainer quickly glances at various ideas, evaluates those and immediately prioritise those according to their importance and effectiveness and summarises the findings which may be noted down by participants. There is no follow up on it. A lot depends on trainer or leaders ability to evaluate and summarise.

3.7.7 Syndicate Method

The syndicate method of training can be very effective for enhancing managerial skills especially in decision making and problem solving. A small group of 5-6 trainees is formed who study and discuss a managerial problem. The group comes out with a report which has suggested solutions. The main advantage is that the trainees draw upon their own experiences and discuss and come to a consensus. The trainees also learn how to work and adjust in a group. The report is then presented where the views of the faculty and other trainees are also received.

3.7.8 Panel Discussion

Three or four experts who are an authority in a specific subject comprise a panel. The panelists conduct an open discussion in the presence of a training group with a moderator guiding the discussion. The method is very effective when the subject matter is very complex with many facets or when there are different views on the subject. The members of the audience can also join in the discussion. The interaction amongst the panelists and the trainees helps in better understanding of the problem. Selection of a skilled moderator is very important for the panel discussion to be effective.

3.7.9 Programmed Learning

In programmed learning a trainee learns himself (self learning) by going through a series of steps. At the end of each step the trainee has to answer a few questions. Only if the questions are answered correctly does the trainee proceed to the next step.

The features of programmed learning are (ILO handbook on programmed learning):

1) Trainee works at his own pace
2) Through a series of logical steps
3) Each step leading to predefined objectives
4) Responding actively and mastering each step.
5) Recovering feedback at each step to correct and encourage the trainee.
6) The programme is pre-tested before using it.

Check Your Progress 2

Which is the best training method?

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.....

.....

.....

3.8 TRAINING AIDS

The trainer's aim to make the process of learning interesting and simple. Based on the observation that sight accounts for around three fourth of the senses used by man along with that the remembrance is best when vision and sight are used in combination, the trainers use aids to facilitate learning. So the training aids are in facts learning aids. They are used to clarify and simplify topics which may be difficult if explained orally.

They are effectively used to emphasize key points and maintain interest. The commonly used training aids are blackboard or chalkboard, white board, magnetic board, flip chart, flash cards, charts, overhead projector, models, audio cassettes, slides, synchronized slides and cassettes and video cassettes. The selection of the aid should be based on the necessity and suitability of the topic. It should be simple and should take into consideration the size of the audience.

Blackboard or chalkboard is the most widely available and commonly used aid. Write boldly using coloured chalks if necessary. Do not talk while writing on the board. Turn around and talk to the audience and do not stand in the middle of the board obstructing the view.

The whiteboard is like the blackboard except that pens are used instead of chalks. The magnetic board is used by placing prepared cards on it. Both are costly but effective aids if available. The flip chart is also used like a blackboard with the difference that the charts can be reused. Further good quality charts can be made in advance. Notes can be written lightly by a pencil which the trainer can read but the trainees cannot see. Sequence should be pre-arranged and rehearsed prior to the session. Use of models makes the process of learning very simple. Slides should be used along with commentary. Synchronized slides with audio cassettes reduce the need of commentary by trainer. A good video cassette can be a very effective aid in learning. It should always be followed by a discussion. It should not be used as a filler for the speakers not turning up.

Overhead Projector (OHP)

The transparencies are projected on a screen and the OHP is used as a refined blackboard. Technically the reception by the trainees is better if the transparencies are prepared by keeping them in a horizonted position and some computer packages prepare them in that manner. However practically what happens is that it is projected outside the screen if the OHP is not set properly. Since setting of the OHP depends on the space available and beyond the control of the trainers the solution is to prepare transparencies by keeping them in a vertical position.

The portion of the transparency not to be screened should be covered by a piece of paper. The extra written material projected distracts the audience. Switch of the light when no transparency is being projected and also while changing transparencies. On projecting a transparency wait for a few seconds for the audience to read it before describing it. Do not read from the transparency by talk around it describing what is written. Do not write too many details. Remember it is an aid for the trainee and not the trainer. Notes written on the mounted transparency by pencil may be used as a guide to the trainer. Ability to maintain eye contact with the trainees is the advantage OHP has over blackboard and it should be used to the maximum. Don't turn your back towards the audience pointing towards the screen. The same may be done by using a pencil on the transparency and maintaining eye contact with the trainer.

Display – Only when required

Describe – What it represents

Teach – Using the aid to assist

Dispose – When no longer required

For a group of 20-25 trainers are

6 mm size of letters

6 words in a time

6 lines in a page

Last and most important—make and use your own aids.

3.9 EVALUATION OF TRAINING

Training is worthwhile only if it produces results. I think you will all agree with this statement. So let's see how we can measure results. The only problem is that different

people will view results differently. The trainee who undergoes training will consider the training worthwhile only if there is an improvement in his knowledge and skills and can perform his job better after training. The immediate officer of the trainee (supervisor) views the success of the training in terms of improved performance and output. The trainers evaluate the training in terms of the level of achievement of the objectives. The senior administrator (you) will like to know if the investment on training was worthwhile. In a business enterprise this is very easy to calculate. You invest three lakhs in the training of your marketing manager, sales executives and sales representatives. After an year you assess the increase in sales. If the sales go up by 1 lakh you know that the investment would break even in 3 years (we don't take the interest on investment for the ease of calculation) and then you will be gaining 1 lakh every year. Seemingly a worthwhile investment. How do you measure this in a hospital? The improvement will not be in terms of money but in terms of (a) improvement in the quality of services, (b) improvement in client satisfaction; (c) improvement in the reputation of the hospital. As an administrator you will have to develop yardsticks (indicators) to measure these and weigh the investment on training in relation to the indicators developed.

In any case this will be possible only if need based quality training is imparted. Assuming that the training needs were correctly assessed. Let's see how can we evaluate the quality of training imparted.

The purpose of training is to bring about an improvement in performance. In other words, a trainee after undergoing training should be able to perform his job better. Only when this happens can we call the training to be successful.

So how do we find out if the training is successful? The simplest method is by examining the performance of the health personnel i.e. how the trainee is performing. But there can be situations where the trainee is good and sincere with a willingness to learn. Yet there may be no improvement in performance. Well, what do you think could be the reason in such a case? Yes you have guessed it right. The training could be faulty and ineffective. In order to have a correct idea we should also examine the training process. So what we are actually doing is examining the trainer and his training course.

When we are assessing the progress and the performance of the trainee, it is called as "Assessment". When we are trying to find how well the trainer is doing (including the course he is running) it is known as evaluation.

Check Your Progress 3

Assessemnt is how well the ..... is doing.

Evaluation is how well the ..... is doing and how good is the .....

3.9.1 Assessment

As we have already discussed, the assessment is of the trainee. Now we'll make an attempt in defining it.

"Assessment is the testing and appraisal of trainees' performance or achievement, resulting from a training experience."

i) **Functions of Assessment**

We will now briefly discuss the functions served by the assessment of trainee.

By assessing the trainees we are able to inform the trainees how well they are progressing during the training. Immediate feedback to the trainers help them in finding their weakness and motivates them, improve their performance, it also keeps the trainees active. As we all know that the learning is maximum, when there is an intense trainee activity. It also helps in grading the trainees.

Assessment also informs the trainers of how well the trainees are progressing. This may give insight to trainers in how to provide remedial training to those trainees who are not doing too well. It also informs the trainers of how well the training itself is working.

Last and not the least (perhaps the most important) it helps in maintaining training standards.

ii) **Types of Assessment**

Visualize a shooting competition. Dozens of participants aim at the bull's eye and the one who scores the maximum gets the prize. One winner and all other losers. This doesn't seem to be a very happy situation in training. There is a lot of wastage. Can you suggest a better method of assessment? I think you have guessed it right. The car driving test. All the prospective drivers who achieve the basic minimum standards of driving are given a driving licence. Here we are aiming for a situation where everyone is a winner.

iii) **Norm-referenced Assessment**

When assessment is done for grading purposes, like in the shooting competition, where we are trying to select the best, it is known as Norm-Referenced Assessment. The performance of the trainees is compared with that of other trainees. The rank-ordering of trainees has priority over their actual competency and capability.

iv) **Criterion-referenced Assessment**

When we assess the trainee with reference to a criterion or a standard it is known as criterion-referenced assessment. The driving test was one such example. This kind of assessment is very useful in profession where the trainees have to achieve a desired level of competence at the job. This desired level of competence is laid by the administrator in collaboration with the trainer as the criterion. For example the anganwadi worker should be able to plot the weight of the child on the growth chart.

Criterion Referenced Assessment provides feedback to the trainer also. A large proportion of failures is an indication of poor training. Either the selection of trainees was faulty or the process of imparting the training was not satisfactory.

Check Your Progress 4

In which situation can we use Norm-referenced Assessment in training?

.....

.....

.....

3.9.2 Evaluation

Evaluation, as we have already discussed is of training and thereby the performance of the trainer. So we can say, "Evaluation is a system designed to value the effectiveness, efficiency, and effects of training and of the trainer". Trainee assessment is part of the system of evaluation. The other parts appraise the efficiency and effectiveness of the design system itself and the ways in which you use this system when implementing the training.

i) **Functions of Evaluation**

What are the functions of Evaluation?

Evaluation of training has several functions and is a very useful tool for the trainer. First of all it helps the trainer in judging the overall effectiveness of the training. It shows us the deficiencies both in the designing and the implementation of training. It also suggests the areas where we need to improve.

Evaluation also helps us in knowing how the training effected the learner i.e. to what extent did the trainee achieve the objectives of training. It also helps the trainer in making changes in the training course, whether it is in the form of providing remedial training to the trainees lagging behind or making changes in the objectives that are not being achieved. Evaluation also appraises the trainers of their effectiveness.

In broader terms evaluation helps in identifying the outcomes of training which can be used for grading and certificating the trainees. It also helps in valuing the training in terms of cost effectiveness.

ii) **Types of Evaluation**

There are two main types of evaluation, these are

- Formative Evaluation
- Summative Evaluation

Formative Evaluation takes place during the training and at the end of the training. It is concerned with modifying the form and process of training, whilst the training is happening and after it is completed.

Summative Evaluation as the name suggests sums up the result of a course, mostly after the training is finished and it has little effect on the structure and process of the training which has just taken place.

Formative evaluation is used to diagnose the weakness in and performance of the trainee and the faults in process of training. These are subsequently corrected or at least remedial efforts should be tried.

Summative evaluation confirms both the improvement in the trainee's performance and the training itself.

iii) **Methods of Evaluation**

In most of the university examinations the failure rate is at least 25% and may be as high as 40%. Training cannot afford failure rates of this magnitude. Our aim is that 80%-90% of the trainees achieve 80-90% of the required mastery.

In formative evaluation we want to find out those trainees who have not attained the requisite mastery and should be given remedial training.

We can also make the profile of the trainee's progress by using the tests which measure against the criteria of competence. This criterion of competence is laid in the specific objective.

Tests of this nature include:

- Criterion-referenced tests
- Pre-tests
- Post-tests
- Skills tests.

It is preferable, if the trainees are informed in the beginning of the course, about the role of the criterion tests are to perform in evaluation.

iv) **Informal Evaluation**

Informal evaluation also makes valuable contribution in formative evaluation. It is based on collecting information from the trainees by informal discussions. Summative evaluation is done to grade the trainees. Some of the trainees perform very well, some poorly and the majority are crowded in between. Generally it is done at the end of the training. The grading is normally done by norm referenced tests and final examinations. Sometimes grading is done by tests after each phase of training.

3.9.3 Assessment Tests

Suppose you are invited to attend the sectoral meeting of ICDS. In the continuing education being conducted for the anganwadis the topic was "Use of Growth Charts".

The objective of the session was:

"At the end of the session the anganwadis should be able to plot the weight of the child on the growth chart'.

The training methodology used was demonstration (without return demonstration). At the end of the session you request the medical officer to kindly assess the performance of the trainees to see, if the objective of the session has been achieved.

He asks the anganwadis the following questions:

1) Who devised the growth chart?

2) What is the role of immunization in the healthy growth of the child?

3) Name four vegetarian weaning foods.

How would you feel?

I am sure that you would be as disgusted as I am. The questions per se are correct and may be important but totally irrelevant as far as the present training is concerned. In fact not only the trainer but also the trainee do not come to know if the objective was achieved. The anganwadis would receive poor scores because they were asked what they were not taught. This will de-motivate them for further training.

So how do we evaluate the training? The answer is simple. "Test the trainees for what you have taught them". And what do we teach them "That what is stated in the objectives".

So the crux of the issue is that, if we are able to frame our objectives correctly the training and the evaluation simply follows them and becomes extremely simple.

How would you evaluate the anganwadi in the training session mentioned above?

The only way to know, if the anganwadi can plot the weight of the child on the growth chart is by observing her doing so.

We request the anganwadi to weigh a child accompanied by its mother and plot its weight on the growth chart. Then we observe the Anganwadi using a checklist.

For Example	**Yes**	**No**
1) Determines the age of the child correctly		
2) Adjusts the weighing balance to remove zero error		
3) Asks the child to stand in the right position		
4) Records the weight correctly		
5) Plots the weight on the growth of the child against the column of its age.		

If all the five steps have been done correctly then the anganwadi has fully achieved the objective.

Assessment in this manner gives confidence to the trainee, if she has achieved the objectives and a chance to improve her performance by learning from her mistakes if she hasn't.

Test Items

a) **Oral Question**

The oral question technique can be used to assess trainee achievement and the effectiveness of an instructor's presentation. The oral questions arouse interest, provoke thinking, checks understanding, discovers the trainee's weakness and evaluates how well the trainee has grasped the new concepts, ideas and facts. The questions should be short and the requisite answer should be specific.

b) **Essay Test Item**

All of us are familiar with essays. They can measure the complex learning outcomes, synthesis and organisation of ideas, analysis and criticism. The emphasis is on thinking and problem solving. Normally the essays are unstructured or openended. However, they may be structured where the trainer lays down some specific criteria.

The major drawbacks of essays are that they are time consuming with a low realiability and validity. Marking of essays is highly subjective.

c) **Two-option Alternate – Response Test Items**

The most common form for alternate response items is the statement to be judged true or false where-in the learner responds to a sentence length statement by indicating their truth or falsity. Agree-disagree items ask the participants to indicate whether they agree or disagree with statements that cannot be either true or false with certainty. Their items are used to measure attitudes.

Tips for Devising Two Option Questions

Limit each statement to a single idea. Do not use complex sentences, especially, ones that might contain both true and false elements.

Example

True/False — Theory X recognizes the interdependence of managers and employees, and Theory Y relies heavily on self-control and self-direction.

Doesn't it seem to be a bit confusing. Let us try to improve upon it.

True/False — Theory X recognizes the interdependence of managers and employees.

True/False — Theory Y relies heavily on self-control and self direction.

It is important to eliminate long, complex sentences. It is better to test for one single idea or fact.

d) **Multiple-Choice Test Items**

The most popular type of objective test item is that in which the trainee is required to choose one alternative response from a group of problems, questions or statements. The multiple choice item is considered the best type of objective testing method for measuring a variety of training objectives.

Anatomy of Multiple Choice Test Items

The parts that go together to make a multiple choice item are stem + alternative = item : for example,

Item — The instrument used to measure the blood pressure of the patient is known as

Alternatives
a) sphygmomanometer — Desired Answer
b) haemoglobinometer
c) potentiometer — Distractors
d) altometer

The desired answer to a multiple choice item should be:

i) the best possible answer

ii) independent of information given in other items on the test.

The distractors should be important, plausible choices rather than obviously wrong.

e) **Matching Test Items**

Matching exercises are not widely used. Matching items are most useful for measuring selection or recognition. In a matching exercise, the learner is presented with two lists, of such things as symbols, pictures, names, words, facts, phrases, numbers and principles. In a sense matching is series of interrelated multiple-choice items. It is the pairing of a term on one side with the term or terms on the other. In its simplest form, matching requires a series of multiple-option decision by the learner.

- *Pre Eclamsia*
- *Threatened Abortion*
- *Ante partum Haemorrhage*
- *Post partum Haemorrhage*

a) Oedema, diabetes & proteinurea
b) Oedema, hypertension & proteinurea
c) Bleeding during first trimester
d) Bleeding during second trimester
e) Bleeding during third trimester
f) Bleeding during second stage of labour
g) Bleeding during third stage of labour

f) **Completion or Fill in Items**

Alternate-response, multiple choice and matching test questions are selection or recognition types. In responding to completion or fill in questions, learners must recall, compute or otherwise create the answers. In the most popular completion type of question, the learner extends or adds to the test by writing words, phases, number or symbols in the spaces provided.

g) **Skill Performance Tests**

The trainee is required to demonstrate competence or mastery of a skill by practising the skill itself. Marks are awarded by the tester observing the process, which the trainee follows by using a checklist or by marking the finished product of the skill process or both.

Evaluatory Instruments

Assessment of the trainees inform us whether the objectives have been achieved or not. In other words, it tells us about the success of the course. But won't out information be incomplete if we do not know how the trainees felt? There may be situations when the trainer is satisfied by the progress of the trainees but the trainee feels that the course was not useful or even useless. The feedback given by the trainees can go a long way in improving the future courses. The simplest way of collecting this feedback is by asking direct questions mainly through questionnaires.

As an administrator you may be interested in knowing about the way the course was designed and implemented. You may also be interested in knowing about the different trainers. So you may like to develop evaluatory tools in the form of questionnaires. These tools should be simple to fill by the trainees and easy to mark. These should also simple to analyse.

3.9.4 Evaluation of Trainers

In order to save time lets come to a questionnaire directly.

a) **Trainer's Performance Questionnaire**

Please help me in judging my performance as a trainer by ticking the most appropriate number.

1-Poor, 2-Average, 3-Good, 4-V. Good, 5-Excellent

Name of Trainer_____ Topic_____

	1	2	3	4	5
1) Introduction of Topic was interesting					
2) Contents of the topic titled into the course					
3) The specific objectives were achieved					
4) Continuity of the topic was maintained					
5) Shows relevance of the topic to the job					
6) Contents were presented in a logical sequence					
7) Questions were stimulating					
8) Handling of student activity was effective					

9) Stimulates the trainees to think

10) Encourages trainee activity

11) Appropriate use of Audio-Visual aids

12) Voice was clear

13) Body language was appropriate

14) Was confident

15) Was interested in training

Analysis of the data can be done by making a master chart. Suppose the data given is the response of a trainer by five trainees for the first five questions is as follows.

	Trainee Response						
Question	**A**	**B**	**C**	**D**	**E**	**Total**	**Average**
1	2	1	3	2	1	9	1.8
2	3	3	3	2	2	13	2.6
3	1	1	1	1	2	6	1.2
4	5	5	4	4	5	23	4.6
5	3	3	3	2	3	14	2.8

The above findings suggest that the trainer's introduction to the topic was dull. The specific objectives were not achieved through the trainer had maintained the continuity of the topic.

As a course co-ordinator you may also use these responses to the trainer's sessions for comparing the quality of sessions of different trainers.

b) **Information Evaluation**

Questionnaires give information which can be compiled and used. However, informal discussions can tell us the feelings which the questionnaires can't.

c) **Steering Committee**

A committee comprising of 3-4 trainee volunteers is constituted. The members of the committee interact with other trainees informally during lunch and tea break and in the hostel and take their views about different aspects of the course. The views of the trainees is then compiled and given to the course co-ordinator. As the views of the coordinator are given by the trainees to their peers, they are very frank and straight forward and can be very useful.

d) **Trainee's Diaries**

The trainees are given a diary at the beginning of the course and are to write their views on it every day. Normally fifteen minutes are set aside for this towards the end of each day. The diaries are collected at the end of the course.

3.10 PREPARATION OF TRAINING PLAN FOR THE HOSPITAL

As an able administrator you always plan for the future. The same should be done about training of your staff. A well chalked out training plan for your employees may go a long way in the maintenance of standards in your hospital. It may be more productive and cost effective than the services you conduct in your hospital regularly.

The personnel department takes great pains in selecting the more talented employees for

the hospital. They will able to give their best performance if they are given induction training once they are appointed. This will enable them to perform their jobs as per the requirements of the hospital. I know that you will say that your staff learns what they are to perform in a few months. Yes, I agree but that is by trial and error. The grasping is further dependant on the personality of the employee and some achieve less than desired level of competence. Further, this period of a few months is very stressful. A well designed induction training will eliminate these few months of trial and error. Further, this will keep the new entrant more confident and motivated.

The introduction of any new technology should always be followed by training of the concerned staff.

You also plan about the career development of your employees. They are promoted and given new responsibilities. Whenever you are planning about the promotional avenues of your employees an element of promotional training should also be introduced.

Last and most important regular supervision and objective performance appraisal gives you insight about the employees who are not performing up to the desired level. They should be provided training preferably on the job. For the lower and middle level workers on-the-job training is perhaps the best form of training.

3.11 LET US SUM UP

Training is not a panacea for all ailments in the hospital but it definitely improves the performance of the employees. A carefully chalked out training plan over a period of few years improves the technical skills, inter-personal communication, behaviour, motivation and decision making abilities.

Training will be effective only if it is need based. Training need is the difference between the desired performance and the actual performance minus the managerial problems or non training intervention. The training needs are best identified by observing the employees and determining the gap between the desired and the actual performance. Other means of determining the training needs are by interviewing the employees, their peers, supervisors and sometimes their subordinates. Reviewing the performance appraisals and self-appraisals are also helpful as is the client satisfaction.

Once the training needs have been identified you as an administrator have to plan for the training. The training should be conducted applying the principles of adult learning wherein. The experiences of the learners is exploited to the maximum. The participation of the trainees should be high with a plenty of practice. Positive feedback should be provided helping them to correct themselves and improve their knowledge and skills. High motivational level should be maintained with low dependency on the trainer. Active learning by the trainees should be encouraged.

The training may be induction i.e. at the time of joining an organisation, placement i.e. at the time of posting an employee for a new job. Inservice training is imparted during their service with the aim of acquiring new knowledge and skills. On the job training is imparting training at the place of his work.

The training needs decide the objectives of the course which should be stated in behavioural terms which are measurable. The methodology selected for training should be participatory with less dependence on didactic teaching. Methods like lecture should be discouraged and those involving high level of trainee participation and their experiences like case method, role play, brainstorming and counseling should be encouraged. Further, the training should also utilize the audio-visual aids to the maximum as they facilitate the process of learning.

Evaluation of training should be given due emphasis wherein you should measure the improvement in the performance of the trainees in terms of knowledge and more important skills. The quality of the courses conducted should also be evaluated and modified according to the results and feedback. Further as an administrator you should also evaluate the cost-benefit ratio i.e. the benefit to the organisation in relation to the amount of money spent.

Last and not the least, perhaps the most important is that you should chalk out a short, medium and long-term training plan for the employees of the hospital.

3.12 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

The trainee will be able to autoclave syringes and needles in a pressure cooker.

Check Your Progress 2

There is no 'best' training method. The training method should be selected on the basis of the objective that has to be achieved. The training method is the means to facilitate learning.

Check Your Progress 3

Assessment is how well the trainee is doing. Evaluation is how well the trainer is doing and how good is the course.

Check Your Progress 4

We will be precise and explain to the trainer what are the needs of our trainees and the exact improvement expected in the participants after undergoing the training.

UNIT 4 COMMUNICATION

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- define this enabling instrument;
- learn about the types and means of communication;
- understand and evaluate the elements of communication and communication networks;
- identify barriers and bridges in communication; and
- list out Ten Commandments of good communication.

4.1 INTRODUCTION

In organisations, it is only through communication that all the important functions of information handling, instructing, directing, integrating and monitoring are carried out. In person-to-person relationships, mutual trust, understanding and cooperation can be achieved only with the help of meaningful communication. Interpersonal conflicts and misunderstandings arise where there is a lack of communication. Thus, it can be seen how important communication is in organisation as well as in social situation.

In the hospitals, most of the tasks are characterised by speed and accuracy. At times even a slight deviation from the predetermined plan could spell disaster. From this can be deduced the magnitude of information handling that would be required in the hospital set ups and the need for emphasis on communication.

If the study of communication is enlarged to provide a deep and insightful knowledge, it would include the entire gamut of psychological sub-disciplines like perception, cognition, linguistics, motivation etc. It would also extend into organisational areas such as structure, hierarchy authority and management functions. Of necessity, the present study will have to be limited in scope. The objective of the unit on communication is to create an understanding of the process of communication and how it is related to the structure of organisation, and to enable one to relate this knowledge to one's effective task performance.

4.2 WHAT IS COMMUNICATION?

Communication has been defined in numerous ways. The one chosen for the purpose of the present study is : 'Communication is a mutual exchange of facts, thoughts and perception, resulting in common understanding of all parties. This does not imply agreements.' An examination of this definition reveals the following ingredients as being important in communication:

- Communication is purpose oriented.
- It is a two-way process.
- Psycho-social aspects like thoughts, feelings, emotions are involved in communication.

Communication in organisations does not mean mere exchange of messages. It embraces a great deal more. The values, prejudices, feelings and personality factors of all the participants concerned come into play. Used appropriately, communication can be the most effective instrument for growth and development of organisations and their members. Its absence or inappropriate use can engender conflicts and problems.

Peter Drucker identifies four fundamentals of communication which show the nature of the process. These are briefly stated below:

- **Communication is Perception.** This implies that is only the recipient who communicates, because if he doesn't perceive what is transmitted no communication takes place.
- **Communication is Expectation.** People perceive only what they expect to. The unexpected is ignored or misunderstood.
- **Communication Makes Demands.** Experiments have shown that words with unpleasant emotional charges or threats tend to be suppressed while those with pleasant associations are retained longer. In other words, communication makes a demand on the recipient in terms of his emotional preference or rejection. It is also demands him to become somebody or do something.

Information is logic, format and impersonal, while communication is perception. The less tied up information is with human factors. The more valid and reliable it becomes.

4.3 TYPES OF COMMUNICATION

As said earlier, communication occurs in all social situations. It can also take place within a person. Communication is generally categorised into three types:

- **Organisational Communication.** Everyone is familiar with this type of communication. It is a work-a-day experience. It encompasses generation or collection of data, collation and dissemination of information, decision making and implementation, and management of conflict.
- **Interpersonal Communication.** It is one that takes place between two persons. It is characterised by active interaction. The quality of encounter and the relationship, that occurs between two people through such transaction determines the extent to which growth and development are enabled. Mutual trust, understanding and consideration grow out of positive transaction.
- **Intrapersonal Communication.** Human being are given to self-reflection and introspection. It is a kind of communication one holds with one's self. The psychologist CG Jung observed, 'Self is a product of intrapersonal communication or the behaviour that results from the dialogue between conscious experience and unconscious values.' The range and depth of a person's experience of the physical and abstract world around him, his self awareness, and concept of self are determined by the quality of intrapersonal communication. Further, it is the ability to become aware of one's self that helps one understand others. Thus intrapersonal communication indirectly influences interpersonal communication.

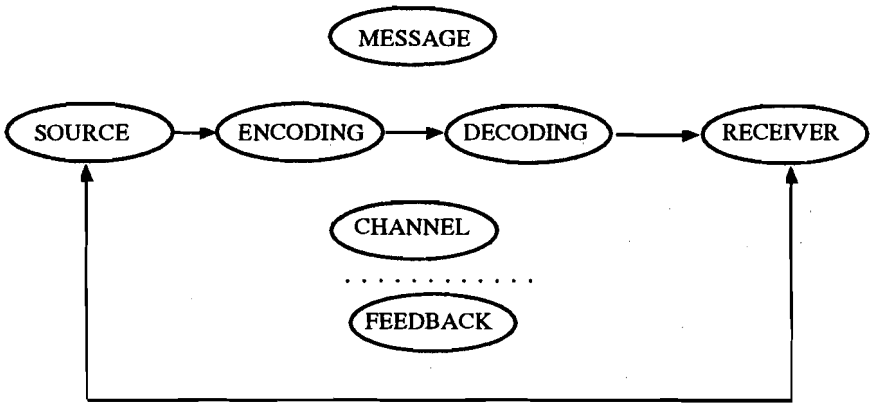
There are many means one can choose from to initiate and continue communication. It

could be verbal, non-verbal, vocal or non-vocal. The following matrix shows the various combinations and the resultant channels one can use for communicating :

	Vocal	Non-vocal
Verbal	Spoken Word	Written Word
Non-Verbal	Scream Grunt Inflection	Gesture Spatial Relationship Facial Expression

4.4 ELEMENTS OF COMMUNICATION

One of the simplified models of communication is shown below to illustrate the elements in the process of communication :



(. . . . . = NOISE)

Source: In an organisation situation the source is normally a person with ideas, intentions, information, and a purpose for communication. One of the prime responsibilities of the source is to ensure that the communication initiated is within the field of perception of the receiver.

Encoding: One of the prerequisites of communication is to establish a common base of understanding between sender and receiver. Encoding is a process which partially achieves this. It translates the conceptions of the source into symbols and forms.

Message: Is the 'Hardware' or the physical product of the source. The shape and form that message assumes are determined by the channel that would be used and the speed intended.

Channel: Channel of communication is the mode that is used for conveying the message from the source to the receiver. A message could be verbal, written, face-to-face, telephonic, mass-media etc. The appropriateness of channel selection contributes to effectiveness of communication.

Decoder & Receiver: Real communication takes place only when the recipient takes cognizance of what is emitted. The most important of the elements in the process is decoding the incoming message in terms of the receiver's past experience, expectations etc. Most problems in communication situations occur when there is incongruence between source encoder and decoder-receiver. In organisations this is one of the key areas for managerial attention for improving communication.

Feedback: The source or sender ought to know the impact of his message on the recipient. Firstly, he has to be assured that it has been received in full as intended and secondly he should know the message is understood and its contents have had the desired influence. This element, therefore, has to be inbuilt in the system of communication. Surprisingly, feedback system is not so common in organisations, particularly those with a rigid hierarchy.

The process of communication is susceptible to distortion, breakdown, or interference along any of the elements. There are numerous organisational and human causes which contribute to noise in communication situations.

4.5 VERBAL AND NON-VERBAL COMMUNICATION

A communication in which words are used can be called verbal communication. Communication over long distance takes place usually through verbal communication. As an adjunct to this is the non-verbal communication which refers to the use of body language in communicating ideas from the sender to the receiver. Non-verbal communication most often takes place unconsciously, and it may either supplement the verbal communication, or may at times negate the very purpose of verbal communication.

Let us examine each of these one by one.

The main characteristics of verbal communications are the use of words, either written or spoken.

Written communications include personal letters, memoranda, policy and procedure manuals and notices placed on the notice boards.

Examples of oral communication are conferences, committee meetings, telephone conversation, loudspeaker announcements, etc.

Both written and oral communications have their merits and demerits.

A written communication has the advantage of being easily verified and of being more precisely defined if there arises a need for subsequent correction. Spoken messages cannot always be verified so easily.

Secondly, because a written communication is likely to be a permanent record, we are more particular in making it precise and accurate.

Thirdly, lengthy and complicated messages are better understood if they are put in writing. It would be difficult to understand and retain a lengthy message if it were only in oral form.

Together with these advantages, written communications have some drawbacks also. Some of these are:

- Firstly, it is a slower method of communication if we considered the total amount of time involved from the formulation of idea by the sender to the understanding of the idea by the receiver. A written communication competes with all other written material that reaches the desk of an executive. As such there can be a gap between the time when a communication reaches the manager's desk and the time when he reads it. Moreover, if clarifications are needed because the message is not clear to the receiver, further delay would take place.
- Secondly, despite the fact that a greater degree of preciseness is aimed at while preparing a written communication, there is always a possibility of ambiguity or lack of clarity creeping in leading to misunderstanding on the part of the receiver. Clarifications naturally mean delay.
- Lastly, over-reliance on written communication can lead to too much of paper-work in the organisation. This not only consumes time, money and energy, but also indicates a lack of trust among the employees of the organisation. It has been observed that when trust is low and suspicions are high in an organisation, an over-reliance on written communication is likely to occur.

Oral Communication

Although an organisation cannot function without written communications of various kinds, yet by far the greater percentage of information is communicated orally. It has been observed that managers spend 60 to 80 percent of their work time in oral communication. Oral communication has the merit of being more rapid. Generally, the spoken word is quicker and less complicated way of getting one's ideas agrees another person. Again, it offers the potential of two-way information flow, and therefore less possibility of misunderstanding the communication. The creation of a less formal atmosphere and generation of fellow feelings are the additional advantages brought about through oral communication.

However, the oral communication is not entirely free from defects. It is less effective as a means of presenting complicated and lengthy data. It is also subject of misinterpretation and the effects of barriers arising from interpersonal relationships.

Can you determine which of the two, oral or written, is a better means of communication? You will see that the choice between the two is, generally speaking, determined by the situation. However, the use of both together will very often strengthen and reinforce a message.

Take your own case. The material in your hand is the written communication which will be fortified subsequently through oral communication in the contact classes or educational TV programmes. The two together, we hope, will further increase your understanding of the concepts and application of management.

Choosing Your Words

You have read earlier that communication refers to the transmission of meaning from the sender to the receiver. Such transmission takes place through the use of symbols, whether verbal or non-verbal. In verbal communication the symbol is a word. In order that the transmission of meaning takes place it is important that the particular symbol (word) used must create within the mind of the receiver the same image which was in the mind of the sender of the communication. It is only then that the basic purpose of communication which is to influence the behaviour of the receiver, will be achieved. It has been found that words do not necessarily have commonly understood meanings. The abstract words like 'participation' or 'democracy' suffer from difficulty that different people are likely to attach different meanings to these words. The greater the use of such abstract words, the bigger the difficulty in bringing about an understanding of the message and a change in behaviour through communication.

Keith Davis in his well known book 'Human Behaviour at Work : Organisational Behaviour', has suggested a few guidelines for making verbal communication more effective. These are:

- Use simple words and phrases.
- Use short and familiar words.
- Use personal pronouns (such as 'you') whenever appropriate.
- Give illustrations and examples.
- Use short sentences and paragraphs.
- Use active verbs such as in 'The manager plans'.
- Economise on adjectives.
- Express thoughts logically and in a direct way.
- Avoid unnecessary words.

Use of Body Language

In determining the effectiveness of communication, in the sense of effecting a change in behaviour, non-verbal communication has an important role to play. Experts in the field of human communication have found that, in a typical message between two persons, only about 7 percent of the meaning or content of the message is carried by the actual words being used. Another 38 percent of the message is carried by one's tone of voice (which includes pacing, tuning, pauses, accents). The major part of 55 percent of the content of the message is in non-verbal form, in other words, in the form of our physical attitude going along with our verbal message. The physical attitude is also referred to as body language.

Non-verbal communication can take place with our actions or with our body gestures. For example, a manager who pounds his fist on the table while announcing that from now on participative management will be practiced in his organisation creates a credibility gap between what he says and what he practices. A manager who says that he believes in an open door policy for all his employees but is busy with his own files while an employee is giving him certain suggestions towards improvement in work

environment, is making non-verbal communication quite in conflict with his verbal communication. In such situations the non-verbal message is the stronger one and the verbal message will cease to be effective.

Body gesture that 'communicate' may relate to your handshake, your smile, your eye-contact, your posture while standing or sitting, your facial expression while listening, the shrug of your shoulders, indeed, the movement of any part of your body. You must, therefore, be watchful of your body language so that it does not contradict your verbal message. This is indeed difficult because the body language is so involuntary that we are not even aware of it.

Some of the non-verbal actions, which assist communication, include:

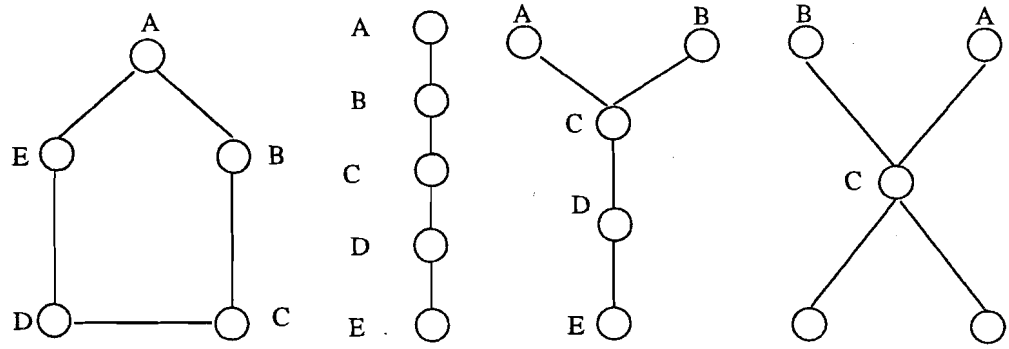
- Maintaining eye contact.
- Occasionally nodding the head in agreement.
- Smiling and showing animation.
- Leaning towards the speaker.
- Speaking at a moderate rate, in a quiet tone.

Some of the non-verbal action that impede the communication are :

- Looking away or turning away from the speaker.
- Sneering or using other contemptuous gesture.
- Closing your eyes.
- Using an unpleasant tone of voice.
- Speaking too slow or too fast.

4.6 COMMUNICATION NETWORKS

There are different patterns or networks of communication, each of which has its own characteristics. The structure of the network influences speed and accuracy of message handling, and performance and motivation of the participants. Some of the most common structures are shown below:



Around 1950, Leavitt and his group carried out experiments to evaluate the effectiveness of the different networks. For each position in every network, they worked out indices of centrality and peripherality. Network functioning and participants' behaviour were then related to these indices to arrive at a conceptual framework. Some of the findings of the researchers are :

- **Patterning:** The 'Wheel' was constant in its operation and peripheral positions sending information to the central point (C) which worked out answers and decisions. 'Y' operated so as to give the central position (C) complete decision making authority. Organisation in this took longer than wheel to evolve, but remained stable after evolving. In the 'Chain' information was sent from both ends to the central position (C). Organisation took longer than other two stabilise. The 'Circle' had no consistent operational organisation.

- **Message handling** was faster in Wheel than Circle. Circle used more messages than other to solve problems.
- Leaders emerged invariably in Wheel and "Y" but less frequently in Chain and Circle. In the Wheel, position (C) was always considered the leader.
- Only in the "Wheel" people were able to recognise the organisation.
- Enjoyment of participants of their jobs was in the order of — Circle, Chain, Y, Wheel, Circle being the most. Circle members sent more informational message and replies than members of any other pattern.
- The persons holding the central position and greater probability of becoming leader and also deriving job satisfaction.
- The Circle displayed remarkable ability to adapt to sudden changes and confused situations which others, particularly the Wheel, did not possess.

To summarise, the study revealed that the network affected the behaviour of participants in a communication situation. The aspects of behaviour observed were accuracy, total activity, member satisfaction. The position a person occupied in a pattern was found to influence satisfaction and leadership emergence.

Activity 1

Identify various types of communication networks that exist in your organisation, which is the most effective one and why.

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List the channel you use for communication in your organisation with

Your Superiors	Your Subordinates
1)	1)
2)	2)
3)	3)
4)	4)
5)	5)

4.7 COMMUNICATION : BARRIERS AND BRIDGES

The process of communication is very sensitive to distortions, which are easily caused by the human element involved in it. These distortions are the barriers to communication, and they can be encountered at any point between the source and the receiver. Any one of the numerous factors can set a read block to the flow of communication, causing ultimately total breakdown. The origin of most of the hospital maladies and inter-personal frictions can be traced to breakdown of communication.

The environmental conditions in the hospital services are such that a free flowing communication is very essential. The one most important binding factor in

organisational relationships in the hospital is human interaction, which cannot take place without effective communication. Any breakdown in communication could be costly, even disastrous.

4.7.1 Communication Barriers

While the number and type of barriers abound, they are being considered hereby grouping them on the basis of their relevance to various types of communication. Some of the barriers, common to all situations, will also be discussed.

- **Perceptual Problems:** Perception plays important role in communication, in that it determines how events are seen and interpreted, and what meanings are attached to symbols. However, both sender and receiver can induce distortions in communication through incorrect perception. Stereotyping, prejudice and selectivity are few of the common problems that cause distortion. There are many other similar problems related to perception that undermine effective communication.
- **Lack of Listening:** Although its effect is more pronounced in face-to-face interpersonal communication, lack of listening can be resent as a barrier in other situations also. Absence of motivation, preoccupation of mind, lack of interest and such like reasons can be attributed of poor listening on the part of the receiver.
- **Semantic Problem:** This is one of the most critical problems in communication. Words can be interpreted in different ways by different people because they denote a number of things and also carry certain connotations. Perception, frame of reference and individual experience are some of the factors that influence meanings of word. If the receiver does not perceive meanings of words in message as intended by the sender, communication breakdown can easily occur. Sarcasm, insinuations and indirect remarks, most frequently encountered barriers, fall under this category.
- **Premature Evaluation:** Most people have the tendency, in whatever type of communication they are participating, to start evaluating what they receive from the very beginning. They make certain conclusions prematurely, based on scanty data and their own frame of reference. Such premature judgement could cause the receiver to terminate receiving the message midway. At least he will be biased heavily during the reception of the rest of the message.
- The message content itself could turn into a barrier in certain situations. If what is being conveyed is too complex for the receiver he may show no interest and ignore the message completely. On the other hand, too simple an idea in a communication may also be dismissed by the receiver as unworthy and inconsequential.
- The status and credibility of the sender of the message also influence how the receiver perceives it. For instance, if the source of a particular communication is of dubious standing, or usually in the habit of amending its message frequently the receivers are likely to be negatively biased in their perception.
- **Observation *vs* Inference:** One of the most common problems in communication is the sender transmitting, not what he actually observes but, the inferences he makes from the observations and at the same time assumes that the receiver will be able to distinguish one from the other. Thus, information becomes subjective opinion whereas it should be objective fact. Decisions made on the basis of such information are bound to be 'influenced'.
- It is not within the ambit of this paper to go into the intricate aspect of Intra-Personal Communication and the related problems. However, the importance of intra-personal communication in personal growth and development needs no emphasis. Communication with one's self can be severely hampered by inhibition, limitation of vocabulary, or defensive mechanism pre-dominating.
- It is in organisational situations that one encounters numerous barriers and problems related to communication. These are contributed by the very structure, relationship and processes in an organization. Some of the frequently occurring barriers are examined here.

- **Chain of Command:** Following the traditional concepts of organisation and communication, many organisations insist on the flow of communication strictly following the hierarchy. Delay and distortions results from this constraint.
- **Information and Power:** Information is power in organisations. Even if a person has no position of consequence in the hierarchy, the fact that he has information which make him all too important. People, therefore, indulge in information hoarding and use it as a sort of a currency for 'Pyramid Climbing' or to make people dependent. Thus, communication channel can become dry of purposive information flow.
- **Staff-Screen:** An artificial screen can be created between the top management and those below by interested middlemen, or staff, to filter messages, specially those going upward. This can smoother the circular exchange of communication, and eventually cause organisational stagnation and impasse.
- **Distortions by Relay Points:** In serial communication, conveying of message through a number of intermediary stations, distortions in terms of omission, alteration and addition occur.
- **Specialisation:** When there is greater specialisation in an organisation communication is adversely affected.
- **Lateral Relations:** It is not uncommon to see a hesitation among colleagues to seek information from each other. This is mainly because of the fear that such an attempt to seek information would be considered as an indication of ignorance or lack of confidence.
- **Lack of Feedback:** Organisations generally do not cater for feedback mechanism in the structure of communication. As a result, the originators of communication often remain obvious to the impact of their message on others. Even though the importance of feedback in the cybernetic system is an established fact, it is not sufficiently put to use by organisations.
- **Interpersonal Problems:** It is in the area of interpersonal communication that, besides the various barriers discussed earlier, the people's problems have a significant effect on communication. Interpersonal communication is most sensitive to distortions, because the participants are face-to-face and exchange ideas and views, using multiple modes of communication, and thus making hidden message susceptible to detection. (For ease of categorising, inter-personal communication refers mostly to face-to-face.) Lack of mutual trust and sincerity restrict people from reaching out to each other. Relations can be impoverished when people indulge in deceitful transactions and meaningless rituals. The body language has something different in mind. This incongruence between vocalised message and that conveyed by body language can act as a powerful barrier. La k of awareness of self and others, the inability to see the other man's point of view and a deliberate avoidance of rear contact with other people are some of the reasons why interpersonal communication comes to grief abruptly.

Activity 5

Identify the communication barriers in your hospital/organisation which are affecting the effectiveness. What can you do to remove the barriers?

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4.7.2 Communication Bridges

The numerous possible barriers to communication point up the magnitude of administrators' task in structuring and maintaining effective communication system in organisations. The effort involved in obviating, or overcoming the roadblocks is enormous indeed. The examination of various barriers itself has given a fairly clear idea as to what should be done to eliminate, or at least minimise the effect, the problem sources.

Following are some of the general hints for improving communication :

- Make notes where necessary.
- Give information in sequentially organised form.
- Do not take it for granted that the words and symbols are understood in a similar manner by all concerned.
- Make the distinction between observation and inference very clear.
- Simplify messages as far as possible.
- Slow down oral transmission.
- Use multi-media for sending message.
- Repeat message where necessary.
- Emphasise the important.
- Keep the link in the chain minimum.
- Make a preview and review for each message transmitted.

In order to improve the sending of message the source should take following measures:

- Analyse the characteristics of the receiver and evaluate competence for perceiving and understanding communication.
- Keep the receiver in mind throughout transmission.
- Be aware of the impact made on the receiver through a well established feedback system.
- Improve transmission skill through a conscious effort and constant practice.

Improving Receiving: The receiver has certain responsibilities in making communication effective and the guidelines for this element are given below :

- Adopt a positive attitude.
- Shut out distractions.
- Look for purpose in each message.
- Be alert to signals that pre-empt what is to come.
- Look for summary of what has gone before.
- Evaluate supporting materials.
- Look for non-verbal cues to perceive the message correctly.

4.8 TEN COMMANDMENTS OF GOOD COMMUNICATION

As a Hospital Administrator, your prime responsibility is to get things done through people. However, sound your ideas or well-reasoned your decisions, they become effective only as they are transmitted to others and therefore, is your most vital management tool. On the job you communicate not only with words but through your apparent attitudes and your actions. How well you manage depends upon how well you communicate in this broad sense. The ten commandments are designed to help

you improve your skills as a manager by improving your skills of communication – with superiors, subordinates, and associates.

- Seek to clarify your ideas before communicating. The more systematically we analyse the problem or idea to be communicated, the clearer it becomes. This is the first step toward effective communication. Many communications fail because of inadequate planning. Good planning must consider the goals and attitudes of those who will receive the communication and those who will be affected by it.
- Examine the true purpose of each communication. Before you communicate, ask yourself what you really want to accomplish with your message-obtain information, initiate action, change another person's attitude? Identify your most important goal and then adapt your language, tone, and total approach to serve that specific objective. Don't try to accomplish too much with each communication. The sharper the focus of your message the greater its chances of success.
- Consider the total physical and human setting whenever you communicate. Meaning and intent are conveyed by more than words alone. Many other factors influence the overall impact of a communication, and the administrator must be sensitive to the total setting in which he communicates, for example, the circumstances under which you make an announcement or render a decision; the physical setting–whether you communicate in private, or otherwise; the social climate that pervades in work relationships within the company or a department and sets the tone of its communications; custom and past practices—the degree to which your communication conforms to, or departs from, the expectations of your audience. Be constantly aware of the total setting in which you communicate. Like all living things, communication must be capable of adapting to its environment.
- Consult with others, where appropriate, in planning communications. Frequently it is desirable or necessary to seek the participation of others in planning a communication or developing the facts on which to base it. Such consultation often helps to lend additional insight and objectivity to your message.
- Be mindful, while you communicate, of the overtones as well as the basic content of your message. Your tone of voice, your expression, your apparent receptiveness to responses of others–all have tremendous impact on those you wish to reach.
- Take the opportunity, when it arises, to convey something of help or value to the receiver. Consideration of the other person's interests and needs–the habit of trying to look at things from his point of view will frequently open up opportunities to convey something of immediate benefit or long-range value to him.
- Follow up your communication. Our best efforts at communication may be wasted, and we may never know whether we have succeeded in expressing our true meaning and intent, if we do not follow up to see how well we have put our message across.
- Communicate for tomorrow as well as today. While communications may be aimed primarily at meeting the demands of an immediate situation, they must be planned with the past in mind if they are to maintain consistency in the receiver's view; but, most important of all, they must be consistent with long-range interests and goals.
- Be sure your actions support your communications. In the final analysis, the most persuasive kind of communication is not what you say but what you do.
- Last, but by no means least; seek not only to be understood but to understand be a good listener. When we start talking we often cease to listen-in that larger sense of being attuned to the other person's unspoken reactions and attitudes.

4.9 LET US SUM UP

Communication is the transfer of information from one person to another. Successful communication is much more than mere transfer of information–it is the transfer of meaning and understanding between two persons.

Communication has paved the way for modern civilisation and good communication is the foundation for sound management. No administrative activity is possible without communication of some kind, and the major part of an administrator's working time is devoted to communicating.

Communication is accomplished through a process in which the sender encodes an idea which is transmitted through a channel to a receiver who decodes the message and gains an understanding of the idea of the sender. The reverse process of feedback also follows the same pattern. During the entire process, interference is created by 'noise' which can lead to distortion of the communication.

Communication takes place either orally or in writing. It could be just one-way or two way, which allows the sender and receiver to interact with each other. A two-way communication is regarded better as it brings about understanding through clarity of the message. In an organisation communication may take place in several directions upward, downward, lateral and diagonal.

Words either written or oral convey a very small part of the communication : most of it is transmitted through non-verbal gestures. A manager ought to be careful lest his non-verbal gestures contradict his verbal message.

Communication within an organisation flows either through formally designed authority channels or through informal channels spontaneously formed and cutting across authority levels. Informal channels can have both positive and negative sides. Cluster chain network of informal communication permits a rapid flow of information through the formation of a grapevine. Formal communication is transmitted through several kinds of networks. The choice of a network will depend upon considerations of the complexity of a task, speed in decision-making in order to adapt to a change, and the satisfaction of members desired.

Interference in communication is caused by semantic, psychological and organisational barriers. In order to achieve effectiveness in communication, administrator consciously try to lower these barriers.

4.10 SELF-ASSESSMENT TEST

1) Write down the elements of Communication Process.

2) Identify 'noises' in the communication in your hospital.

3) Walk into your superiors doors and communicate with him on some issue and note the non-verbal clues and come to your office and record them.

4) You have received a telephonic message that one of your doctors have been hurt in a road traffic accident and requires urgent evacuation to your hospital. What are channel/methods of communication in this situation?

5) There is an acute shortage of a particular antibiotics in your hospital. What are channel you will use to reach all concerned at the earliest?

6) Your hospital has to participate in 'Pulse Polio Programme'. What are all action as Hospital Administrator you will take to achieve maximum success?

4.11 FURTHER READINGS

Chal, Harold Koonz (1986), *Essentials of Management*, McGraw Hill Book Company: New York.

Sherlekar, S.A. (1984), *Principles of Management*, Himalaya Publishing House: Bombay.

Frances, C.M. (1991), *Hospital Administration*, Jaypee Brothers: New Delhi.

UNIT 1 MOTIVATION

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- define motivation;
- list the important motives influencing employee behaviour;
- explain and compare the major content theories of work motivation;
- discuss the importance of theory "Y" in the present hospitals; and
- describe the job enrichment approach of job design as an applied area of work motivation.

1.1 INTRODUCTION

In the present unit, we would begin by discussing the concept and basic process of motivation and theoretical approaches to work motivation would be explained. And in the end, we would turn our attention to the application of these ideas to work setting by discussing the applied aspects of motivation by examining job design and job enrichment.

Today the most important question troubling any manager or hospital administrator is 'How do you get employees to work to achieve organisational goals?' The answer rests in an understanding of what motivation is all about, for it is motivated workers who ultimately get things done, and without them no organisation can hope to be effective.

The Hospital administrator must be accomplished at planning and organising human and material resources, but unless employees work to achieve hospital goals, success will be elusive. The work of the administrator will be fruitless unless the various employees of

their hospital willingly contribute their efforts to the achievement of common objectives. Therefore, the primary function of the administrator is to induce voluntary co-operation on the part of their subordinates and associates. It follows from this that the most important qualification of an administrator is (i) an understanding of why employees are willing to contribute their efforts and (ii) skill in obtaining co-operation from the members of an organisation in working towards planned objectives.

1.2 CONCEPT AND DEFINITION OF MOTIVATION

Why do people behave as they do? How to make people work more or work better? How does one person obtain the cooperation of others? The major ingredient in answering all these questions is motivation. The first step in understanding motivation is to realise that it is a means of understanding the way people behave in organisations. In other words, these are 'Whys' of behaviour, the concept of motivation is both simple and complex. It is simple because behaviour of individuals is goal directed and either externally or internally induced. It is complex because the mechanism that induces behaviour consists of the individual's needs, wants and desires and these are shaped, affected, and satisfied in different ways. The hospital administrator must have mastery over the concept of motivation and be able to identify employee's drives and needs so as to fully understand human behaviour and to channel the behaviour towards task performance.

Why does one employee work harder than another? Why is one employee more cooperative than the other? The answer to these questions can be traced to the fact that every individual has needs to satisfy and will act in certain ways in order to achieve satisfaction. In simple words, we can say that our needs cause us to undertake a pattern of behaviour. We can define motivation as a "process that starts with a physiological or psychological deficiency or need that activates behaviour or a drive that is aimed at a goal or incentive". In more simpler terms, motivation is defined as "self or extremely induced behaviour that occurs in order to bring about or maintain need fulfilment." Thus, the key to understanding the process of motivation lies in the meaning of, and relationship between, needs drives, and goals. Using this understanding, we can design a simple model of motivation process (see Fig. 1.1).

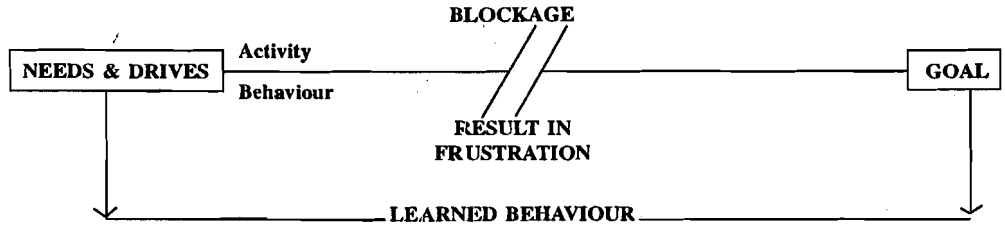

Fig. 1.1: Motivation Model

When we recognise behaviour patterns that enable us to satisfy our needs, we repeat these patterns until they no longer contribute to need fulfilment. If we have a need for praise and recognition from our immediate supervisor, the likely behaviour pattern would be exceptional job performance. If praise and recognition occur, we can assume that continued performance will result in more praise. This learned behaviour pattern is presented as the lower loop in Fig.1.1. But this motivational process explains the behaviour of individuals conceptually. Just imagine what would happen if you are blocked from fulfilling your needs? Or what happens if you work extremely hard, putting your best efforts and there are no rewards, and your needs are not fulfilled?

This phenomenon of behaviour at times cannot be explained rationally. When a behaviour pattern perceived as leading to need fulfillment is blocked, we often behave and react irrationally.

It is very important for the administrator/manager to recognise and understand what kind of behaviour this frustration generates as this would affect subordinate's behaviour, e.g. frustration may occur when an employee has a strong need for esteem and recognition but the job is not providing it or when an employee who is turned down

for promotion because he/she lacks the requisite training for the new job. One form of behaviour, we often see in our organisations is absenteeism, questioning one's abilities, negativism or self-termination (quitting). Their reactions to frustrations are not selected consciously by us but are a product of unconscious learning. These unconscious reactions to the tension created by frustration are called defense mechanisms.

The following are some of the most common defense mechanisms that the manager must understand and recognise:

Withdrawal: Some people react by withdrawing from frustration situations resulting in physically leaving the scene.

Repression: Some times a person may react by repressing the frustrating situation. This leads to losing conscious awareness which minimises the frustration that would otherwise result.

Displacement: Some times it is not possible to react aggressively towards the person who has caused the frustration (e.g. toward the boss), in such situations the aggression is directed towards another person — a colleague, subordinate, spouse or child or even some object.

Regression: Some times, in an attempt to avoid an unpleasant reality, some people revert to child like behaviour exhibited as horseplay in the work setting.

Compensation: Some times an employee would attempt to excel in one area of ability to offset deficiencies in another area.

Rationalisation: Often people are able to conduce themselves that the reasons for not fulfiling a need lie somewhere else e.g. a medical technologist may explain poor laboratory work by blaming obsolete equipment rather than some personal deficiency.

Fixation: Fixation takes place when a person continue to exhibit the same behavioural pattern over and over again despite the fact that experience has shown such behaviour to be ineffective. In such cases frustration freezes old habitual responses and prevents the use of new and more effective ones.

1.3 MOTIVES RELATED TO EMPLOYEE BEHAVIOUR IN ORGANISATION

Broadly three kinds of motives are identified such as: Primary Motives, General Motives and Secondary Motives. The secondary motives which are the motives related to employee behaviour in organisation would be the main focus of discussion in this section, but first let us understand the first two motives briefly.

1.3.1 Primary Motives

Such motives are also called physiological, biological, unlearned. For a motive to be included in the primary classification, two criteria need to be met i.e. it must be unlearned and it must be physiologically based. Thus the most commonly recognised primary motives include hunger, thirst, sleep, avoidance of pain, sex and maternal concern. Since people have the basic physiological makeup, they all have essentially the same primary needs. This is very unlike the learned secondary motives.

1.3.2 General Motives

There are a number of motives which lie in the gray area between the primary and secondary classification. To be included in this general category, a motive must be unlearned but not physiologically based. While the primary motives seek to reduce the tension or stimulation, these general needs induce the person to increase the amount of stimulation. The motives of curiosity, manipulation, activity and affection seem to meet the criteria for this classification of general motives. An understanding of these general motives is very important and relevant to organisational behaviour than are primary motives.

1.3.3 Secondary Motives

These are the most important motives which are related to employee behaviour in organisations. The learning principle of reinforcement is conceptually and practically related to the secondary motives. A motive must be learned in order to be included in the secondary classification of motives. Number of important motives meet this criterion but the ones which influence the employee behaviour in any organisation merit a discussion in this category. Some of the more important ones are **achievements, affiliation, power** or as they are commonly referred as **n Ach, n aff**, and **n power**. In addition to this, the **competence** motive, as an important factor in current attempts to attain high quality services/care are also included along with **security** and **status** motives in reference to organisational behaviour. Table 1.1 gives examples of each of these important secondary motives.

i) **The Achievement Motive**

The achievement motive can be expressed as a desire to perform in terms of a standard of excellence or to be successful in competitive situations. This kind of motivation is a drive, some people have to overcome challenges and obstacles in the pursuit of goals. An employee with this drive wishes to develop and grow, and advance up the ladder of success. For such people accomplishment is important for its own sake, not for the rewards that accompanies it. A number of characteristics explain these achievement-oriented employees. They work harder when they know that they will receive personal credit for their efforts, when they receive positive feedback about their past performance, and when there is moderate risk of failure in the work situation. Once these high achievers select a goal, they tend to be totally preoccupied with the task until it is successfully completed. They can never leave a job half finished and are not satisfied with themselves until they have put their maximum efforts.

ii) **The Affiliation Motivation**

This type of motivation is a drive to relate the people on a social basis. While employees with achievement-oriented motives work harder when their supervisor provides a detailed evaluation of their work behaviour, the employees with affiliation motives work better when they are complemented for their favourable attitudes and cooperation. Achievement motivated managers select subordinates who are technically capable, with little regard for personal feelings about them; but the ones with affiliation motivation tend to select friends to surround them as they get inner satisfaction from being with friends, and they also desire the job freedom to develop these relationships.

iii) **The Power Motivation**

This particular motive is a drive to influence employees and to change situations. Power motivated people wish to create an impact on their organisations and willing to take risks to do so. Once this power is obtained, it may be used either constructively or destructively. If their drives are for institutional power rather than personal power than such managers are very beneficial for organisations because as these managers seek power through legitimate means, they rise to leadership positions through successful performance and are easily accepted by others. This institutional power is the need to influence other's behaviour for the welfare of the whole organisation.

iv) **The Competence Motivation**

Another motive leading to organisational success is the competence drive to do high quality work. The very nature of hospital work requires this kind of motive in its doctors and administrators/managers to achieve high quality of services and patient care. Competence motivated employees seek job mastery, develop problem-solving skills and strive to be innovative. These individuals perform good work to achieve inner satisfaction and to gain esteem from others. Competence motivated doctors also expect high-quality work from their associates and become impatient if others perform poorly.

v) The Security Motivation

In today's fast-paced, highly technological society, security is a very intense motive. Job security, in particular has a great effect on organisational behaviour. On the surface, security appears to be much simpler then other secondary motives, for it is based largely on fear and is avoidance oriented. To sum-up, people have a learned security motive to protect themselves from the contingencies of life and actively try to avoid situations which would prevent them from satisfying their primary, general and secondary motives.

vi) The Status Motivation

This kind of a motive is basically a desire to be respected and treated with deference especially by others in the social and organisational environment. People high on this motive would hesitate to violate social norms and would do so only when they get the desired recognition positively. They run for offices, like to show authoritarian tendencies while working with others. They would also categorise people into status groups and interact with others selectively.

Table 1.1: Examples of Key Motives Influencing Employee Behaviour in Hospitals

Need for Achievement • A concern for excellence. • Doing better than competitors. • Setting and attaining difficult goals. • Solving a complex problem. • Carrying out a challenging assignment successfully. • Developing a better way to carry out jobs. • Derive pleasure from doing difficult things.	***Need for Competence*** • A drive to do high quality work. • Seek job mastery and strive to be innovative. • Develop problem-solving skills. • Gain inner satisfaction by performing high quality work.
Need for Affiliation • Establishing warm and affectionate relations with others. • Being accepted and liked by many people. • Enjoy working with friendly people. • Maintain harmonious relationships and avoid conflicts. • Participate and organise social activities.	***Need for Security*** • Wish to have a secure job. • To be sure of one's economic security. • Having protection against illness and disability. • Avoiding tasks or decisions involving risk of failure.
Need for Power • Influencing people to change their attitude and behaviour. • Gaining control over other people and their activities. • Enjoy being in a position of authority over others. • Argumentative and always wanting to be first. • Gaining control over information and resources.	***Need for Status*** • A desire to be respected and to be treated with deference. • Like to have a right car and right cloths. • Like to run for offices and positions. • Like to show authoritarian tendencies while working with others. • Categorise other people into status groups.

The knowledge and relation of these above key motives, influencing employee behaviour, can certainly help the hospital administrator/manager to understand the work attitudes of each employee. They can learn to deal with employees differently according to the strongest and dominant motivational drive in each. For example, an employee with high achievement motive can be assigned a job, accompanied by an explanation of its challenges. And the employee with high competence motive can be assigned a similar job with emphasis on its requirements for high-quality work. In this way the manager attempts to communicate with each employee according to that particular person's need.

Activity 1

Motivation—Self-Test

Please complete this self-test before you proceed further.

A number of activities are presented below. You may like some of these and you may not like others. Please go through each item and mark those activities in which you like to be involved.

1) Setting difficult goals for myself
2) Competing with other colleagues for better performance
3) Doing something difficult to prove that I can do it
4) Doing things that would help me stand out uniquely
5) Taking up things with determination and working towards accomplishing them
6) Meeting a lot of people
7) Joining a social club or group
8) Inviting people home for tea-parties and get-togethers
9) Having a lot of friends
10) Attending parties and social activities
11) Getting what I deserve even if I have to fight for it
12) Doing something that might provoke criticism
13) Arguing with a superior or subordinate
14) Teasing some one who is conceited
15) Annoying people I don't like
16) Helping someone in trouble even if I have to go out of my way
17) Taking personal care of workers and their problems
18) Fighting for national goals
19) Sacrificing things for the sake of others
20) Consoling someone who is disturbed
21) Doing tasks my superiors ask me to do
22) Pleasing my superiors
23) Observing the rules and regulations outlined for me very strictly
24) Checking things with superiors before I make decisions
25) Consulting people for most of the decisions
26) Having workers who do whatever I ask them to do
27) Getting people to accept my point of view
28) Framing rules and regulations
29) Demonstrating my knowledge and sharing it with others
30) Controlling workers through various techniques

Directions for scoring and interpretations of your responses to this self-test are provided later in this Unit.

Analysis of (Motivation) Self-Test

In the self-test you took at the beginning of this unit (Activity), six motives were included: achievement, power, affiliation, dependence, extension and aggression. Each group of five items measures one motive. The first five items (1 to 5) deal with

achievement, the next five items (6 to 10) with affiliation, followed by aggression (items 11 to 15), extension (items 16 to 20), dependence (items 21 to 25) and control (items 26 to 30). The number of items you checked out of five gives your score on that motive. For example, if you have checked all the items from 1 to 5 you get a score of 5 indicating that you have a high achievement need. If you have checked only one or two items, then you get scores of 1 or 2, indicating a low level of achievement need. Similar interpretations may be given to other motives. You may like to plot your motive profile below on the basis of your self-test.

Your Motive Profile

		Achievement (items 1-5)	Affiliation (items 6-10)	Extension (items 11-15)	Dependency (items 16-20)	Control (items 21-25)	Aggression (items 26-30)
Very high	5	—	—	—	—	—	—
High	4	—	—	—	—	—	—
Moderate	3	—	—	—	—	—	—
Low	2	—	—	—	—	—	—
Very low	1	—	—	—	—	—	—

Interpret Your Motive Profile

You may like to reflect upon the implications of this motive profile for you as a manager. A few comments are made below to help you reflect on your motive profile.

High scores on Achievement and Extension are desirable for your own effectiveness and the good of your organisation. A high score on extension is a welcome thing if you are in any service department or your work involves serving others. The achievement motive is good if you are a manager or executive.

A moderate degree of affiliation may be good but too much of it may indicate your tendency to value relationships more than tasks or work.

A high dependency need or control need may be indicative of your preference for rules, regulations and control. These can have both positive and negative effects. You may reflect on these.

Your scores on the self-test are only crude indicators of your motives. The self-test was meant to be used as a stimulant for your reflection and understanding about human motivation. You are not to take the scores as conclusive. Motives are complex and cannot be measured accurately with short instruments like the self-test given earlier. The test is meant only to give you a feel of how different motives operate.

1.4 THEORIES OF MOTIVATION

So far we have discussed motivation as a basic psychological process which consists of several motives, needs and drives and for an administrator to understand employee behaviour, the secondary motives have been highlighted here. But however, they serve as only background and foundation for the more directly relevant work-motivation approaches. This section would deliberate upon the theories of motivation based upon work-motivation approaches mainly. These theories are divided into two broad categories i.e. **Content Theories and Process Theories.**

Presently these two groups of content and process theories have be
explanation for work-motivation. Fig.1.2 mentions the the
content and process theories related to work moti

Content Theories identify specifically
environment, that initiates, su
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theories def
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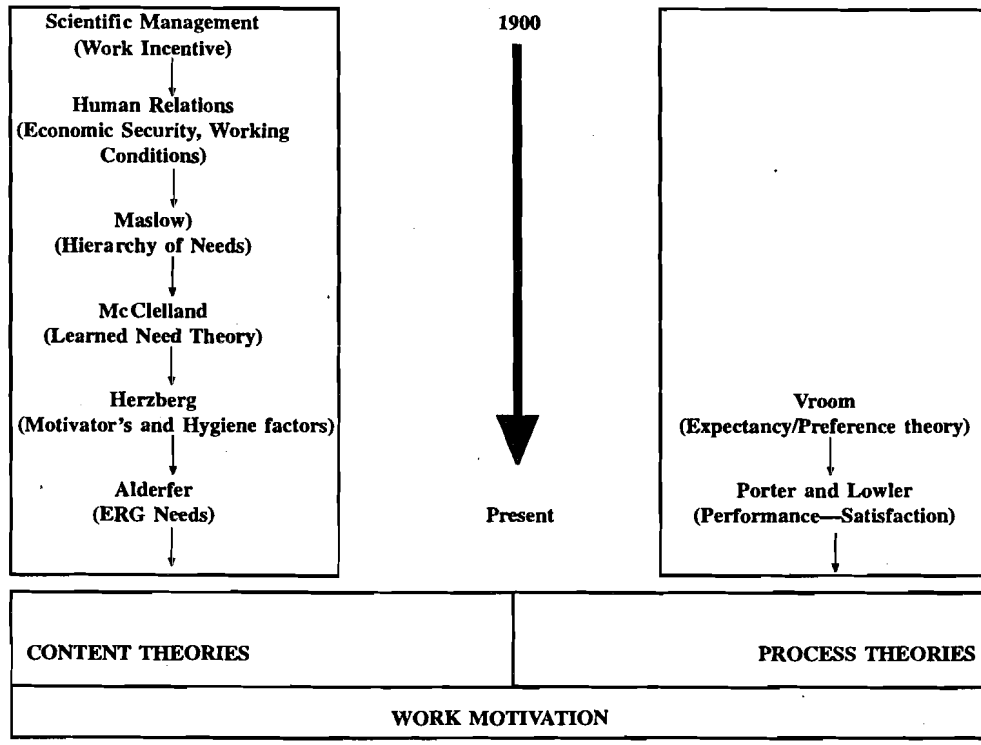

Fig. 1.2: Theoretical Development of Work Motivation

1.4.1 Content Theories of Work Motivation

The content theories of work motivation attempts to determine what it is that motivates people at work by identifying the needs/drives that people have and how these needs/drives are prioritised. These theories focus on the type of incentives/goals that people strive to attain in order to perform well and gain satisfaction. Earlier it was believed that money was the only incentive (**Scientific Management**), but a little later other scientists came up with the conclusions that incentives include working conditions, security and may be a democratic style of supervision (**Human Relations**). But significantly in the recent times the content of motivation has focused on the so-called "Higher Level" needs/motives, such as esteem and self-actualisation (**Maslow**); responsibility, recognition, achievement and advancement (**Herzberg**); and the growth and personal development (**Alderfer**).

1) Maslow's Hierarchy of Needs

In the earlier part of this chapter we have examined the important primary, general and more particularly the secondary needs of people, but without relating them to any theoretical framework. Abraham H. Maslow, a psychologist formulated one of the most widely known content theories of motivation called the Need Hierarchy. First published in the early 1940' the theory stressed two fundamental premises. The first is that humans are wanting animals whose needs depend upon what they already have. Only needs not yet satisfied can influence behaviour; an adequately fulfilled need is not a motivator. The second premise is that people's needs are arranged in a hierarchy of importance. Once a particular need is fulfilled, another emerges and demands fulfilment. Fig.1.3 illustrates the Maslow's need hierarchy. Maslow identified five levels in his need hierarchy, which are briefly explained here:

i) **Physiological Needs:** The most fundamental of all needs are physiological needs, which generally correspond to the unlearned primary needs discussed earlier. Some common examples are hunger, thirst, sleep, sex, rest etc. A person deprived of every thing would want to satisfy these basic needs first. Other needs in the hierarchy would be, at least for the moment, of secondary importance. Once these basic needs are satisfied, they no longer motivate.

ii) **Safety and Security Needs:** Once the physiological needs are basically satisfied, safety needs replace them. First there is the need for survival and second is the need

for the security and this need has both physical and psychological/emotional dimensions. Once these needs are satisfied, they no longer motivate.

iii) **Affection and Social Activity Needs:** When physiological and safety needs are basically satisfied, this third level needs related to the social and gregarious nature of people become important motivators. This is something of a breaking point in the hierarchy in that it begins to get away from the physical or quasi-physical needs of the first two levels. They are seen in people's need for association or companionship, belonging to groups and for giving and receiving friendship and affections.

iv) **Esteem and Status Needs:** This esteem need is much more psychological in nature than the first three needs and these represent the higher needs for people. The needs for power, achievement and status can be considered part of this level. Maslow carefully pointed out that this esteem level represents both self-esteem and esteem from others.

v) **Self-Actualization Needs:** This highest level of human needs represents the culmination of all the lower, middle and higher needs of humans. This need includes achieving full development of one's potential. It is evidenced by the need to be creative and have the opportunity for self-expression.

Interpreting the Hierarchy of Needs with Work Motivation

It can be interpreted from Maslow's need-hierarchy model that employees are more enthusiastically motivated by what they are seeking than by what they already have. Though Maslow did not intend that his need hierarchy be directly applied to work motivation and in fact did not delve into the motivating aspects of humans in organisations, the Maslow hierarchy of needs has had a powerful impact on contemporary managers by making a significant contribution in terms of making management aware of the diverse needs of employees at work and offers some useful tips for helping managers think about motivating their employees. If Maslow's

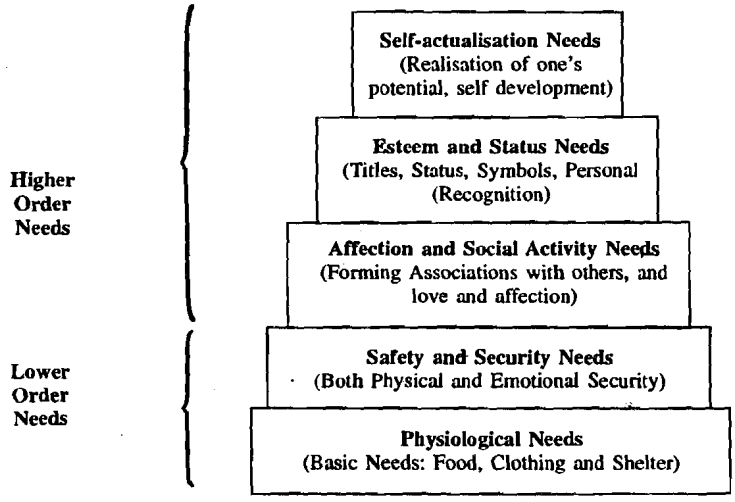

Fig. 1.3: Maslow's Hierarchy of Needs (Work Motivation)

estimates are applied to an organisation, e.g. the lower level needs of personnel would be generally satisfied (85% of the basic needs and 70% of the security needs), but only 50% of the social needs and 40% of the esteem needs, and a mere 10% of the self actualisation needs would be met. But despite these interpretations, the Maslow model has many limitations and unfortunately, the limited research lends little empirical support to the theory.

2) Learned Need Theory

Another content theory, not unlike Maslow's has been developed by McClelland. In it, the concept of needs is more focused. He argues that people are motivated by only three types of needs: Achievement, Power and Affiliation or as they are commonly referred: **n Ach, n Pow,** and **n Aff**. More importantly McClelland argues that these needs and the behaviours associated with the efforts to satisfy them can be learned.

For example, one who wishes to develop drive for achievement should strive to attain feedback from colleagues, seek models of achievement to emulate, and modify self-image by emulating some one who needs success and challenge.

3) Herzberg's Two Factor Theory of Motivation

In 1959 Herzberg extended the work of Maslow and developed a specific content theory of work motivation which was a direct result of research conducted by him and his associate on job satisfaction and productivity among 200 accountants and engineers. Each subject was asked to think of a time when he or she felt especially good about his or her job and a time when he or she felt particularly bad about the job and to describe the conditions that led to their feelings. The researchers found that the employees named different types of conditions for good and bad feelings. This led Herzberg to the conclusion that, motivation consists of two separate independent dimensions: Hygiene or maintenance (see Table 1.2).

Hygiene or Maintenance Dimension (Dissatisfiers)

Absence of some job condition can serve to dissatisfy employees. However, presence of these same conditions does not essentially lead to high degree of motivation. Herzberg called them maintenance or hygiene factors, since they are necessary to maintain a reasonable level of satisfaction. He also noted that many of these factors have been perceived by managers to be motivators, but that they are actually more potent as dissatisfiers (demotivators) when absent. He concluded that there were ten maintenance/hygiene factors (see Table 1.2).

Motivational Dimension (Satisfiers)

There are other job conditions that, if present, tend to build high levels of motivation and job satisfaction. However, if these conditions are not present, it does not prove to be highly dissatisfying. But he believed that these factors caused enhanced job performance. Herzberg described six of these factors as motivational factors or satisfiers (see Table 1.2).

Table 1.2: Herzberg's Classification of Maintenance and Motivational Factors

Maintenance/Hygiene Factors (Dissatisfiers)	Motivational Factors (Satisfiers)
1) Organisational Policy and Administration	1) Achievement
2) Technical Supervision	2) Recognition
3) Interpersonal Relations with Supervisors	3) Advancement
4) Interpersonal Relations with Peers	4) The work itself
5) Interpersonal Relations with Subordinates	5) The possibility of growth
6) Salary	6) Responsibility
7) Job Security	
8) Personal Life	
9) Working Conditions	
10) Status	

If we compare the Maslow and Herzberg models, it can be seen that they both emphasise the same set of relationships. Both are content theories; they look at what motivates human behaviour. Maslow looked at the human needs of the individual while Herzberg focussed on how job conditions affect the individual's basic needs. The main advantage of Herzberg's theory of motivation over the Maslow model of need priority is that Herzberg's theory shows the distribution between maintenance and motivational factors and, most importantly for the application of motivation theory in the work place, Herzberg shows that motivation tends to be derived from the work itself. He also draw attention to the importance of job content factors in work motivation, the job design technique of job enrichment is also one of Herzberg's contributions.

4) Alderfer's ERG Theory

Building upon earlier need models and especially the Maslow's and seeking to

overcome some of their weaknesses, Clayton Alderfer proposed a modified need hierarchy with just three levels. Like Malsow and Herzberg he also felt the need to categorise needs by making a basic distinction between lower order needs and higher order needs.

Alderfer identified three groups of core needs: **existence, relatedness,** and **growth**, also called as ERG Theory.

i) **The Existence Needs:** He suggested that employees are initially interested in satisfying their existence needs, which combine physiological and security factors and concerned with basic survival. Salary, Physical working conditions, Job security address with need.

ii) **The Relatedness Needs:** The needs are at the next level and these involve being understood and accepted by people above, below, and around the employees at work and outside. These needs basically stress the importance of interpersonal and social relationships.

iii) **The Growth Needs:** These needs at the third category involve both the desire for self-esteem and self-actualisation and are concerned with the individual's intrinsic desire for personal development.

Alderfer's ERG Theory suggests more of a continuous of needs than hierarchical levels or two factors needs. Unlike Maslow and Herzberg, he does not contend that a lower-level need has to be fulfilled before a higher-level need is motivating or that deprivation is the only way to activate a need.

1.4.2 The Process Theories of Work Motivation

The content theories discussed above attempted to identify **what** motivates employees at work (e.g., responsibility, recognition, achievement, self-actualisation and growth), the process theories explain **how** behaviour is initiated. We shall examine here two that are based on the theory of expectancy, which proposes what will generally be high performers if they believe (expect) that there is a good chance high performance will result in certain preferred outcomes, usually more positive outcomes such as rewards rather than negative outcomes.

1) Vroom's Expectancy Theory of Motivation

Victor H. Vroom developed a preference expectancy theory suggesting that motivation is a product of **expectancy** (what one thinks will result from certain actions) and **preference** (what one would like to have resulted from certain actions or behaviour). The preference-expectancy theory is more an explanation of the motivation phenomenon than a description of what motivates (as in the content theories we have discussed earlier). Vroom's theory explains how preference and expectation variables determine motivation.

Preference: In Vroom's Model, preference refers to outcomes an individual might experience as the result of certain behaviour. For example, a doctor in a hospital who operates upon more patients than others may receive higher pay and a promotion, or may impress upon the seniors and make his colleagues jealous. Many other outcomes are possible, including the possibility that nothing will happen. However, this doctor clearly has a preference.

Expectancy: The other part of the Vroom model is the individual's expectation that certain behaviour will produce a desired outcome. A person with a preference for an outcome must feel it can be achieved by doing certain things. Vroom's model's importance lies in its emphasis that motivation is individualistic and is dependent on the person having a specific preference coupled with a belief or expectation that certain activities or behaviour will bring about this outcome.

2) The Porter and Lower Model

The second important process theory based on expectancy theory has been developed by Porter and Lower. According to this theory, people are motivated by future expectations that are based on previously learned experiences. This theory suggests that

performance cause satisfaction. This contrasts with the view held by other experts that satisfaction courses performance.

Activity 2

Some descriptions of the behaviour of some individuals are presented in column 1 below. Column 2 lists the possible motives that are indicated by the behaviours in column 1. Enter the correct motive level from column 2 against each set of behaviours in column 1.

Behaviour descriptions	Motives
1	2
1) Mr. M involves himself in very few activities. Whatever he does, he does it exceedingly well. He is always the first to arrive at the office. As a school boy also he always strived to be first. (Motive is_____).	a) Aggression
2) Mr. N likes friends. Whenever he has time he likes to visit friends. In the office he has a group of people round him during lunch hours and tea breaks. It is rare to see him alone while coming to or leaving the office. He is always with someone. (Motive is _____).	b) Security
3) Mr. O is a fighter. There is hardly any one in the office who has not been hurt by his comments. Sometimes in the villages he has visited, he has been involved in physical fights. (Motive is _____).	c) Activity
4) Recently Mr. P is very depressed. His productivity is coming down. He is always worried about the future of his children. He is 35 years old with three children. He is looking for a permanent job. (Motive is _____).	d) Independence
5) Mr. Q loves music. He works in a family planning organisation. He brings his transistor radio to the office to listen to music during leisure hours and breaks. He has been insisting that the best way to disseminate family planning education is through audio-visual aids and particularly through movies. He has recently organised a series of dance programmes in his family planning campaigns. He is a very active person. He is doing something or the other all the time. In the office he never relaxes. (Motive is _____).	e) Extension
6) Mr. R is considered a leader in the village where he lives. He is there to help any family in trouble. People keep consulting him. He also takes the needy to hospital, reads and writes letters for them, discusses political affairs and so on. He is also considered a leader in the organisation. He does more than what his job demands. (Motive is _____).	f) Affiliation
7) Mr. S is argumentative. His standard response to any direction by his boss is "What is the use of this?" or "Can you give me more information?" He likes to explore and discover many things before he does anything. His superiors are getting fed up with him because he tries to act like their boss. (Motive is _____).	g) Achievement
8) Mr. T likes to argue. But he is willing to listen. In meetings he puts forth his points clearly. His points are considered most influential and he has a knack of getting others do whatever he wants them to. (Motive is _____).	h) Power

1.5 MOTIVATION OF EMPLOYEES

We have, till now, discussed six motivation theories. All are different yet all are related; the common thread among them is that motivation is goal-directed behaviour. Earlier money was believed to be the main incentive. Maslow suggested a range of needs that are shared by all human beings and which exist in a hierarchy. McClelland introduced the concept that people can learn to increase motivating forces. Herzberg's two-factor theory developed a distinction between maintenance factors (necessary to avoid dissatisfaction) and motivational forces (necessary to motivate workers). Alderfer identified three groups of core needs: existence, relatedness and growth. Vroom, Porter and Lawfer suggest ways to understand the motivational process: individual preference as to desired outcome of activities and behaviour coupled with the expectation that it can be achieved.

1.6 MANAGEMENT'S ATTITUDES TOWARDS EMPLOYEES

The health services administrator is faced with the day-to-day operational necessity of motivating employees. An important factor contributing to the manager's success will be attitudes about employees. There is a great deal of evidence that people respond to leadership, it is clear that a leader/administrator who can help others meet their needs as they perceive them will be followed. We have to realise that the way in which a manager tries to motivate the employees is directly influenced by the assumptions he or she makes about the employees. And the manner in which motivation is approached depends largely upon the manager's attitudes about the basic nature of people. Are they lazy or are they self-starters? Do they want loose or close control? Are the employees content with satisfying lower level needs or do they strive also for esteem and self-actualisation fulfilment? As managers begin to address these questions, they express their attitudes and assumptions about nature of the organisation's personnel. One of the finest summaries of these managerial assumptions has been provided by Douglas McGregor. He called these assumptions theory X and theory Y. According to McGregor, the traditional organisation with its centralised decision making, superior subordinate pyramid, and external control of work is based upon assumptions about human nature and human motivation.

Theory X: What is commonly called the autocratic or authoritarian style of management has arisen, in part, as an out growth of strong centralisation of control. In its extreme form, such a management style begins to closely resemble the classic theory X of McGregor. Theory X assumptions hold that people are basically lazy and that in order to get them to work it is often necessary to use coercion and threats of punishment. These assumptions drawn by McGregor are summarised in Table 1.3.

From this summary of their attitudes, we can arrive at two conclusions regarding theory X managers. First, they like to control their subordinates because they feel such control is in the best interests of both the organisation and its personnel. Second, they believe that people work to satisfy their lower-level needs (security above all else) and that upper-level need satisfaction is not very important.

Behavioural Sciences research has clearly demonstrated that management based on theory X is definitely not effective over a long period of time, especially in the health sector. Employees subjected to management based upon these assumptions take little initiative, make few innovations, and enjoy no sense of achievement or job satisfaction. Most health sector employees will not function under the stringent, centralised direction and control implicit in the theory X approach to management (Table 1.3).

Table 1.3: List of Theory X and Theory Y Assumptions about Human Nature

Theory X	Theory Y
1) People by their very nature, dislike work and will avoid it when possible.	1) Work is as natural as play, if the conditions are favourable.
2) Most people are not ambitious, have little desire for responsibility, and prefer to be directed.	2) Self-control is often indispensable in achieving organisational goals.
3) Most people have little capacity for creativity in solving organisational problems.	3) The capacity for creativity in solving organisational problems is widely distributed in the population.
4) Motivation occurs only at the physiological and security levels.	4) Motivation occurs at the social, esteem, and self-actualisation levels, as well as at the physiological and security levels.
5) Most people must be clearly controlled and often coerced to achieve organisational objectives.	5) People can be self-directed and creative at work if properly motivated.
	6) Under conditions of modern life, the intellectual potentialities of the average human being are only partly utilised.

Theory Y: McGregor felt that management needed practices based on a more accurate understanding of human nature and motivation. As a result, McGregor developed an alternate theory of human behaviour called Theory Y, which is highly applicable in the health sector. It is based on the belief that the most effective way to get results is to work with people rather than to use them. If employees are lazy, in-different, unwilling to take responsibility or are uncooperative, theory Y implies that the causes lie in management's methods of organisation and control, thus theory Y places the problems squarely in the lap of management. The theory Y assumptions drawn by McGregor are summarised in Table 1.3.

Theory X and Theory Y are attitudes or pre-dispositions management has towards employees. They are important concepts and are related to motivation because they represent a dichotomy of how the manager may approach the task of motivating others. The hospital administrator who operates under Theory Y assumptions will see the task as creation of an organisational climate in which the health services worker can find satisfaction and, therefore, fulfil needs while performing the job.

1.7 TECHNIQUES TO MOTIVATE EMPLOYEES

Job design has emerged as an important application area for work motivation. It refers to any activities involving work changes. With the purpose of increasing the quality of the employee's job experience or improving the employee's productivity. Now with quality of work life (QWL) becoming major societal issue all over the world, the job design has taken a broader perspective. Job design can employ techniques such as job rotation, job traction, and job enlargement and job enrichment. Since job enrichment dominates the other techniques of job design, this technique is going to be discussed in detail here.

Job Enrichment

Since job enrichment represents an extension of other techniques of job design in a more behaviourally sophisticated manner which attempts to build psychological motivators. The term job enrichment was originally coined by Frederick Herzberg, based on his two factor theory of motivators and maintenance factors, with the assumption that in order to motivate employees, the job must be designed to provide opportunities for achievement, recognition, responsibility, advancement and growth. The technique entails "enriching" job so that these factors are included. In particular job enrichment is concerned with designing jobs that include a greater variety of work

content; require a higher level of knowledge, and skill; give employees more autonomy and responsibility in terms of planning, directing, and controlling their own performance; and provide the opportunity for personal growth and a meaningful work experience. Job enrichment brings many benefits which includes motivating employees for growth and self-actualisation. The job is built in such a way that intrinsic motivation is encouraged, with an aim to improve performance.

Research has found that certain dimensions can be built with the work that will bring about higher output, lower absenteeism, higher quality and greater internal work motivation. Hackman and Oldham have identified five core dimensions that especially provide enrichment for jobs. Its desirable for jobs to have all five of these dimensions (see Table 1.4 for five core dimensions of jobs). If one is perceived to be missing, employees are psychologically deprived and motivation tends to be reduced. These core dimensions tend to improve motivation, satisfaction and quality of work and to reduce turnover and absenteeism.

Table 1.4: Five Core Dimensions that Enrich Jobs

1) **Skill variety:** The Degree to which the job requires a variety of different activities so the worker can use a number of different skills and talents.

2) **Task Identity:** The degree of which the job requires completion of a whole and identifiable piece of work.

3) **Task Significance:** The degree to which the job has a substantial impact on the lives or work of other people.

4) **Autonomy:** The degree to which the job provides substantial freedom, independence and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out.

5) **Feedback:** The degree to which carrying out the work activities required by the job results in the individual obtaining direct and clear information about the effectiveness of his or her performance.

1.8 BENEFITS FOR JOB ENRICHMENT FOR HOSPITALS

When there is a positive match between job environment efforts and employees who are desirous of holding more challenging jobs, job enrichment can offer several benefits for the professionals. These benefits are for both the Job holders and for Organisations as such:

A) **Benefits for Individual Employees**

- More job satisfaction
- Greater responsibility and authority
- The opportunity to experience more growth and development
- A greater sense of achievement
- More job autonomy
- A greater diversity of job experiences
- More practice at making decisions

B) **Benefits for the Organisation**

- Higher level of job performance
- Increased quality of patient care and services
- Improvement in quality of decisions
- Employee's loyalty and commitment to organisation increased
- Fewer absenteeism
- Lower turnover rate

1.9 SELF-ASSESSMENT TEST

1) Motives are the "whys" of behaviour. What does this statement mean?

2) What are the common defense mechanisms people use when they are frustrated.

3) Briefly define the three classification of motives.

4) Explain Maslow's theory of motivation and relate it to work motivation and Herzberg's two-factor theory.

5) Identify the key situations in your hospital/health sector where you think the administrator/manager should be more of a Theory Y person and why.

1.10 LET US SUM UP

The first step in understanding motivation is to realise that it is a means of understanding the way people behave in organisations. Further, a comprehensive understanding of motivation is provided through the process sharing relationship between needs, drives and goals. The key motives related to employee behaviour, especially the secondary motives are explained. The knowledge and relation of these key motives, influencing employees behaviour can certainly help the hospital administrator to understand the work attitude of each employee. With this background, theories of motivation based upon work motivation approaches have been discussed in detail under two headings of content and process theories. Next the relevance of management's attitudes towards employees in relation to motivation, have been discussed based upon the theory X and theory Y and finally the last section discussed the more applied areas of motivating employees performance through Job Design and Job Enrichment in order to enhance quality of work life.

1.11 KEY WORDS

Frustrations : The thwarting or blocking of an attempt at need satisfaction.

Hygiene factors : Identified by Herzberg, are factors that will not motivate people by their preserve but will cause dissatisfaction by their absence.

Job Enrichment : A job redesign technique that attempts to build psychological motivators into job.

Motivation : A psychological drive or force that directs someone toward objectives.

Motive : An internal or external force consisting of needs, drives and wants that impels people towards certain goals in life.

Needs : Internal biological and learned states within people that help to initiate, guide and direct behaviours towards certain goals.

1.12 FURTHER READINGS

Hodgetts, R.M. and Cascio, D.M. (1983), *Modern Health Care Administration*, Academic Press, INC. New York.

Luthans, F. (1989), *Organisational Behaviour*, 5th ed., Mc Graw-Hill Series in Management.

Rakich, J.S., *et al.* (1985), *Managing Health Services Organisations*, 2nd ed., W.B. Sounders Company.

UNIT 2 LEADERSHIP

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the importance of leadership in the health organisations;
- identify the major leadership styles;
- explain the situational approaches to leadership;
- discuss the main functions of a leader; and
- explain the leadership skills required for a hospital administrator.

2.1 INTRODUCTION

The previous unit on "Motivation" discussed the importance for health administrator/ manager to have mastery over the concept and process of work motivation to fully understand employee behaviour. This present chapter on leadership is linked to the previous one in the sense that an administrator/manager requires leadership skill to empower employees and motivate them to work in an efficient manner to achieve health organisation's goal. Moreover, motivating employees and developing positive attitude towards them is one of the crucial skills that the leader needs to develop. This present unit on leadership would enable you to understand importance of leadership, leadership behaviour. The thrust of this unit would be to discuss and analyse the widely recognised styles of leadership. This is followed by an examination of roles and functions of leadership. The last part of this unit gives description of the leadership skills which are increasingly being recognised as crucially needed for today's changing and demanding health organisations. The difference between **styles, roles** and **functions** and **skills** which are the main parts of this unit, are that **leadership styles** deal with the **way** leaders influence followers; **Roles and Functions** are **What** leaders do, and **skills** are concerned with **how** leaders can be effective.

2.2 IMPORTANCE OF LEADERSHIP AND ITS DEFINITION

For the health care organisations/hospitals, to achieve the goal of quality of patient care and health for all in the next millenium, the twenty-first century require a generation of

leaders. For the health organisations to endure and quality patient care to be provided, effective leadership is required. The simple reason for this is that an important part of management consists of dealing with and working through people. Further more, some one must determine, initiate, coordinate, influence, and over see work activities of other individuals.

We all must have observed that every group of people that performs near to its total capacity has some person as its head who is skilled in the art of leadership. This skill seems to be a compound of at least four major ingredients:

- the ability to use power effectively and in a responsible manner,
- the ability to comprehend that human beings have different motivation forces at different times and in different situations,
- the ability to inspire, and
- The ability to act in a manner that will develop a climate conducive to responding to and assuring motivations.

Leadership is the process of encouraging and influencing people to direct their efforts towards the achievement of some particular goal(s). It is the human factor that helps a group identify where it is going and then motivate it towards its goals. In fact, **Leadership transforms potential into reality**. Leadership is the ultimate act that identifies, develops, and uses the potential that is in an organisation and its people.

The Fundamental Principles of Leadership

Since people tend to follow those who, in their view, offer them a means of satisfying their own personal goals, the more managers understand what motivates their subordinates and how these motivations operate, and the more they reflect this understanding in carrying out their managerial actions, the more effective they are likely to be as leaders.

Leadership can be formally defined as "The process of influencing the activities of an individual or a group in efforts towards the achievement of some particular goals in a given situation." Another definition defines leadership as "Interpersonal influence exercised in a situation and directed through the communication process towards the attainment of a specialised goal(s)". Besides influence, leadership has been defined in terms of group processes, personality, power, goal achievement, interaction, role differentiation etc.

People have been concerned about the nature of leadership since the beginning of history.

2.3 TRAIT APPROACHES TO LEADERSHIP

Prior to 1949, studies of leadership were based largely on an attempt to identify the traits that leaders possess, starting with the "Great man" theory that leaders are born and not made, a belief dating back to the ancient Greeks and Romans researchers have tried to identify the physical, mental and personality traits of various leaders. But this "Great man" theory lost much of its acceptability with the rise of the behaviourist school of psychology.

Various researchers identified specific traits related to leadership ability; five physical traits (such as energy, appearance, and weight), four intelligence and ability traits, sixteen personality traits (such as adaptability, aggressiveness, enthusiasm, and self-confidence), six task-related characteristics (such as achievement drive, persistence, and initiative), and nine social characteristics (such as cooperativeness, interpersonal skills, and administrative ability). More recently the following key leadership traits were identified: drive (including achievement, motivation, energy, ambition, initiative, and tenacity), leadership motivation (the aspiration to lead but not to seek power as such), honesty and integrity, self confidence (including emotional stability), cognitive ability, and an understanding of the task.

But in general and practically, the study of leader's traits has not been a very fruitful approach to explaining leadership. Not all leaders possess all the traits. The trait approach gives no guidance as to how much of any trait a person should have. Most of these so-called traits are really patterns of behaviour.

Much of the recent emphasis has shifted away from traits and towards identification of leadership behaviours. As per this view, successful leadership depends upon appropriate behaviours, skills and actions, and not on personal traits. This agreement is very significant and practically true also since behaviours can be learned and changed, while traits are relatively fixed. Leadership behaviour, to be precise, is the way or the style the leaders actually carry out their jobs.

2.4 LEADERSHIP STYLES

Leadership styles make a difference. The total pattern of leader actions as perceived by their employees, is called Leadership Style. It represents the leader's philosophy; skills and attitudes and behaviour towards others. The styles differ on the basis of motivation, power, or orientation towards people and tasks. Many different classifications of leadership styles have been proposed over the years.

Four important styles of leadership behaviour which are widely recognised to be highly useful and relevant for today's organisations are discussed here:

- Continuum of leadership behaviour
- Managerial grid style
- Life-cycle or situational approach
- Four systems of management leadership

2.4.1 Continuum of Leadership Behaviour

In 1958, Robert Tannenbaum and Warren H-Schmidt formulated a continuum describing the decision-making authority dimension of leadership. It has two polar ends with varying amounts of leader-subordinate decision-making authority. At one extreme the leader makes the decisions, tells his or her subordinates, and expects them to carry out that decision. At the other extreme, the leader fully shares his or her decision making power with subordinates, allowing each number of the group to carry an equal voice — one person, one vote. Between these two extremes of autocratic to laissez-faire fall a number of leadership styles, with the style selected dependent upon forces in the leader, the operating group, and the situation. As shown in Fig. 2.1, there is a relationship between the degree of authority used and the amount of freedom available to subordinates in reaching decisions. This continuum is seen as a zero-sum game; as one gains, the other loses, vise versa.

i) **Autocratic:** In the continuum of leader authority presented in Fig. 2.1, the autocratic end represents the manager who makes decisions and announces them to the group. The total interacting relationship and work setting have been determined by the manager and he or she provides hardly any opportunity for a subordinate to participate.

ii) **Consultative:** This style is characterised by description 2 and 3 in the continuum. Here the manager sells or makes the decision concerning the work activity, its purpose, how it is to be done, when and by whom, and invites questions from subordinates.

iii) **Participative:** This style indicates that the manager identifies purposes, problems and means by which activities should be carried out; presents a tentative decision already made, that is subject to change or presents the problem to subordinates, gets suggestions, and then makes the decision. This represents the participative style of leader decision authority wherein the area of decision making freedom for subordinates is much greater and use of authority by the manager is much smaller than with autocratic and consultative style.

This participative leadership style is a very powerful motivator enabling employees to have some measure of influence and control over work related activities.

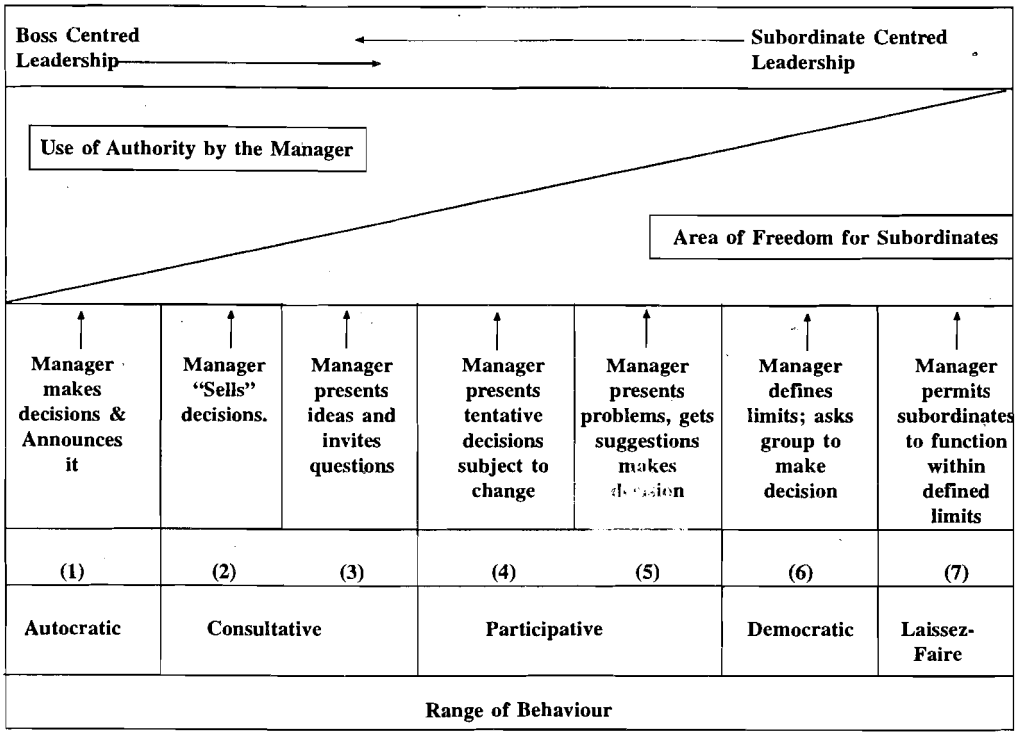

Fig.2.1: Leadership Behaviour Continuum by Tannenbaum and Schmidt

iv) **Democratic:** In the democratic style of leadership, the manager defines the limits of the situation and problem to be solved and asks the group to make decisions, the subordinates have a relatively large area of decision freedom.

v) **Laissez-Faire:** This style at the far end of the continuum is called free rein, wherein subordinates are permitted to function within limits set by the manager's superior. There is no interference by the manager, who may participate in decision-making, but attempts to do so with no more influence than any other member of the group.

Interpreting Autocratic to Democratic—which is correct?

Research and experience has shown that no single decision authority style is correct all the time. The leader needs to change and adopt the style to fit the situation. In the hospital, in the operating room, the physician or the surgeon uses the autocratic style, but while dealing with other professionals in the meeting room or in problem solving situation, the democratic style may be more appropriate.

Factors Affecting Style

The leader decision authority style adopted by the manager depends a great deal on factors such as:

- Importance of results,
- Nature of the work,
- Characteristics of workers, and
- Personal characteristics of the manager.

If there is a disaster or crisis situation emerges and the task has to be performed immediately, the health services manager needs to adopt an autocratic style of the continuum. But, if time is available with the manager and other people are equally creative and empowered, the manager needs to adopt a participative or democratic style.

Subordinates characteristics—their training, education, motivation, and experience can influence the leader authority style adopted by the manager. This factor is closely related to type of work. If subordinates are skilled professionals, as opposed to unskilled, the manager may seek opinions more readily and use a consultative or participative style. But in the case of unskilled or inexperienced employees the manager may have to make the decisions unilaterally. Moreover, personal characteristic

of the manager can affect the leader authority style adopted. Some individuals, by reason of their personality, previous experiences, values, and cultural background, function better under one style or another may find it difficult to change with the situation. For example in the health care organisations when a physician becomes an administrator, he may find it difficult to adjust styles because of previous training and experience because in the doctor-patient relationship the doctor has always been the primary decision maker. But as a manager, participative approach is often more appropriate particularly when working with other professionals.

But, it must be kept in mind that no one style is appropriate at all times. Which style is more appropriate depends upon the situation which includes work environment, what is to be done, the nature of employees, and the organisational climate.

2.4.2 Managerial Grid Style

One very popular approach to identifying leadership style of practicing managers is a graphic portrayal of a two-dimensional view as developed by Blake and Mouton. They proposed a managerial grid consisting of two dimensions: concern for production and concern for people. The grid, depicted in Fig. 2.2 has 9 possible gradients or degrees associated with each dimension, on each of axis, creating 81 possible combinations of concern for production on the horizontal axis and concern for people on the vertical axis. A1 represents low concern for the dimension and A9 presents high concern.

Rather than try to direct attention to all 81 combinations, grid development practitioners tend to focus on 5 "Critical Combinations". The combinations are usually referred to by number, and when people become familiar with the grid they know what the numbers mean. Although, they are briefly described in Fig. 2.2. Let us examine each combination in more detail:

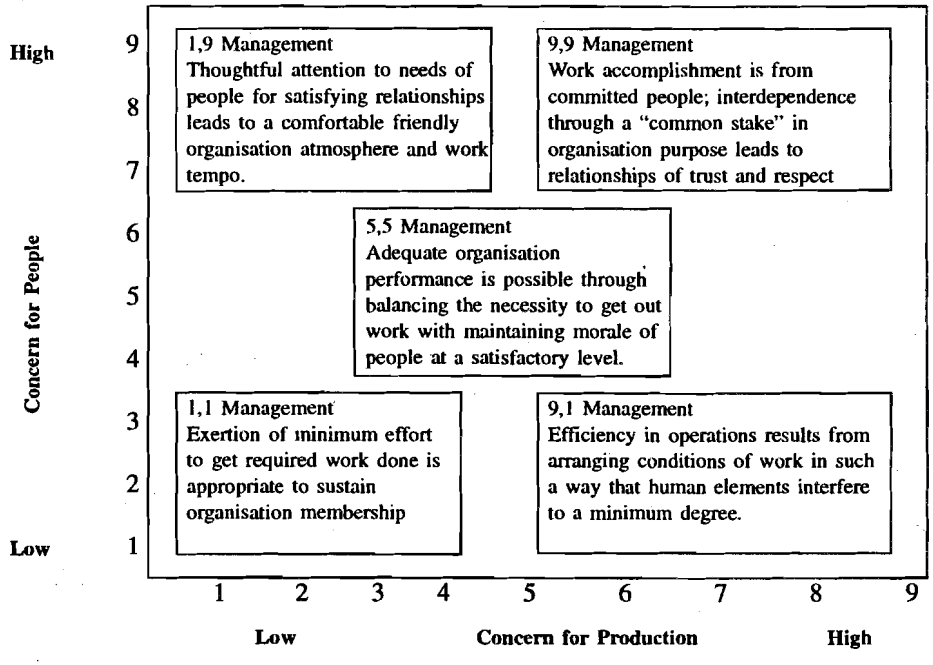

Fig. 2.2: The Managerial Grid

i) **The 1,1 Managerial Style** is often referred to as Impoverished Management. In this style, the manager tends to put people in jobs and then leave them alone. He or she does not check upon their work (no concern for production) or try to interact with them by offering praise and encouraging them to keep up the good work (no concern for people).

ii) **The 9,1 Managerial Style** is often referred to as Task Management. This manager has a high concern for production and a low concern for people. He or she plans the work and pushes to get it out, similar to the autocratic style, little interest is shown for people, if they can not fulfil the task they are replaced by others who can.

iii) **The 1,9 Managerial Style** is called as Country Club Management because of high emphasis given to concern for people's feelings, comfort, and needs. The manager is basically interested in obtaining loyality from the subordinates and tries to motivate them to do their work without putting pressure on them.

iv) **The 5,5 Managerial Style** is often referred to as Middle-of-the-road Management. The manager assumes that there is an inherent conflict between the concerns for production and people. Therefore, he or she tries to compromise and balance the two dimensions.

v) **The 9,9 managerial style** is referred to as Team Management. It is regarded by many as the best and the ideal style, as the one that both managers in particular and the organisation in general should employ. This style focuses on people's higher level needs, involves subordinates in decision making and assumes that the goals of the people and the goals of the organisation are in harmony. As a result the 9,9 manager believes that maximum concern for both dimensions will result in the greatest overall efficiency.

Which one of these basic styles is best? The answer will depend on the needs of the subordinates, the manager, and the organisation.

Activity 1

Interview a representative sample of managers in an organisation and try to find out their preference for various managerial styles.

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2.4.3 Life Style or Situational Approach to Leadership

One of the most widely practiced leadership models is Paul Hersey and Ken Blanchard's situational leadership theory. This very popular approach to management style training and development has been used as a major training device at such Fortune 500 companies as Bank of America, IBM, Mobile Oil, and Xerox and it has also been widely accepted in all the military services.

Situational leadership, an extension of the managerial grid approach is a contingency theory based on an interplay among:

- the amount of guidance and direction (task behaviour) a leader gives,
- the amount of socio-emotional support (relationship behaviour) a leader provides, and
- The readiness levels that follower's exhibit in performing a specific task, function or objective. This concept was developed to help people attempting leadership, regardless of their role, to be more effective in their daily interactions with others. It provides leadership with some understanding of the relationship between an effective style of leadership and the level of readiness of their followers. Successful leadership is achieved by selecting the right leadership style, which Hersey and Blanchard argue is contingent on the level of the followers maturity.

It must be noted here that situational leadership is a model, not a theory. Its concepts, procedures, actions, and outcomes are based upon tested methodologies that are practical and easy to apply.

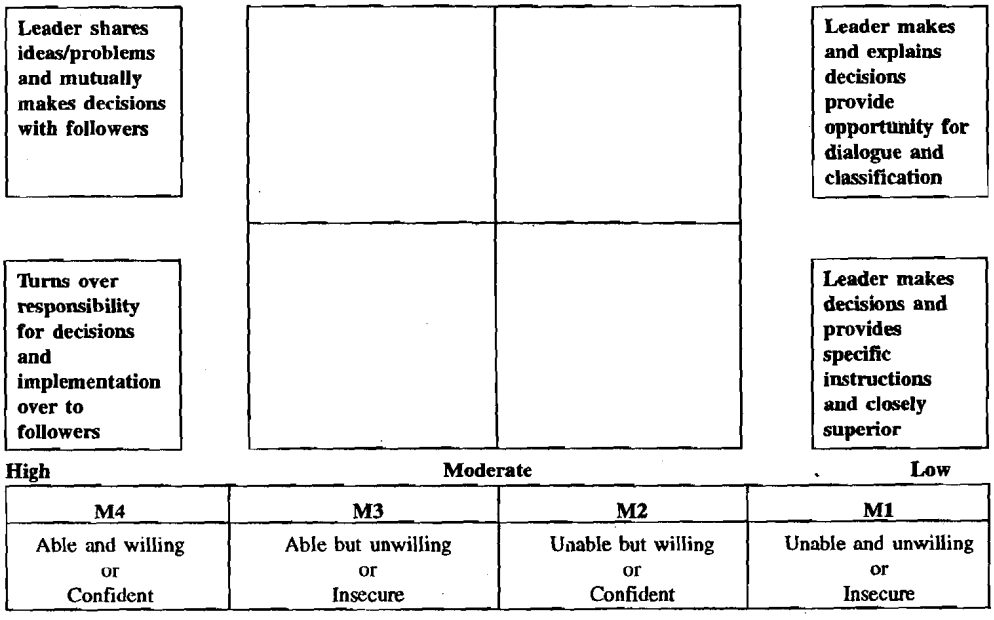

Fig. 2.3: Situational Leadership Style

Basic Concepts of Situational Leadership

According to this model, there is no best way to influence people, which leadership style a person should use with individuals or groups depends on the readiness level of the people the leader is attempting to influence. Fig. 2.3 summarises the situational leadership approach which identifies the following styles:

i) **Task Style:** The leader organises and defines roles for members of the work-group; the leader explains the tasks that members are to do and when, where, and how they are to do them.

ii) **Relationship Style:** The leader has close, personal relationships with the members of the group, and there is a two-way communication along with psychological and emotional support.

iii) **Maturity Level:** The level of maturity is defined by three criteria:

- Degree of achievement motivation
- Willingness to take on responsibility
- Amount of education and/or experience

According to Hersey and Blanchard, it has two components; Job maturity and psychological maturity. The first encompasses one's knowledge and skills and the individuals high on this have the knowledge, ability, and experience to perform their job tasks without direction from others. Psychological maturity relates to the willingness or motivation to do something. Individuals high in psychological maturity don't need much external encouragement; they are already intrinsically motivated.

Activity 2

Interview several people asking them to describe situations where someone's attempt to influence them was successful or unsuccessful.

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Situational leadership model uses two leadership dimensions i.e. relationship and task and by considering each as either high or low combines them into four specific leadership styles: Authoritative or telling; consultative or selling; participative or supportive; and delegating. They are described as follows:

a) **Authoritative or Telling Style:** This is a high task, low relationship style and is effective when followers are at a very low level of maturity. The leader defines roles and tells other what, how, when and where to do various tasks. It emphasises authoritative or directive behaviour.

b) **Consultative or Selling Style:** This is a high task, high relationship style and is effective when followers are on the low side of maturity. Here the leader provides both directive and supportive behaviour.

c) **Participative or Supportive Style:** This is a low task, high relationship style and is effective when followers are on the low side of maturity. Here the leader and follower share in decision-making, with the main role of the leader being facilitative and communicating.

d) **Delegating Style:** This is a low-task, low-relationship style and is effective when followers are at a very high level of maturity. The leader provides little direction or support.

The final component in Hersey and Blanchard's theory is defining four stages of maturity:

- **M1:** People are both unable and unwilling to take responsibility to do something. They are neither competent nor confident, so they need clear and specific directions.
- **M2:** People are unable but willing to do the necessary job tasks. They are motivated but currently lack the appropriate skills. The high task behaviour compensates for the followers lack of ability, and the high relationship behaviour tries to get the followers psychologically to "buy into" the leaders desires.
- **M3:** People are able but unwilling to do what the leader wants. This stage creates motivational problems that are best solved by a supportive, non-directive, participative style.
- **M4:** People are both able and willing to do what is asked to them and so the leader at this stage does not have to do much.

The Fig. 2.3 integrates the various components into the situational leadership models. As followers reach high levels of maturity, the leader responds by not only continuing to decrease control over activities, but also by continuing to decrease relationship behaviour as well.

You might have noticed that the high similarity between Hersey and Blanchard's four leadership styles and the four extreme "corners" in the managerial grid.

2.4.4 Four Systems of Management Leadership

Rensis Likert proposed four basic systems, or styles, of organisational leadership that evolved from the many years of research by the Michigan group. Table 2.1 summarises these four styles, called **Systems of Management Leadership.**

The manager who operates under system 1, approach is very authoritarian and actually tries to exploit the subordinates. In system 2, the manager takes a paternalistic approach while still being autocratic. Behaving as a benevolent autocrat the leader maintains strict control over the subordinates and never delegates authority to work group members, but he or she "pats them on the head" and "does it for their best interests". In System 3, the manager uses a consultative approach; that is, though, the leader consults the subordinates and receives participative input from work group members, but he/she still maintains the right to make final decisions. Finally, in system 4, the manager uses a democratic style; this manager gives some directions to work group members but provides for total participation and takes decisions by consensus and majority.

Table 2.1: Linker's Four Systems of Management Leadership

CHARACTERISTICS	SYSTEM-1 (Exploitative Authoritative	SYSTEM-2 (Benevolent Authoritative)	SYSTEM-3 (Consultative)	SYSTEM-4 (Participative Group)
Trust in Subordinates	None	Condescending	Substantial	Complete
Motivation Accomplished by	Fear and Threats	Rewards and Punishment	Rewards, Punishment involvement	Group Participation, involvement
Communication	Very Limited	Limited	Fairly Widespread	Widespread
Interpersonal interaction	Very Limited	Limited	Moderate Amount	Extensive
Decision Making	Centralised	Mostly Centralised	Broad participation Allowed	Dispersed
Goal Setting	Centralised	Mostly Centralised	Some Participation Allowed	Participation Allowed
Control	Centralised	Mostly Centralised	Moderate Delegation	Extensive Delegation
Informal Organisation	Always Developed and in Opposition to the Organisation	Usually developed and partially in opposition to the organisation	May be Developmend and May Support or Oppose the Organisation	Informal Organisation is the same as the formal organisation

To have an empirical research back up to support which style is more effective, Likert and his colleagues asked thousands of managers to describe on an expanded version of the format shown in Table 2.1, the highest and lowest producing departments with which they had experience. Quite consistently, the high-producing units were described according to systems 3 and 4, and the low-producing units fell under systems 1 and 2. This led Likert to conclude that the best way for all organisations to manage employees is to move towards system 4.

Leadership Styles in Today's Perspective

Tanenbaum's continuum of leadership behaviour, Blake and Mouton's managerial grid, Hersey and Blanchard's life cycle, and Likert's four systems represent the established approaches to leadership style. They have been practically applied and tested for a number of years and are still relevant in the perspective sense of what leaders should do, more so in today's demanding and emerging organisations.

There is accumulating evidence that a leader's style can make a difference. For example, recent studies have concluded that the leader's style is the key to the formulation and implementation of strategy and also plays an important role in work group members creativity. In other words, there is little doubt that the way (style) leaders influence work group members can make a difference in their own and their people's performance.

This immense concern and impact of the styles of leadership have given way to importance of the roles and functions of leadership and skills required for effective leaders. Now in the following sections, in this Unit, you will appreciate and learn **what** (Roles and Functions) and **how** (Skills) of leadership.

2.5 ROLES AND FUNCTIONS OF LEADERSHIP

Now we turn to the roles and functions of leaders by answering the question, "What do effective leaders do on a day-to-day basis?" There are many tasks that the leader must perform. The many functions listed out, with behavioural descriptions, in Table 2.2 can be conceptually collapsed in to the four managerial functions shown as follows:

i) **Communication:** Leaders are effective and successful not only because of what they do but also because of how their acts are interpreted. They need to be able to tell, show, write and listen so that they can convey to others what they are doing and want to be done. The leader of an organisation spends about 60 to 90 per cent of the working day on communication. This also includes exchanging routine information and processing paper work. The leaders need versatility in role behaviour in order to deal with people in terms of their individual expectations. Different roles call for different communications behaviour.

ii) **Traditional Management:** This role consists of performing functions like planning, decision-making, and controlling. Its observed role behaviours include setting goals and objectives, defining tasks needed to accomplish goals, scheduling employees, assigning tasks, producing routine instructions, defining problems, handling day-to-day operational crises that usually emerge in hospital kind of organisations, deciding what to do, developing new procedures, inspecting work, walking around inspecting and supervising the work, monitoring performance data, and doing preventive maintenance.

iii) **Human Resource Management:** This function contains the most behavioural categories, motivating/reinforcing, disciplining, staffing, training and development and most importantly building effective teams for goal achievement. The observed behaviours of this activity includes allocating formal rewards, asking for input, conveying appreciation, giving credit where due, listening to suggestions, giving positive feedback, developing job descriptions, reviewing applications, orienting employees, arranging for training, clarifying roles, coaching, etc. And under this category the most important function is developing team work which requires special attention and discussion.

Developing Team Work: One of the most important functions of leadership is to develop team work. This is most likely to develop when the leader builds a supportive environment for it. Supportive measures taken by the leader help the group to take the first necessary steps towards team work and these steps become the basic trust, and compatibility. Studies have shown that greater the trust and compatibility in a team, the greater their effectiveness tends to be; so leader will seek to develop an organisational climate that build's these conditions. There are three key factors in the development of team work: the leader, the subordinates, and the environment as shown in Fig. 2.4 below. They are interdependent. For example if the leader cannot get along with the subordinates, the group members do not like the leader or the environment is not conducive to effective team work, over all group efficiency suffers.

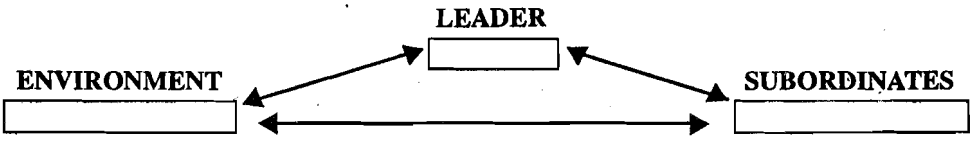

Fig. 2.4: Team-work Determinants

iv) **Networking:** This activity consists of socialising/politicking and interacting with outsiders. The observed behaviours associated with this activity include non work related interactions, informal joking around; dealing with consumers, clients, suppliers. attending external meetings, and doing/attending community service events.

What do Effective Leaders Do?

Comprehensive studies have been conducted to understand what do effective real managers and leaders do, and it was found that communication and human resource management functions, described above, made by far the largest relative contribution to the leader's effectiveness, and that the traditional management activities, and especially the networking activities, made by far the least relative contribution (Luthans, *et al*, 1985). Luthans and his associates explained that if effectiveness is defined as the perceived quantity and quality of the performance of a manager's unit and his or her work group member's satisfaction and commitment, then the biggest relative contribution to leadership effectiveness comes from the human oriented activities communication and human resource management.

Table 2.2: Leadership Activities and Behavioural Descriptors

1) Planning/Coordinating a) Setting goals and objectives b) Defining tasks needed to accomplish goals c) Scheduling employees, time-tables d) Assigning tasks and providing routine e) Coordinating activities of each work group member to keep work running smoothly. f) Organising the work	2) Staffing a) Developing job descriptions for position openings b) Reviewing applications c) Interviewing applicants d) Hiring e) "Filling in" where needed
3) Training/Developing a) Orienting employees, arranging for training seminars, etc. b) Clarifying roles, duties, job descriptions c) Coaching, mentoring, walking work group members through task d) Helping work group members with personal development plans	4) Decision Making/Problem Solving a) Defining problems b) Choosing between two or more alternatives or strategies c) Handling day-to-day operational crises as they arise d) Weighing the trade-offs; cost benefit analyses e) Actually deciding what to do f) Developing new procedures to increase efficiency
5) Processing Paper work a) Processing mail b) Reading reports, in-box c) Writing reports, memos, letters, etc. d) Routine financial reporting and bookkeeping e) General desk work	6) Exchanging Routine Information a) Answering routine procedural questions b) Receiving and disseminating requested information c) Conveying results of meetings d) Giving or receiving routine information over the phone e) Staff meetings of an informational nature
7) Montoring/Controlling Performance a) Inspecting work b) Walking around and checking things out, touring c) Monitoring performance data (e.g. computer printouts, production, financial reports) d) Preventive maintenance	8) Motivating/reinforcing a) Allocating formal organisational rewards b) Asking for input, participation c) Conveying apprecition, compliments d) Giving credit where due e) Listening to suggestions f) Giving positive performance feedback g) Increasing job challenge h) Delegating responsibility and authority i) Letting work group members determine how to do their own work j) Sticking up for the group to managers and others, backing a work group member
9) Disciplining/Punishing a) Enforcing rules and policies b) Demotion, firing, layoff c) Any formal organisational reprimand or notice	10) Interacting with Outsiders a) Public relations b) Customers c) Contacts with suppliers d) External meetings e) Community-service activities

11) Developing Team Work a) Create an environment in which team work can happen. b) Creating trust, cooperation and compatibility with the subordinates d) Define tasks and motivate the team members towards goal attainment.	12) Socialising/Politicking a) Nonwork related chitchat (e.g. family or personal matters) b) Informal "joking around" c) Attending external meetings/ conferences/seminars d) Attending community service events.

Human oriented leadership skills may be of considerable value in meeting the challenges of global competition, and of providing the quality of health care services. The last section in this unit now focusses on these leadership skills.

2.6 LEADERSHIP SKILLS

As the above section indicates, there is now recognition in both leadership theory and practice of the importance of skills, **how** leaders behave and perform effectively the various functions. Both styles and roles/functions are closely related to skills and can be used as a point of departure for the discussion of skills. The results of various research studies have combined into the following four categories of effective leadership skills:

i) **Participative and Human Relations:** These includes supportive interpersonal communication and team building.

ii) **Competitiveness and Control:** which include being assertive and gaining power and influence.

iii) **Innovativeness and Enterpreneurship:** includes creative problem solving.

iv) **Maintaining Order and Rationality:** includes managing self, stress, conflicts, and time; and doing rational decision making.

These skills categorised into the four groups are interrelated and over lapping. Effective leaders do not perform one skill or one set of skills independent of others. In fact, effective leaders are multiskilled.

With this background two models are developed to identify skills as personal and interpersonal leadership skills. These are summarised in Fig. 2.4. and 2.5.

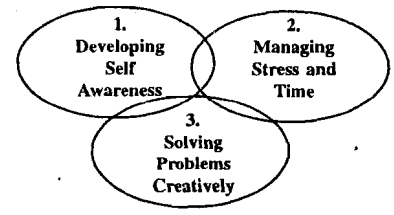

Fig. 2.4: Model of Personal Leadership Skills

In the end, we must discuss the very important managerial skills required for leader, as they move in the hierarchy in the organisations.

Managerial Skills

It is generally agreed that there are at least three areas of skill necessary for carrying on the various functions of management, technical, human and conceptual (see Fig. 2.6). Though they are interrelated in practice, they can be considered separately.

a) **Technical Skill:** Ability to use knowledge, methods, techniques and equipment necessary for the performance of specific tasks acquired from experience education, and training. Examples are the skills learned by medical doctors and pharmacists. This skill is the distinguishing feature of job performance at the operating level; but as employees are promoted to leadership responsibilities, their technical skills become proportionately less important as shown in Fig. 2.6. They increasingly depend on the technical skills of their subordinates and in many cases never practice some of the technical skills that they supervise.

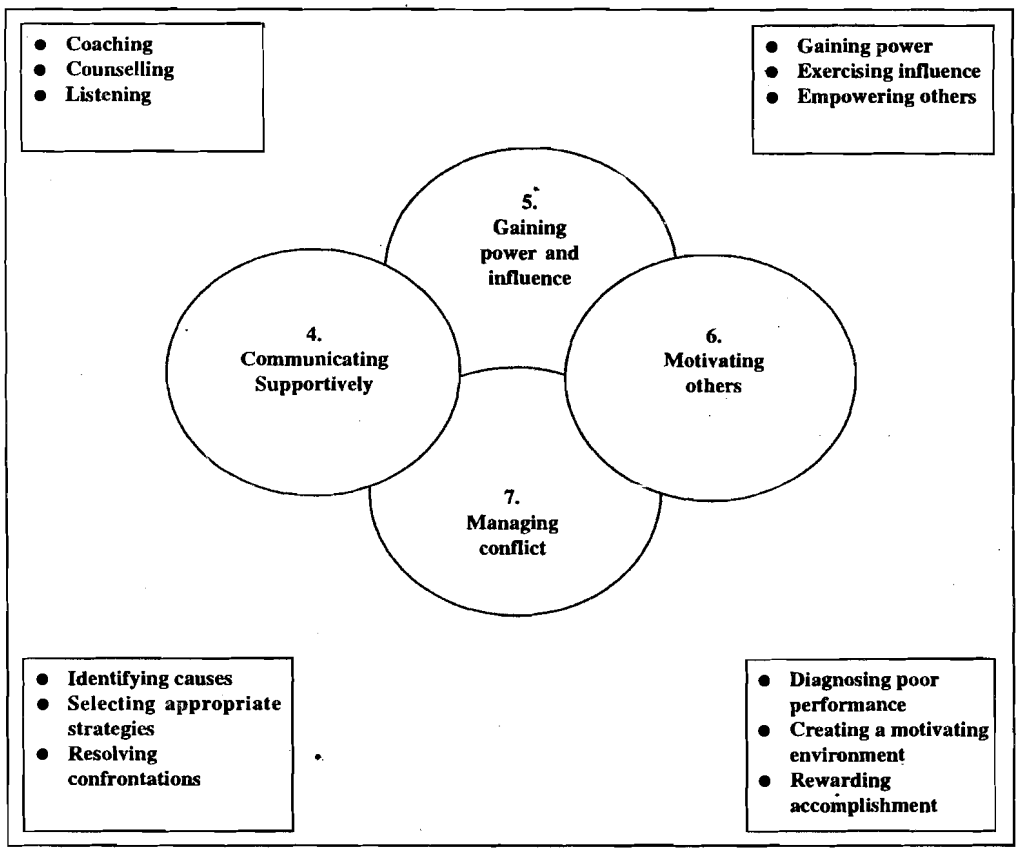

Fig. 2.5: Model of Personal Leadership Skills

b) **Human Skills:** This is the ability to interact and work effectively with people and to build team work. This skill which includes an understanding of motivation and an application of effective leadership is very important for middle level managers who must lead others. Without a solid understanding of such behavioural areas as interpersonal communication, motivation, counselling and directing, middle level managers would be ineffective in leading their subordinates.

c) **Conceptual Skills:** This skill becomes increasingly important in higher managerial jobs. This skill is the ability to understand the complexities of the overall organisations and covers many activities, from formulating organisational objectives, policies and procedures, to developing techniques for handling office work flow. The appropriate mix of these skills varies as an individual advices in management from supervisory to top management positions as illustrated in Fig. 2.6. The leaders place in the hierarchy determines the degree of managerial skill he or she must have. As leaders prove their effectiveness and begin moving up the higher levels in organisation need to learn and use more human and conceptual skills to be effective less technical skill tend to be needed as one advances from lower to higher levels in the organisation. It needs to be noted that while the amount of technical and conceptual skills needed at these different levels of management varies, the common denominator that appears to be crucial at all levels in human skill.

All the styles and roles and functions discussed are very relevant and effective in our health care organisations. How our health care managers and administrators apply these skills and techniques can make a difference in the challenges that lie in the health organisations.

2.7 LET US SUM UP

This unit is concerned with leadership styles (the way leaders influence followers/ subordinates); functions of leadership (what leaders/managers do in their day-to-day jobs; and leadership skills how leadership styles were the main focus which includes Tannenbaum's leadership continuum; Blake and Monton's managerial grid; Hersey and Blanchard's situational leadership model; and Likert's four systems. Each of these

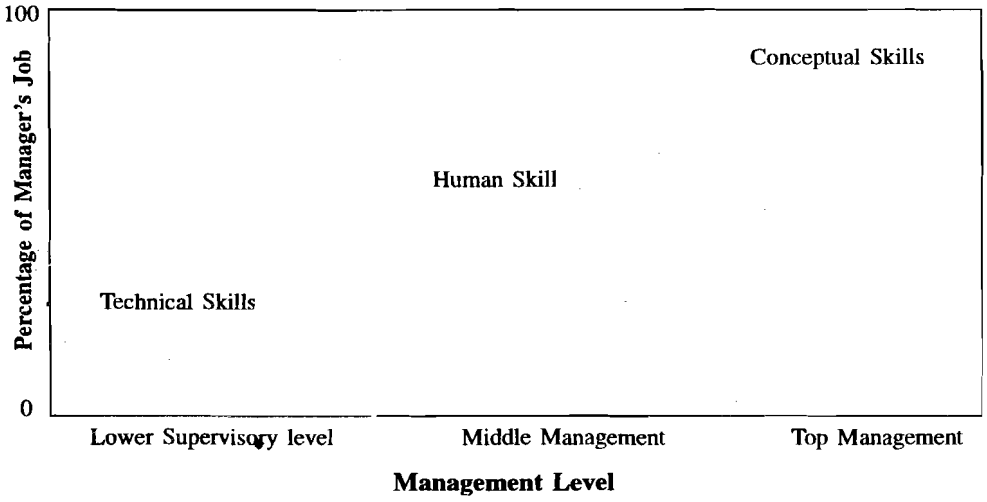

Fig. 2.6: Managerial Skills needed at different Hierarchical Levels

styles have implications for the practice of leadership. The shift in attention from styles to roles and functions reflects a more empirical emphasis on what leaders really do.

The last part of the unit is concerned with leadership skills, how leaders behave and perform effectively the personal and interpersonal skills. Models are especially comprehensive and useful. Managerial skills for leadership emphasise the importance of human skill at all levels from learner to top management.

2.8 SELF ASSESSMENT TEST

1) Identify the importance of leadership for health care organisations.
2) How do Hersey and Blanchard define maturity? Is this variable included in other models of leadership.
3) How does perspective leadership behaviour differ from laissez-faire leadership behaviour?
4) What are some of the needed leadership skills for leaders to be effective?
5) What are the three types of managerial skills every leader must have? Explain.

2.9 FURTHER READINGS

Hodgetts, R.M. and Cascio, D.M. (1983), *Modern Health Care Administration*, Academic Press, INC. New York.

Luthans, F. (1989), *Organisational Behaviour*, 5th ed., Mc Graw-Hill Series in Management.

Rakich, J.S., *et al.* (1985), *Managing Health Services Organisations*, 2nd ed., W.B. Sounders Company.

UNIT 3 UNION AND MANAGEMENT RELATIONS

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- define the trade union, explain the procedure for its registration, specify grounds for cancellation, and describe the rights, liabilities and immunities of members and officers of a registered trade union;
- familiarise yourself about the concept, processes involved, advantages and disadvantages of collective bargaining;
- define "industrial dispute", "industry" and workman identity, proper dispute redressal forum and their working;
- distinguish between strike and lock-out, describe the prohibitions on strikes and lock-outs and specify the effect of illegality;
- apply the norms while terminating the services of workmen and holding domestic enquiry; and
- follow the guidelines to ensure prevention of sexual harassment of women.

3.1 INTRODUCTION

Union Management relations is a dynamic social process. It denotes the relationship between employers and workers organisation or union. The main objective of Union Management relations is to develop harmonious relations between them and to minimise industrial conflicts. Conflicts may be generated over determination of bargaining agent and on issues connected with employment, non-employment, terms of employment such as wages and monetary and fringe benefits and condition of service such as working hours, holidays, leave, method of work, introduction of new technology, health, safety and welfare. Such conflict could lead to strikes and lock-outs. Be that as it may industrial conflicts affect the functioning of the establishment. The dispute may be resolved by collective bargaining and voluntary arbitration or through adjudication. India cannot afford a type of collective bargaining for resolution of industrial disputes. It has adopted an adjudication system.

In this unit you will study the regulation of trade unions collective bargaining, strikes and lock-out, redressal of disputes and disciplinary action by the employer, and sexual harassment at work place.

3.2 TRADE UNION

3.2.1 Statutory Definition

Section 2 (h) of the Trade Union Act, 1926 defines trade union as follows:

a) Any combination, temporary or permanent

b) formed for the purpose of:

   i) regulating the relations between

      —workmen and employers, or

      —workmen and workmen; or

      —employers and employers; or

   ii) imposing restrictive condition on the conduct of any trade or business

But it does not include:

i) any agreement between partners as to their business; or

ii) any agreement between an employer and those employed by him as to such employment; or

iii) any agreement in consideration of the sale of the goodwill of a business or instruction in any profession, trade or handicraft.

3.2.2 Procedure for Registration

For the purpose of registration any seven or more members of a trade union may apply for registration by subscribing their names to the rules of trade Union (Section 4). If however, more than half of the members who have applied for registration cease to the members of the trade union or disassociate themselves from the application by giving a notice in writing to the registrar before the registration is granted the application for registration shall become invalid (Section 4).

An application for registration should be sent in FORM 'A'. It shall accompany with a copy of the rules of trade union and a statement of the following particulars [Section 5 (2)].

a) the names, occupation and addresses of the members making the application;

b) the name of the Trade Union and the address of its head office; and

c) the title, names, ages, addresses and occupations of the officer bearers.

The application for registration shall also accompany with a general statement of the assets and liabilities of the trade union prepared in the prescribed form and containing such particulars as may be required, if the trade union has been in existence for more than one year before the making of an application for its registration.

The rule of a trade union must contain provisions relating to subjects mentioned in Section 6 of the Act and unless it is complied with no registration can be allowed.

If after, examining application for registration the Registrar is not satisfied, he may call for further information for the purpose of satisfying himself that the application complies with the provisions of section 5 and 6 of the Act. Unless he is supplied with the information demanded by him he may refuse to register the union (Section 7 (1)). Where the name under which the trade union is proposed to be registered is identical with any existing trade union or in the opinion of the Registrar, so nearly resembles such name as to be likely to deceive the public or the members of either trade union, he may require the applicants that the name of the Union should be altered and shall refuse to register unless the name is altered (Section 7 (2)) .

The Registrar on being fully satisfied that the trade union has complied with all the requirements needed for registration he shall register the trade union by entering in a register maintained for this purpose in which the particulars relating to the trade union contained in the statement accompanying the application for registration must be entered into (Section 8). Once the condition for registration is complied with it is obligatory on the Registrar to register the union. He will have no discretion in the matter. Similarly where there is a rival group asking for registration, he cannot decide which is the real union for the purpose of registration.

After registering the trade union, the Registrar shall issue a certificate or registration which shall be the conclusive evidence that the trade union has been registered. (Section 9).

3.2.3 Cancellation of Registration of Trade Union

The registration of a trade union can be cancelled on its own application which is approved by a general meeting of the Union or a majority of its members. It may also be cancelled by the Registrar Trade Unions by a written notice of not less than two months on any of the following grounds:

a) that the registration certificate has been obtained by fraud or mistake;

b) that the trade union has ceased to exist;

c) that it has willfully and after notice from the Registrar allowed any rule to continue in force which is inconsistent with any provision of the Act.

d) that it has willfully and after notice from the Registrar contravened any provision of the Act.

e) that it has rescinded any rule providing for any of the compulsory matters required under the Act.

Where withdrawal or cancellation of the registration is to be effected it must be preceded by a requisite notice as well an opportunity to show cause against the proposed action.

Once the certificate of registration is cancelled the Registrar cannot withdraw his order on the ground that the trade union has rectified its mistake. However he can withdraw his order of cancellation if it was passed in violation of Statutory provisions.

3.2.4 Immunity Against Criminal Conspiracy in Trade Disputes

The office bearers and members of a registered trade union are given protection against criminal proceedings for conspiracy under sub-section (2) of section 120 B of the Indian Penal Code in respect of any agreement made between the members for the purpose of furthering any such object of the trade union on which its general funds may be spent unless the agreement is an agreement to commit an offence.

If the members of a registered trade union enter into an agreement to commit an

offence under the criminal laws of the country no immunity would be available to them.

In order to achieve their objective or to enforce their demands more often the unions have to resort to strike against employer. The collective action of the members of trade union in this form amounts to interference with the trade or business of the employer or with the employment of other workers and amounts to conspiracy. A strike in furtherance of a trade dispute is protected under section 17 of the Act. But if it is accompanied with wrongful confinement, assault, mischief or criminal trespass to person or property of the employer it would not be protected.

3.2.5 Immunity from Civil Suits

Section 18 of the Trade Unions Act affords protection to a registered trade union, its office bearers or member against civil suits in respect of any act done in contemplation or furtherance of a trade dispute if the ground is only that such act induces some other person to break a contract of employment or that it is in interference with trade, business or employment with some other person or with the right of some other person to dispose of his capital or labour as he wills.

Protection is further given to a registered trade union against a suit or other legal proceeding in any civil court in respect of any tortious act done in contemplation or furtherance of a trade dispute by an agent of the trade union if it is proved that such person acted without the knowledge of or contrary to express instruction given by the executive of the trade union (Section 18 (2)). The immunity under this section is available to both officers, members as well as unions.

3.2.6 Rights and Liabilities of Registered Trade Unions

a) **Rights to spend general fund :** A registered trade union has right to spend its general funds for any or all of the purposes mentioned in section 15 of the Act. This section enumerates as many as eleven times for which the funds may be spent. But, if the fund is spent for any other purpose it will be illegal.

b) **Right to constitute a separate fund for political purposes:** A registered trade union in case it decides to do so can constitute a separate fund from contributions separately levied for or made to a fund for political objects. Payment may be made from such fund for the promotion of civil and political interests of its members in furtherance of the objects specified in the Act (Section 16).

c) **Right to sue and be sued:** A registered trade union may sue and be sued in its registered name as well as in a representative action.

d) **Right to vote:** Being a legal entity it can vote through a person authorised by it in this behalf.

e) **Right to acquire and dispose of property:** A registered trade union can sue as a pauper (having no capacity to pay court fee).

f) **Right to acquire and dispose of property:** A registered trade union has right to acquire both movable and immovable property and to dispose of the same under its registered name. The expenditures for this purpose shall be met from the fund of the Union.

Liabilities

1) To spend its general funds only for the purposes mentioned in Section 15 of the Act.

2) Not to compel any members of the trade union to contribute to the Political Fund; and not to exclude any member who does not contribute to the said fund from any benefits of the trade union or place him directly or indirectly under any disability or disadvantage as compared to those who contribute to the political fund.

3) To give notice of every change of name or amalgamation to the Registrar.

4) To give notice of the dissolution of a registered trade union within 14 days of the dissolution to the Registrar.

5) To submit returns, together with the general statement to the Registrar.

Check Your Progress 1

1) What is the minimum number of members prescribed in applying for registration?

.....

2) Can the Registrar refuse to register a trade union applying for registration is identical or nearly resembles with the existing trade union?

.....

3) Can the Registrar of trade union cancel the registration for allowing any rule to continue in violation of the provisions of the Act without giving any prior notice?

.....

.....

4) Can the officers of a registered trade union be punished for criminal conspiracy for its trade union activities?

.....

.....

3.3 COLLECTIVE BARGAINING

3.3.1 Concept and Nature

Collective Bargaining is a method by which problems of wages and conditions of employment are resolved amicably (although often reluctantly), peacefully and voluntarily between labour and management. In short it is a technique for voluntary regulation of industrial relations.

This system is highly developed in industrially advanced countries but in India still a lot has to be done in this regard. The success of collective bargaining depends on many factors such as that the Union should not be under the control or influence of the employer, and employer and the trade union must stand on equal footing to carry on negotiations. For its success it is necessary that workmen should be united and must be in a position to resist exploitation and unjust discrimination.

3.3.2 Processes

The process of collective bargaining is very complicated. It necessitates a great deal of discussion with a full understanding of others view point. The negotiation in a collective bargaining depend quite a bit on the ability, intelligence and maneuvering capacity of the negotiators and on their skillful handling of the issue. He must enjoy the confidence of his own people and he must be in a position to take a crucial decision.

3.3.3 Advantages

This means of settling a dispute has the following advantages:

i) It is quick and efficient

ii) It is democratic

iii) It produces harmonious relationship between employers and workmen.

3.3.4 Disadvantages

This means of settling a disputes has the following disadvantages:

i) the ultimate sufferer i.e. consumer is not represented in the negotiation;

ii) it flows more from power politics than from rational thoughts;

iii) in case of failure of negotiations unpredictable consequences may follow.

Check Your Progress 2

1) Write one sentence to explain collective bargaining.

.....

2) Enumerate one of the important advantages and disadvantages of collective bargaining.

.....

.....

3.4 RESOLUTION OF INDUSTRIAL DISPUTES

3.4.1 Scope and Applicability of the Industrial Disputes Act

Labour Law plays an important role in regulating the relations between union and management. Thus, the Industrial Disputes Act, 1947 seeks to ensure industrial peace. The principal objects of the Act are:

1) the promotion of measures for securing and preserving amity and good relations between the employer and workmen;

2) an investigation and settlement of industrial disputes, between employers and employees, employers and workmen, or workmen and workmen, with a right of representation by a registered trade union or a federation of associations of employers;

3) prevention of illegal strikes and lock-outs;

4) relief to workmen in the matter of lay-off and retrenchment; and

5) collective bargaining.

The Act primarily regulates the relations of employers and workmen. It draws a distinction between the workmen as such and the managerial or supervisory staff, and confers benefit on the former only.

It is necessary, therefore, to take the Act as a whole and examine its salient provisions. The long title shows that the object of the Act is "to make provisions for the investigation and settlement of industrial disputes, and for certain other purposes".

The Act extends to the whole of India, and is applicable to every "industry". It is, therefore necessary to know the definition of industry. Section 2 (f) defines "industry" to mean:

Any business, trade, undertaking, manufacture or calling of employers and includes any calling, service, employment, handicraft or industrial occupation or avocation of workmen.

The aforesaid definition raises an issue whether hospitals and dispensaries are industry.

3.4.2 Are Hospitals and Pharmacies Industry?

State of Bombay v. Hospital Mazdoor Sabha, (1960) ILLJ 251, constitutes a landmark in labour law. In this case the Supreme Court not only declined to adopt the expression "analogous to carrying out of a trade or business", but coined a new expression "systematically" organised in a business or trade like manner. In this case J.J. Group of Hospital (run by the State of Bombay) retrenched two of its ward servants. Against this order the aggrieved workers moved to the Bombay High Court for the issuance of writ of mandamus directing their reinstatement. The management i.e. the State of Bombay contended that the hospital being not an "industry" the Industrial Disputes Act, 1947 was not applicable. The Bombay High Court held that the hospital was an "industry". Aggrieved by this finding the State of Bombay filed an appeal before the Supreme Court. One of the main issues before the Supreme Court was whether in running the hospitals, the State was carrying an activity of an "industry". The Court answered it in affirmative:

> We have yet to decide which are attributes the presence of which makes an activity an undertaking within Section (j), on the ground that it is analogous to trade or business. It is difficult to state these possible attributes definitely or exhaustively; as a working principle it may be stated that an activity systematically or habitually undertaken for the production or distribution of goods or for the rendering of material services to the community at large or a part of such community with the help of employees is an undertaking. Such an activity generally involves the co-operation of the employer and the employees and its object is the satisfaction of material human needs. It must be organised or arranged in manner in which trade or business is generally organised or arranged. It must not be casual nor must it be for oneself nor for pleasure. Thus, the manner in which the activity in question is organised or arranged, the condition of the co-operation between employer and the employee necessary for its success and its object to render material service to the community can be regarded as some of the features which are distinctive of activities to which Section 2 (j) applies. Judged by this test there would be no difficulty in holding that the State is carrying on an undertaking when it runs the group of Hospitals in question.

In *Lalit Hari Ayurvedic College Pharmacy* v. *Workers Union,* AIR 1960 S.C. 126 the Supreme Court applied the ratio of *Hospital Mazdoor Sabha supra.* In this case Lalit Hari Ayurvedic College was an educational institute in Indian indigenous medicines. It was running a hospital for the practical training of its students and maintaining a pharmacy where its students got some training in the preparation and manufacture of medicines and organisation of Pharmacies. 30% of drugs produced by the Pharmacy were consumed in the hospital and 70%of drugs worth about Rs. one lakh per annum were sold in the market. The profits from the sale were apparently used in the maintenance of the college and its other non profitable activities. On these facts, it was held that the activity of the appellant in running the pharmacy and hospital was an "undertaking" under Section 2(j) of the Industrial Disputes Act, 1947.

However, a larger Bench of the Supreme Court in *Management of Safdarjung Hospital* v. *Kuldip Singh Sethi,* AIR 1970 SC 1407, disapproved the decision, in Hospital Mazdoor Sabha by holding that a hospital which was run and administered by the Government was a part of its sovereign functions and, therefore, it was outside the scope of "industry" and thereby unduly curtailed the scope of the term "industry". In this case three appeals were heard toegether.

In the first appeal a dispute arose between the management of Safdarjung Hospital, a Government owned and run hospital, and its employees for the computation of amount of salary due to workers consequent upon change in the grade. Thereupon the employees made an application to the Labour Court under Section 33 C (2) of the Industrial Disputes Act for the recovery of money due from the employer. The Labour Court directed the hospital to pay the money due to him. It is against this finding of the Labour Court that an appeal was filed.

In the second appeal a dispute arose between the Tuberculosis Association of India, (a research and training institution and its employees relating to pay scales and other facilities of the employees. The Government referred the dispute to the Tribunal. The Tribunal held that "neither the research carried out nor the training imparted nor the existence of Tuberculosis Association of India with which the hospital is affiliated makes any difference and the hospital is an industry within the meaning of the Act." Against this order the appeal was filed to the Supreme Court.

In the third appeal the management of Kurji Holy Family Hospital, Patna (a wholly charitable hospital maintaining some paid beds) took disciplinary action against two of its employees. The dispute was referred by the State of Bihar to Labour Court under Section 10 of the Act. The management raised the preliminary objection that they were not engaged in "industry" and consequently Labour Court had no jurisdiction. Against this a writ petition was made to the Patna High Court which held that it was an "industry". It was against this decision that an appeal was filed to the Supreme Court.

The common question involved in all the three appeals was whether the activities carried on by these hospitals were "industry"? The Court formulated the following test to determine whether or not an activity is an "industry":

i) It is not necessary to view the definition in two parts. 'The definition read as a whole denotes a collective enterprise in which employers and employees are associated. It does not exist either by the employers alone or by employees alone. It exists only when there is a relationship between employers and employees, the former engaged in business, trade, undertaking, manufacture or calling of employers and the latter engaged in any calling, service, employment, handicraft, or industrial occupation or, avocation

ii) The word "Industry" in (the definition of 'workmen') must take its colour from the definition (of industry) and discloses that a workman is to be regarded as one employed in an "industry" if he is following one of the vocations mentioned in conjunction with his employers engaged in the vocations mentioned in relation to the employers.

iii) ... in the collocation of the terms and their definitions these terms have a definite economic content of a particular type and on the authorities of this Court have been uniformly accepted as excluding professions and are only concerned with the production, distribution and consumption of wealth and the production and availability of material services. Industry has thus been accepted to mean only trade and business, manufacture, or undertaking analogous to trade or business for the production of material goods or wealth and material services.

iv) Material services are not services which depend wholly or largely upon the contribution of professional knowledge, skill or dexterity for the production of result. Such services... are services no doubt but not material services. Material services involve an activity carried on through co-operation between employers and employees to provide the community with the use of something such as electric power, water, transportation, mail delivery, and the like... the emphasis is... upon the productivity of a service organised as an industry and commercially valuable. It is the (commercial character of the activity and) the production of ... something (of benefit to particular individuals rendered by all services) which is described as the production of material services.

In the light of aforesaid test the court concluded that the *Hospital Mazdoor Sabha* wrongly held: (i) that the "second part of the definition contained an extension of the first part by including other items of industry", (ii) that economic activity was not an essential part of the concept of industry; (iii) that an economic activity could not exist without the presence of capital or profit making or both; (iv) that the test namely, "can such activity be carried on by private individuals or group of individuals," applied to the facts of the case.

The aforesaid principle was reiterated in *Management of Hospital, Orissa* v. *Their Workmen,* 1971 Lab. I.C. 835. In this case a dispute arose regarding the conditions of service of employees employed in hsopitals, sanatorium and infectious ward owned and run by the government. The Government of Orissa made three references to the Tribunal of adjudication. The Tribunal in all three cases held that the activities of the hospitals, sanatorium and infectious ward were "industry". Against this finding the management of the hospitals preferred an appeal before the Supreme Court. The question arose whether the aforesaid activities run by the government were "industry"? The Supreme Court following the decision in *Safdarjung Hospital* case held that the aforesaid activities were not "industry" because it was being run as a part of the functions of the Government and were being run as department. It further held that the "mere fact that payment was accepted in respect of some beds... could not... (lead) to the inference that the hospitals (were run as a business in a commercial way. Primarily, the hospitals (were) meant as free service by the Government to the patient, without any profit motive."

The principle enunciated in *Safdarjung Hospital supra* was once again followed and applied by the Supreme Court in *Dhanrajgiri Hospital* v. *Workmen,* (1975) 2LLJ 409. The hospital run by a Charitable Trust was engaged in imparting training in general nursing and midwifery. There were good number of trainees in general nursing and midwifery. There were also good number of trainees beds in the hospital meant for their practical training. The hospital was not distinct or separate from training nurses. The patients were charged according to their financial conditions and there was no

regular charge fixed for a patient. On these facts the Supreme Court held that the hospital was not engaged in any "industry" under the IDA.

The seven Judge bench of the Supreme Court in *Bangalore Water Supply and Sewerage Board* v. *Rajappa* after careful consideration of expressions used in the definition of 'industry', traditional attributes of trade or busines i.e. capital and profit motive, statements of International Labour Organisation in respect of industry, purposes and provisions of the legislation as a whole, Indian as well as foreign rulings, keeping in view the directive principles of State policy the following tests to determine the scope of "industry".

I. 'Industry', as defined in Section 2 (j) has a wide import.

   a) Where (i) systematic activity, (ii) organised by co-operation between employer and employee (the direct and substantial element is chimerical), (iii) for the production and/or distribution of goods and services calculated to satisfy human wants and wishes (not spiritual or religious but inclusive of material things or services geared to celestial bliss i.e., making, on a large scale *prasad* or food) *prima facie*, there is an industry in that enterprise.

   b) Absence of profit motive or gainful objective is irrelevant, be the venture in the public, joint, private or other sector.

   c) The true focus is functional and the decisive test is the nature of the activity with special emphasis on the employer-employee relations.

   d) If the organisation is a trade or business it does not cease to be one because of philanthrophy animating the undertaking.

II. Although Section 2 (j) uses words of the widest amplitude in its two limbs, their meaning cannot be magnified to overreach itself.

   a) 'Undertaking' must suffer a contextual and associational shrinkage as explained in Banerji and in this judgment; so also, service, calling and the like. This yields the inference that all organised activity possessing the triple elements in I (supra), although not trade or business, may still be 'industry' provided the nature of the activity, viz. the employer-employee basis, bears resemblance to what we find in trade or business. This takes into the fold 'industry' undertakings, calling and services, adventures 'analogous to the carrying on of trade or business'. All features, other than the methodology of carrying on the activity viz., in organising the co-operation between employer and employee, may be dissimilar. It does not matter, if on the employment of terms there is analogy.

III. Application of these guidelines should not stop short of their logical reach in invocation fo creeds, cults or inner sense of incongruity or outer sense of motivation for or resultant of the economic operations. The ideology of the Act being Industrial peace, regulation and resolution of industrial disputes between employer and workmen, the range of this statutory ideology must inform the reach of the statutory definition. Nothing less, nothing more.

   a) The consequences are (i) professions, (ii) clubs, (iii) educational institutions, (iv) co-operatives, (v) research institutes, (vi) charitable projects, and (vii) other kindred adventures, if they fulfil the triple tests listed in I (supra), cannot be exempted from the scope of Section 2 (j).

   b) A restricted category of professions, clubs, co-operatives and even gurukulas and little research labs, may qualify for exemption if, in simple ventures, substantially and going by the dominant nature criterion, substantively, no employees are entertained but in minimal matters, marginal employees are hired without destroying the non-employee character of the unit.

   c) If, in a pious or altruistic mission many employ themselves, free or for small honoraria or like return, mainly drawn by sharing in the prupose or cause, such as lawyers volunteering to run a free legal service, clinic or doctors serving in their spare hours in free medical centre or ashramites working at the bidding of the holiness, divinity or like central personality, and the services are supplied free or at nominal cost and those who serve are not

engaged for remuneration or on the basis of master and servant relationship, then, the institution is not an industry even in stray servants, manual or technical, are hired. Such elemosynary or like undertakings alone are exempt not other generosity, compassion, developmental passion or project.

IV. The dominant nature test:

a) Where a complex of activities, some of which qualify for exemption, others not, involves employees on the total undertaking, some of whom are not 'workmen' as in the *University of Delhi* case or some departments are not productive of goods and services if isolated, even then, the predominant nature of the services and the integrate nature of the departments as explained in the *Corporation of Nagpur*, will be the true test. The whole undertaking will be 'industry' although those who are not 'workmen' by definition may not benefit by the status.

b) Notwithstanding the previous clauses, sovereign functions, strictly, understood (alone) qualify for exemption, not the welfare activities or economic adventures undertaken by government or statutory bodies.

c) Even in departments discharging sovereign functions, if there are units which are industries and they are substantially severable, then they can be considered to come within Section 2 (j).

d) Constitutional and competently enacted legislative provisions may well remove from the scope of the Act categories which otherwise may be covered thereby.

On the basis of principles laid down in the case the Supreme Court has overruled the cases whose ratio runs counter to the principles enumerated in this case. However, the *State of Bombay* v. *Hospital Mazdoor Sabha* has been rehabilitated.

3.4.3 Coverage

The Industrial Disputes Act, 1947 covers all persons employed in any industry to do any skilled, or unskilled, manual, technical, operational, clerical or supervisory work are workmen within the meaning of this Act. It includes any apprentice. They may be employed for hire or reward and their contract of employment may be express or implied. It has been expressly provided that for the purposes of any proceeding under this Act such as conciliation proceedings etc. in relation to an industrial dispute it includes any such person who has been dismissed, discharged or retrenched in connection with or as a consequence of that industrial dispute or whose dismissal, discharge or retrenchment has led to that dispute. However, persons employed in managerial and administrative capacities and those employed in Army, Air Force, Navy, Police, Prison and Civil Service are excluded.

3.4.4 Industrial Dispute and Individual Dispute

The Industrial Dsiputes Act, 1947 seeks to resolve industrial disputes. Section 2 (k) of the Industrial Dsiputes Act, 1947, defines "industrial dispute" to mean:

> Any dispute or difference between employers and employers or between employers and workmen, or between workmen and workmen, which is connected with the employment or non-employment or the terms of employment or with the conditions of labour, of any person.
>
> The dimensions of the aforesaid definition determine the permissible area of both community intervention in industrial relations as well as labour activity.
>
> Stated broadly, the definition of "industrial dispute" contains two limitations (i) The adjective "Industrial" relates to the dispute of an industry as defined in the Act, and (ii) it expressly states that not all sorts of dispute and differences but only those which bear upon the relationship of employers and workmen regarding employment, non-employment, terms of employment and conditions of labour are contemplated.

The above definition covers only collective disputes or disputes supported by trade unions or by substantial number of workmen. In Section 2A which came into force on

1st December, 1965 it is provided that dispute or difference between an individual workman and his employer connected with or arising out of (i) discharge, (ii) dismissal, (iii) retrenchment, (iv) or otherwise termination of service of an individual workman, shall be deemed to be an "industrial dispute" even though no fellow workmen or any union of workmen is a party to the said dispute. The net effect of Section 2A is that by legislative action such a dispute is deemed to be an industrial dispute even where it is not espoused by a trade union or appreciable number of workmen. Thus, the result of the insertion of Section 2A was that, what was not an "industrial dispute" as per the interpretation of the Supreme Court would be deemed to be an "industrial dispute" in the stated circumstances.

3.4.5 Dispute Settlement Machinery

Under the Industrial Disputes Act, 1947 the following authorities are mentioned:

1) The Works Committee;
2) Conciliation Officer;
3) Board of Conciliation;
4) Courts of Enquiry
5) Labour Courts;
6) Industrial Tribunals; and
7) National Tribunals
8) Voluntary Arbitration

1) The Works Committee

In order to prevent industrial disputes the appropriate Government may, require the employer employing one hundred or more workmen in the industrial establishment on any day in the preceding twelve months to constitute a works committee. It consists of the representatives of the employer and workman in the establishment who is required to discuss the day to day matters in a cordial way. The duty of the works committee, according to section 3 is to promote measures for securing and preserving amity and good relations between the employer and his workmen. It can comment upon the matter of common interest. Its primary duty, therefore, is to prevent the disputes.

2) Conciliation Officer

The appropriate Government is empowered to appoint as many conciliation officers as it may think fit by a notification in the official Gazette. They shall be charged with the duty of mediating in and promoting the settlement of Industrial Dispute. A conciliation officer may be appointed for a specified area or for specified industries, in a specified area for one or more industries. He may be appointed for a limited period or permanently (Section 4). Where an Industrial Dispute exists or is apprehended conciliation officer may, and if a dispute relates to a public utility service, in which a notice of strike or lock-out has been given under Section 22, shall hold conciliation proceeding in the manner prescribed without any delay. He will investigate the dispute and all matters which may affect its merits. He may do all those things which he may think proper for inducing the parties to come to a fair, and amicable settlement of the dispute. He shall send a report to the appropriate Government if a settlement is arrived at. He shall send a memorandum of the settlement, duly signed by him and by the parties to the dispute. In the event of there being no settlement he shall forward a full account in the shape of a report to the appropriate Government giving details of the steps taken by him for bringing about a settlement thereof. He shall also state in his report the facts and circumstances and the reasons on account of which the parties could not come to a settlement. The report shall be submitted within fourteen days from the date of the commencement of the conciliation proceedings or within such shorter period as may be fixed by the appropriate Government. Such period may be extended by a written agreement between the parties. On receipt of such a report, the appropriate government may make a reference to a Board, Court or Tribunal. In the alternative, the Government shall record and communicate to the parties its reasons for not making a reference.

3) Board of Conciliation

The appropriate Government may by notification in the Official Gazette, constitute a Board of Conciliation for promoting the settlement of an industrial dispute (Section 5). The Board shall investigate the dispute and all matters affecting the matters and right settlement thereof. It may do all such things as it thinks fit for the purpose of inducing the parties to come to a fair and amicable settlement of the dispute. If a settlement is arrived at, the Board shall send a report to the appropriate Government, together with a memorandum of settlement, signed by the parties to the disputes. If a settlement could not be reached, the Board shall send a report to the appropriate Government, with full details of the steps taken by it and the facts and circumstances and the reasons why a settlement could not be arrived at. He shall also forward his recommendation for the settlement of the dispute. Such a report should be submitted within 2 months or within such shorter period as may be fixed by the Government. This time may be extended by the parties or by Government as and when necessary. On receipt of the report of the Board, the appropriate Government may make a reference to a Court or a Tribunal for enquiry and adjudication. If such a report of the Board is about a Public Utility Service, and the appropriate Government does not make a reference to a Labour Court, Tribunal or National Tribunal, it shall record its reasons and communicate them to the parties to the dispute.

4) Court of Inquiry

The appropriate Government may constitute a Court of Inquiry as occasion arises, for inquiring into any matter appearing to be connected with or relevant to an industrial dispute (Section 6). A Court of Inquiry shall inquire into the matters referred to it and report thereon to the appropriate Government ordinarily within a period of six months from the commencement of its inquiry (Section 14).

5) Labour Court—Constitution

Under Section 7 the appropriate government is empowered to constitute one or more Labour Court for the same area and in that case their powers and functions shall be determined by the appropriate government itself.

A Labour Court consists of one person who is known as the presiding officer of the Labour Court. A person is not qualified for appointment as the presiding officer of the Labour Court unless:

i) he is or has been a judge of the High Court, or

ii) has been for a period of not less than three years, been a district judge or an Additional District Judge; or

iii) he has held any judicial office in India for not less than seven years; or

iv) he has been the presiding officer of a Labour Court constituted under any Provincial Act or the State Act for not less than five years.

Jurisdiction, Powers and Functions

The Labour Court is required to

i) Adjudicate on industrial dispute relating to any matter specified in the second schedule.

ii) Perform such other functions as may be assigned to them under the Act.

iii) Adjudicate on matter incidental to the matters enumerated in the second schedule.

The matters specified in the second schedule are as follows:

1) Propriety or legality of an order passed by an employer under the standing orders.

2) The application and interpretation of standing orders.

3) Discharge or dismissal of workmen including reinstatement of or grant of relief to workmen wrongfully dismissed.

4) Withdrawal of any customary concession or privilege.

5) Illegality or otherwise of strike or lock-out; and

6) All matters other than those specified in the third schedule of the Act.

6) **Industrial Tribunal**

Under Section 7A of the appropriate government may by notification in the official Gazette constitute one or more Industrial Tribunals for the adjudication of disputes. A tribunal shall consist of one person only to be appointed by the appropriate government. An Industrial Tribunal may be appointed for a limited period on an ad hoc basis or permanently. A person is not qualified for appointment as the presiding officer of a Tribunal unless:

a) he is or has been a judge of a High Court, or

b) he has for a period of not less than three years been a District Judge or an Additional District Judge, or

c) he has been a presiding officer of a Labour Court for not less than five years, or

d) he has held an office not lower than that of an Assistant Labour Commissioner for not less than ten years and holds degree in law.

The Industrial Tribunal may be assisted, if the appropriate government may deem fit, by two persons to be known as assessors to advise the Tribunal in the proceeding before it.

Functions

The Industrial Tribunal exercises the following functions:

i) to adjudicate industrial disputes relating to any matter whether specified in the the third schedule of the Act.

ii) to adjudicate matters which are in the form of new demands giving rise to an industrial dispute affecting the working of the establishment and referred to it.

iii) to adjudicate upon matters incidental to the matters specified in the third schedule.

Matters mentioned in the third schedule:

i) Wages, including the period and mode of payment.

ii) Compensatory and other allowances.

iii) Hours of work and rest intervals.

iv) Leave with wages and holidays.

v) Bonus, profit sharing provident fund and gratuity.

vi) Shift working otherwise than in accordance with standing orders.

vii) Classification by grades.

viii) Rules of discipline.

ix) Rationalisation.

x) Retrenchment of workmen and closure of establishment; and

xi) Any other matter that may be prescribed.

Disqualification for the presiding officer of the Labour Courts or Industrial Tribunals:

No person can be appointed to or continue in the office of the presiding officer of a Labour Court or Tribunal if:

a) he is not an independent person;

b) he has attained the age of sixty five years

Powers of Labour Court and Tribunals: The Labour Courts and Tribunals are empowered to give relief to the aggrieved person in respect of matters enumerated in

the second or in the third schedule of the Act. For the purpose of giving relief these authorities can exercise the following powers:

i) it may follow such procedure as it may think fit;

ii) the presiding officer for the purpose may, after giving reasonable notice, enter the premises occupied by any establishment to which the dispute relates;

iii) it can exercise the powers of a civil court in respect of the following matters namely:

   a) enforcing the attendance of any person and examining him on oath

   b) compelling the production of documents and material objects

   c) issuing commissions for examination of witness

   d) in respect of such other matters as may be prescribed

iv) it can appoint assessor or assessors to advise it in the proceeding before it.

7) National Tribunal

The powers to constitute a National Tribunal vest only with the Central Government under Section 7 B. The pre-condition for constituting a National Tribunal are two namely: (i) the industrial dispute in question should involve questions of national importance and (ii) the industrial dispute should be of such nature that industrial establishments in more than one state are likely to be interested or affected by such dispute. When a reference is made under Section 10, sub-section (7A) to a National Tribunal, Labour Courts and Industrial Tribunals are barred from entertaining the disputes and if any such dispute is pending before any Labour Court or Tribunal shall be deemed to be quashed. Section 15 lays down that where an industrial dispute has been referred by the Central Government to a National Tribunal for adjudication, it shall hold its proceedings expeditiously and shall submit the award to appropriate government as soon as possible.

The National Tribunal is to consist of one person only to be appointed by the Central Government. Under sub-section (4) of section 7B the power has been given to Central Government in fit cases, to appoint two assessors to advise the National Tribunal in the proceedings before it.

Qualifications for Appointment as Presiding Officer: A person who is or has been a judge of a High Court is qualified to be appointed a presiding officer.

Disqualification: A person is disqualified to be appointed as presiding officer under Section 7C, if:

a) he is not an independent person; or

b) he has attained the age of sixty five years

8) Voluntary Arbitrator

Under Section 10 A the employer and employee may agree to refer before a voluntary arbitrator. But such reference must be made before a reference is made by the appropriate government to the Labour Court, Tribunal of National Tribunal.

Check Your Progress 3

1) Is it necessary for employer to constitute works committee in industrial establishment employing less then 100 workmen?

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2) Is it mandatory for conciliation office to intervene and hold conciliation proceedings where workers are on strike in a non-public utility concern?

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3) Whether the law prescribes any time limit for submission of report by court of inquiry?

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3.5 STRIKES AND LOCK-OUTS

Strike is most important weapon in the hands of the workmen to force the employers to concede to their demands. It is a necessary safety value in industrial relations when properly resorted.

Section 2 (q) of the Industrial Disputes Act, 1947 defines strike to mean:

a) Cessation of work by a body of persons employed in any industry acting in combination; or

b) a concerted refusal of any number of persons who are or have been employed in industry to continue to work or to accept employment; or

c) a refusal under a common understanding of any number of persons who are or have been employed in industry to continue to work or to accept employment.

Lock-out: The expression 'lock-out' is defined in Section 2 (1) of the Act. It means the temporary closing of a place of establishment or the suspension of work or the refusal by the employer to continue to employ any number of persons employed by him.

The ingredients of a lock-out are:

i) temporary closing of a place of employment by the employer; or

ii) suspension of work by the employers; or

iii) refusal by an employer to continue to employ any number of person employed by him.

Prohibition on strikes and lock-out in public utility services

1) No person in a public utility service shall go on strike in breach of contract.

   a) without giving notice of strike to the employer as here in after provided within six weeks before striking; or

   b) within fourteen days of giving such notice; or

   c) before the expiry of the date of strike specified in any such notice as aforesaid; or

   d) during the pendency of any conciliation proceeding before a conciliation officer and seven days after the conclusion of such proceedings.

2) Similarly no employer carrying on any public utility service shall lock-out any of his workmen:

   a) without giving them notice of lock-out within six weeks before locking out; or

   b) within fourteen days of giving such notice; or

   c) before the expiry of the date of strike specified in any such notice as aforesaid; or

   d) during the tendency of any conciliation proceedings before a conciliation officer and seven days after the conclusion of such proceedings.

3) But no notice of strike or lock-out shall be necessary where there is in existence a lock-out or strike in the public utility service establishment. But the employer shall

send intimation of such lock-out or strike on the day on which it is declared to such authority as may be specified by the appropriate Government.

4) The notice of strike or lock-out should be given by such number of persons to such person or persons and in such manner as may be specified by the appropriate Government.

5) If on any day an employer receives from any person employed by him any such notices or gives to any persons employed by him any such notices, he shall within five days thereof report to the appropriate Government or to such authority as that Government any prescribe the number of such notices received or given on that day.

The conditions specified in Section 22 are mandatory and non-observance of them will render the strike or lock-out illegal.

General prohibition on strike or lock-out (Section 23)

No workman employed in any industrial establishment shall go on strike in breach of contract and no employer of any such workman shall declare a lock-out:

a) during the pendency of conciliation proceedings before a conciliation Board and seven days after the conclusin of such proceedings;

b) during the pendency of proceedings before a Labour Court Tribunal or National Tribunal and two months after the conclusion of such proceedings;

c) during the arbitration proceedings before an arbitrator and two months after the conclusion of such proceedings where a notification has been issued under section 10A (3A); or

d) during any period in which a settlement or award is in operation in respect of any of the matters covered by the settlement or award.

The prohibitions mentioned in Section 23 are applicable to all the industrial establishments whether it is a public utility service or otherwise.

Illegality of strike and lock-out (Section 24)

A strike or lock-out is illegal if:

1) i) it is commenced or declared in contravention of Section 22 or Section 23; or

ii) it is continued in contravention of an order made under sub-section (3) of Section 10 or sub-section (4A) of Section 10A.

2) Where a strike or lock-out in pursuance of an industrial dispute has already commenced and is in existence at the time of reference of the dispute to a Board, an Arbitrator. Labour Court, Tribunal or National Tribunal, the continuance of such strike or lock-out shall not be deemed to be illegal provided that such strike or lock-out was not at its commencement in contravention of the provisions of the Industrial Disputes Act or the continuance there of was not prohibited under sub-section (3) of Section 10 or sub-section (4A) of Section 10A.

A lock-out declared in consequence of an illegal strike or a strike declared in consequence of an illegal lock-out shall not be deemed to be illegal.

Prohibition of financial aid to illegal strikes and lock-out

No person shall knowingly expend or apply any money in direct furtherance or support of any illegal strike or lock-out (Section 25).

Punishment for illegal strike or lock out

1) i) Any workman who commences, continues or otherwise acts in direct furtherance of an illegal strike shall be punishable with imprisonment, which may extend to one month or with fine which may extend to fifty rupees or with both;

ii) Any employer who commences, continues or otherwise acts in furtherance of

an illegal lock-out shall be punishable with imprisonment for a term which may extend to one month or with a fine which may extend to one thousand rupees or with both (Section 26).

2) Any person who instigates or incites others to take part in or acts in furtherance of a strike or lock-out which is illegal under this Act shall be punishable with imprisonment for a term which may extend to six months or with a fine which may extend to one thousand rupees or with both (Section 27).

3) Any person who knowingly expends or applies any money in direct furtherance or support of any illegal strike or lock-out shall be punishable with imprisonment or a term which may extend to six months or with a fine which may extend to one thousand rupees or with both (Section 28).

Check Your Progress 4

1) Is it necessary to give notice of strike in public utility services?

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.....

2) Can a workman go on strike in a non-public utility service during the pendency of conciliation officer?

.....

.....

3) What is the penalty prescribed for illegal strike under the Industrial Disputes Act, 1947?

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3.6 TERMINATION OF SERVICE AND DOMESTIC ENQUIRY

3.6.1 General

Under the common law an employer had a right to discharge or dismiss an employee, or what is popularly known in some countries as the right to "hire and fire". This right has been subjected to statutory restrictions and judicial decisions. There are three accepted fundamental principles, namely, (1) that an industrial worker must be placed in such a position that the security of his service may not depend upon the caprice or arbitrary will of the employer, (2) that industrial peace should be maintained, and (3) that industry should be efficiently managed. These principles underlie the Industrial Employment (Standing Order) Act, 1946, the Industrial Disputes Act, 1947 and other local statutes of a like nature. The former Act makes it obligatory on employers of large establishments employing 100 workers or more to have standing orders following a model pattern certified by the appropriate authority. They are to be regarded as conditions of service by which both employers and employees are to be governed. When the services of an industrial worker are terminated an industrial dispute can be raised under the Industrial Disputes Act, for it would be a question of "employment and non-employment" and it would be competent for the industrial tribunal to determine whether the termination of service is justified.

3.6.2 Statutory Protection

The Model Standing Orders under Schedule-I of the Industrial Employment (Standing Order) Central Rules, 1946 of *inter alia*, regulates termination of employment.

1) For terminating employment of a permanent workman, notice in writing shall be given either by the employer or the workman—one month notice in the case of monthly rated workmen and two weeks notice in the case of other workmen; one

month or two weeks pay, as the case may be, may be paid in lieu of notice.

2) No temporary workman whether monthly rated, weekly rated or piece-rated and non probationer or badli shall be entailed to any notice or pay in lieu thereof if his services are terminated, but the services of a temporary workman shall not be terminated as a punishment unless he has been given an opportunity of explaining the charges of misconduct alleged against him in the manner prescribed in paragraph 14.

3) Where the employment of any workman is terminated, the wages earned by him and other dues, if any, shall be paid before the expiry of the second working day from the day on which his employment is terminated.

Disciplinary action for misconduct

1) A workman may be fined up to two per cent of his wages in a month for the following acts and omissions, namely: (The form here leaves blanks to be filled).

2) A workman may be suspended for a period not exceeding four days at a time, or dismissed without notice or any compensation in lieu of notice, if he is found to be guilty of misconduct.

3) The following acts and omissions shall be treated as misconduct:

   a) Willful insubordination or disobedience, whether alone or in combination with others, to any lawful and reasonable order of a superior,

   b) Theft, fraud, or dishonesty in connection with the employer's business or property.

   c) Willful damage to or loss of employer's goods or property,

   d) Taken or giving bribes or any illegal gratification,

   e) Habitual absence without leave, or absence without leave for more than 10 days,

   f) Habitual late attendance,

   g) Habitual breach of any law applicable to the establishment,

   h) Riotous or disorderly behaviour during working hours at the establishment or any act subversive of discipline,

   i) Habitual negligence or neglect of work,

   j) Frequent repetition of any act or omission for which a fine may be imposed to a maximum of 2 per cent of the wages in a month (see 14 (I) above).

   k) Striking work or inciting other to strike work in contravention of the provision of any law, or rule having the force of law.

4) a) Where a disciplinary proceeding against a workman is contemplated or is pending or where criminal proceedings against him in respect of any offence are under investigation or trial and the employer is satisfied that it is necessary or desirable to place the workman under suspension, he may, by order in writing suspend him with effect from such date as may be specified in the order. A statement setting out in detail the reason for such suspension shall be supplied to setting out in detail the reasons for such suspension shall be supplied to the workman within a week from the date of suspension.

   b) A workman who is placed under suspension shall be paid subsistence in accordance with the provisions of Section 10A of the Act.

      ba) In the inquiry, the workman shall be entitled to appear in person or to be represented by an office-bearer of a trade union of which he is a member.

      bb) The proceedings of the inquiry shall be recorded in Hindi or in English or in the language of the state where the industrial establishment is located, whichever is preferred by the workman.

      bc) The proceedings of the inquiry shall be completed within a period of three months.

Provided that the period of three months may, for reasons to be recorded in writing, be extended by such further period as may be deemed necessary by the inquiry officer.

c) If on the conclusion of the inquiry or, as the case may be, of the criminal proceedings, the workman has been found guilty of the charges framed against him and it is considered, after giving the workman concerned a reasonable opportunity of making representation on the penalty proposed, that an order of dismissal or suspension or fine or stoppage of annual increment or reduction in rank would meet the ends of justice, the employer shall pass an order accordingly.

Provided that when an order of dismissal is passed under this clause the workman shall be deemed to have been absent from duty during the period of suspension and shall not be entitled to any remuneration for such period, and the subsistence allowance already paid to him shall be recovered:

Provided further that where the period between the date on which the workman was suspended from duty pending the inquiry or investigation or trial and the date on which an order of suspension was passed under this clause exceeds four days, the workman shall be deemed to have been suspended only for four days, or for such shorter period as is specified in the said order of suspension and for the remaining period he shall be entitled to the same wages as he would have received if he had not been placed under suspension, after deducing the subsistence allowance paid to him for such period.

Provided also that where an order imposing fine or stoppage of annual increment or reduction in rank is passed under this clause, the workman shall be deemed to have been on duty during the period of suspension and shall be entitled to the same wages as he would have received if he had not been placed under suspension, after deducting the subsistence allowance paid to him for such period.

Provided also that in the case of a workman to whom the provisions of clause (2) or Article 311 of the Constitution apply, the provision of that article shall be complied with.

d) If on the conclusion of the inquiry, or as the case may be, of the criminal proceedings, the workman has been found to be not guilty of any of the charges framed against him, he shall be deemed to have been on duty during the period of suspension and shall be entitled to the same wages as he would have received if he had not been placed under suspension after deducting the subsistence allowance paid to him for such period.

e) The payment of subsistence allowance under this standing order shall be subject to the workman concerned not taking up any employment during the period of suspension.

5) In awarding punishment under this standing order, the authority imposing the punishment shall take into account any gravity or the misconduct, the previous record, if any, of the workman and any other extenuating or aggravating circumstances, that may exist. A copy of the order passed by authority imposing the punishment shall be supplied to the workman concerned.

6) A workman aggrieved by an order imposing punishment may within twenty one days from the date of receipt of the order, appeal to the appellate authority.

Industrial Disputes Act, 1947

Under Section 11A of the Act the Tribunal has power in cases wherever necessary to set aside the order of discharge or dismissal and direct reinstatement of the workman on such terms and conditions, if any, as it thinks fit or give such other relief to the workman including the award of any lesser punishment in lieu of discharge or dismissal as the circumstance of the case may require. The Supreme Court while delineating the contour of Section 11A laid down the following principles to regulate the management's power to take disciplinary action.

1) The right to take disciplinary action and to decide upon the quantum of punishment are mainly managerial functions, but if a dispute is referred to a tribunal, the latter has power to see if action of the employer is justified.

2) Before imposing the punishment, an employer is expected to conduct a proper enquiry in accordance with the provisions of the Standing Orders, if applicable, and principles of natural justice. The enquiry should not be an empty formality.

3) When a proper enquiry has been held by an employer, and the finding of misconduct is plausible flowing from the evidence adduced at the said enquiry, the Tribunal has no jurisdiction to sit in judgement over the decision of the employer as an appellate body. The interference with the decision of the employer will be justified only when the findings arrived at in the enquiry are perverse or the management is guilty of victimisation, unfair labour practice or mala fide.

4) Even if no enquiry has been held by an employer or if the enquiry held by him is found to be directive, the Tribunal in order to satisfy itself about the legality and validity of the order, had to give an opportunity to the employer and employee to adduce evidence before it. It is open to the employer to adduce evidence for the first time justifying his action, and it is open to the employee to adduce evidence contra.

5) The effect of an employer not holding an enquiry is that the Tribunal would not have to consider only where there was a prima facie case. On the other hand, the issue about the merits of the impugned order of dismissal or discharge is at large before the tribunal and the latter, on the evidence adduced before it, has to decide for itself whether the misconduct alleged is proved. In such cases, the point about the exercise or managerial functions does not arise at all. A case of defective enquiry stands on the same footing as no enquiry.

6) The Tribunal gets jurisdiction to consider the evidence placed before it for the first time in justification of the action taken only, if no enquiry has been held or after the enquiry conducted by an employer found to be defective.

7) It has never been recognised that the Tribunal should straight away, without anything more, direct reinstatement or a dismissed or discharge employee, once it is found that no domestic enquiry has been held or the said enquiry is found to be defective.

8) An employer, who wants to avail himself of the opportunity of adducing evidence for the first time before the Tribunal to justify his action, should ask for it at the appropriate stage. If such an opportunity is asked for, the Tribunal has no power to refuse. The giving of an opportunity to an employer to adduce evidence for the first time before the Tribunal is in the interest of both the management and the employee and to enable the Tribunal itself to be satisfied about the alleged misconduct.

9) Once the misconduct is proved either in the enquiry conducted by an employer or by the evidence placed before a Tribunal for the first time, punishment imposed cannot be interfered with by the Tribunal except in cases where the punishment is so harsh as to suggest victimisation.

10) In a particular case, after setting aside the order of dismissal whether a workman should be reinstated or paid compensation is, as held by this court in the management of Panitole Tea Estate vs. The Workmen, 1971-I SCC 742 = (AIR 1971 SC 2171) within the judicial decision of a Labour Court or Tribunal.

Check Your Progress 5

1) Is it necessary for the employer to conduct proper managerial enquiry in the accordance with the standing orders, if applicable before taking disciplinary action?

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2) Is it necessary for the employer to follow the principles of natural justice before taking disciplinary action?

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) Whether Tribunal has power to allow the parties to adduce fresh evidence if no enquiry has been held?

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3.7 SEXUAL HARASSMENT OF WOMEN AT WORK PLACE

With the increasing awareness and emphasis on gender justice, there is increase in the effort to guard against such violations and the resentment towards incidents of sexual harassment is also increasing.

In Vishake v State of Rajasthan, 1992 LLR 991, the Supreme Court not only explained the concept of sexual harassment but laid down the following guidelines to be observed by the employers in work places as well as other responsible persons or institutions to ensure prevention of sexual harassment of women. According to the Court the fundamental right to carry on any occupation, trade or profession depends on the availability of a safe working environment. Right to life means life with dignity. The primary responsibility for ensuring such safety and dignity through suitable legislation, and the creation of a mechanism for its enforcement, is of the legislature and the executive. When however, instance of sexual harassment resulting in violation of fundamental rights of women workers under Article 14, 19 and 21 of the Constitution are brought before us for redress under Article 32 of the Constitution an effective redressal requires that some guidelines should be laid down for the protection of these rights to fill the legislative vacuum. It is necessary and expedient for employers in work places as well as other responsible persons or institutions to observe certain guidelines to ensure the prevention of sexual harassment of women.

Duty of the employer or other responsible persons in work places and other institutions

The Supreme Court ruled that it shall be the duty of the employer or other responsible persons in work places or other institutions to prevent or deter the commission of acts of sexual harassment and to provide the procedures for the resolution, settlement or prosecution of acts of sexual harassment by taking all steps required.

While dealing with the third party harassment the court held that where sexual harassment occurs as a result of an act or omission by any third party or outsider, the employer and person in charge will take all steps necessary and reasonable to assist the affected person in terms of support and prevention action.

Check Your Progress 6

1) Whether a man or woman would chair the complaint committee in case complaint about sexual harassment is made?

.....

.....

2) Is it necessary for the employer to prevent third party harassment?

.....

.....

) Is private employer also bound to follow the norms laid down by the Supreme Court in regard to prevention of sexual harassment?

.....

.....

3.8 LET US SUM UP

From the above study, you may draw several conclusions. The Trade Unions Act, 1926, Industrial Disputes Act, 1947 and the Industrial Employment (Standing Orders) Act, 1946 seek to regulate the union and management relations. Further the judicial decisions seek to prevent sexual harassment of women workers.

3.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) 7

2) Yes

3) No

4) No

Check Your Progress 2

1) It is a technique for voluntary regulation of industrial relations.

2) The important advantage is that it is quick and efficient and the disadvantage is that the ultimate sufferer is consumer.

Check Your Progress 3

1) Yes

2) No

3) One month imprisonment or fifty rupees fine or both

Check Your Progress 4

1) No

2) No

3) 6 months

Check Your Progress 5

1) Yes

2) Yes

3) Yes

Check Your Progress 6

1) Woman

2) Yes

3) Yes

3.10 FURTHER READING

Srivastava, S.C. (2000), *Industrial Relations and Labour Law*, 4th ed., Vikas Publishing House: New Delhi.

UNIT 4 WAGE AND SALARY ADMINISTRATION

Structure

4.0 OBJECTIVES

After reading this unit you should be able to:

- explain the concept of minimum wage, fair wage and living wage and make a distinction between them;
- define and explain the meaning c wages under different labour legislation;
- define wage period, identify the persons responsible for payment of wages and enumerate the deductions authorised under the Payment of Wages Act;

- describe the procedure for fixation of minimum wage and the effect of non-payment or less payment;
- explain the scope and coverage of the payment of bonus, set-off and set on and describe the method for determination of bonus; and
- describe the duties of employer to pay equal remuneration for men and women for same work or work of similar nature and also not to make discrimination while recruiting men and women workers.

4.1 INTRODUCTION

In the previous units you have studied the law relating to the management of welfare, health and medical facilities and the union and management relations. In this Unit you will study wage and salary administration. For a better salary administration it is necessary that the payment should be made at regular intervals and without any arbitrary deductions. Further there should be no discrimination between men and women in respect to wages paid to them for equal work. Quite apart from this law must ensure minimum standards in respect to wages. To meet this situation the law regulates these aspects. It is, therefore, necessary to enforce and administer the law and the minimum standards laid down in this regard.

4.2 EVOLUTION OF WAGE CONCEPTS

Broadly speaking, wages have been classified into six broad categories:

i) Statutory minimum wage

ii) Bare subsistence or minimum wage

iii) Living wage

iv) Fair wage

v) Minimum wage

vi) Need-based minimum wage

The statutory minimum wage is determined according to the provisions of the Minimum Wages Act, 1948, Category (ii) is the innovation of the Indian Judiciary, Categories (iii), (iv) and (v) have been introduced in the Report of the Committee on Fair Wages, Category (vi), i.e. need-based minimum wage has emerged from the Resolution of the 15th Session of the Indian Labour Conference. Let us discuss each of these in some detail.

4.2.1 The Statutory Minimum Wage

The Minimum Wages Act, 1948 does not define the expression minimum wage. The statutory minimum wage, however, is the minimum wage, providing for some measure of education, medical requirements and amenities.

4.2.2 The Bare Subsistence or Minimum Wage

The bare minimum wage is a "wage which would be sufficient to cover the bare physical needs of the worker and his family i.e. a rate which has got to be paid to the workers irrespective of the capacity of the industry to pay".

4.2.3 The Concept of Living Wage

The concept of the living wage which has influenced the fixation of wages in all economically advanced countries is an old and well-established one. But most of the current definitions are of recent origin. The most expressive definition of the living wage is that of Justice Higgins of the Australian Commonwealth Court of Conciliation in the Harvester case. He defined the living wage as one appropriate for the "normal

needs of the average employee, regarded as a human being living in a civilised community".

Article 43 of the Indian Constitution has also adopted the following as one of the Directive Principles of State Policy:

> The state shall endeavour to secure, by suitable legislation or economic organisation or in any other way, to all workers, agricultural, industrial or otherwise, work, a living wage, conditions of work ensuring a decent standard of life and full enjoyment of leisure and social and cultural opportunities.

This is the ideal to which the workers are hopefully looking forward to achieve.

In *All Indian Bank Employees Association* v. *Reserve Bank of India,* (1965) 2 L.L.J. 175 (S.C.), Hidayatullah, J. observed:

> Our political aim is living wage though in actual practice living wage has been an ideal, which has eluded out efforts like an ever receding horizon and will so remain for some time. Our general wage structure has at best reached the lower levels of fair wage though some employers are paying much higher wages than the general average.

4.2.4 Fair Wage

Fair wage is the mean between the living wage and the minimum wage. Said the Committee on Fair wages:

> While the lower limit of the fair wage must obviously be the minimum wage, the upper limit is equally set by what may broadly be called the capacity of industry to pay. This will depend not only on the present economic position of the industry but on its future prospects. Between these two limits the actual wage will depend on (i) the productivity of labour, (ii) the prevailing rates of wages in the same or similar occupation in the same or neighbouring localities, (iii) the level of the national income and its distribution, and (iv) the place of the industry in the economy of the country.

In *Kamani Metals and Alloys Ltd* v. *Their Workmen*, the Supreme Court observed that fair wage lies between the minimum wage which must be paid in any event, and the living wage which is the goal.

4.2.5 Minimum Wage

The Committee on Fair Wages expressed the view that the minimum wage must provide not merely for the subsistence of life, but for the preservation of the efficiency of the worker. For this purpose, the minimum wage must also provide for some measure of education, medical requirements and amenities. The committee also stated that an industry which was incapable of paying this minimum wage had no right to exist and for fixing the minimum wage, no regard should be paid to the capacity of the industry to pay and it should be based on the requirements of the worker and his family.

In *Hydro (Engineers) Pvt. Ltd.* v. *Their Workmen*, the Supreme Court, while upholding the findings of the Committee observed that the minimum wage rates must ensure not only the mere physical needs of the worker and those of his family but also preserve his efficiency as a workman.

4.2.6 Need-based Minimum Wage

According to 15th Indian Labour Conference (July, 1957), the need-based minimum wage "should ensure the minimum human needs" of the industrial worker, irrespective of any other consideration. The Fair Wage Committee adopted the following norms for the calculation of "need-based wage for industrial labour" which should guide all wage fixing authorities:

i) In calculating the minimum wage, the standard working class family should be

taken to consist of 3 consumption units for one earner; the earnings of women, children and adolescents should be discared.

ii) Minimum food requirements should be calculated on the basis of a net intake of 2,700 calories, as recommended by Dr. Aykroyd for an average Indian adult of moderate activity.

iii) Clothing requirements should be estimated at a per capita consumption of 18 yards per annum which would give for the average worker's family of four, a total of 72 yards.

iv) In respect of housing, the norms should be the minimum rent charged by Government in an area for houses provided under the Subsidised Industrial Housing Scheme for Low Income Groups.

v) Fuel, lighting and other 'miscellaneous' items of Expenditure should constitute 20 per cent of the total minimum wage.

Of these, point (ii) referring to the nutritional requirements in the aforesaid norms has been the subject of much controversy.

In *Workmen* v. *Management of Reptakas Brett & Co.* the Supreme Court observed:

> The concept of "minimum wage" is no longer the same as it was in 1936. Even 1957 is way behind, a worker's wage is no longer a contract between an employer and an employee. It has the force of collective bargaining under the labour laws. Each category of the wage structure has to be tested at the anvil of social justice which is the live fibre of our society today. Keeping in view the socio-economic aspect of the wage structure, we are of the view that it is necessary to add the following additional component as a guide for fixing the minimum wage in the industry:
>
> (iv) Children education, medical requirement, minimum recreation including festivals/ceremonies and provision for old age, marriages etc. should further constitute 25% of the total minimum wage.

The Court added:

> The wage structure which approximately answers the above six components is nothing more than a minimum wage at all times and under all circumstances. An employer who cannot pay the minimum wage has no right to engage labour and no justification to run the industry.

Check Your Progress 1

Fill in the blanks:

i) Fair wage lies between the ..... wage and the ..... wage.

ii) Statutory minimum wage is determined in accordance with the provision of the .....

4.3 PAYMENT OF WAGES ACT, 1936

4.3.1 Purpose of the Act

The object of the Act is to eliminate all avoidable delays in the payment of wages to workmen within the meaning of this Act and to protect them from unlawful deductions in the payment of their wages.

4.3.2 Applicability of the Act

The Payment of Wages Act applies to the persons mentioned hereunder:

a) persons employed in a factory

b) persons employed otherwise than a factory

c) persons employed upon any Railway by Railway administration, either directly or through a sub-contractor fulfilling a contract with Railway administation.

d) persons employed in an industrial or other establishment specified in sub-classes (a) to (g) of clause (ii) of Section 2.

4.3.3 Definition of Wages

Section 2 (vi) of the Payment of Wages Act, 1936 defines "wages" as all remuneration, including salary, allowance, or otherwise expressed in terms of money or capable of being so expressed, which would, if the terms employment express or implied were fulfilled, be payable to a person employed in respect of his employment, and includes:

a) any remuneration to which the person employed is entitled in respect of overtime work or holidays or any leave period;

b) any remuneration payable under any award of settlement between the parties or order of Court;

c) any additional remuneration payable under the terms of employment (whether called a bonus) or by any other name;

d) any sum which by reason of the termination of employment of the person employed is payable under any law, contract or instrument which provides for the payment of such sum, whether with or without deductions, but does not provide for the time withint which the payment is to be made;

e) any sum to which the person employed is entitled under any scheme framed under any law for the time being in force.

But the sums mentioned hereunder shall not include:

i) any bonus (whether under a scheme of profit sharing or otherwise) which does not form part of the remuneration payable under the terms of employment or which is not payable under any award or settlement between the parties or order of a Court;

ii) the value of any house accommodation, or of supply of light, water, medical attendance, or other amenity or of any service excluded from the computation of wages by a general or special order of the State Government;

iii) any contribution paid by the employer to any pension or provident fund, and the interest which may have accured there on;

v) any sum paid to the employed person to defray special expenses entailed on him by the nature of his employment; or

vi) any gratuity payable on the termination of employment in cases other than specified in sub-clause (d).

4.3.4 Responsibility for Payment of Wages

The Act imposes an obligation on every employer to make payment of all wages required to be paid under this Act to persons employed by him. In addition, for person employed (otherwise than by a contractor), the following persons so named, nominated, or responsible to the employer, jointly and severally, are responsible for such payment:

i) In factories the person named as manager

ii) In industrial or other establishments the person who is responsible to the employer for the supervision and control of the industrial or other establishment.

iii) In railways (otherwise than in factories) the person who has been so nominated in this behalf for the local area concerned by the railway administration.

4.3.5 Wage Period

Section 4 of the Payment of Wages Act, 1936 provides that every person responsible for the payment of wages under Section 3 of the Act shall fix wage periods in respect of which such wages shall be paid. Wage period may be fixed as payable daily, weekly, fortnightly or monthly. Employer is bound to fix wage periods. No wage period shall exceed one month.

4.3.6 Time of Payment of Wages

Section 5 lays down the rules as to the time of payment of wages. The payment must be made at regular intervals. Every person employed upon or in:

a) any railway, factory, or industrial or other establishments or in which there are less than one thousand employees, the wages shall be paid before the expiry of the seventh day; and

b) any other railway, factory or industrial or other establishment shall be paid before expiry of the tenth day after the last day of the wage period in respect of which the wages are payable.

In the case of persons employed on a dock, wharf, or jetty, or in a mine, the balance of wages found due on completion of the final tonnage account of the ship or wage loaded or unloaded, as the case may be, shall be paid before the expiry of the seventh day from the day of such completion.

Where the employment of any person is terms by or on behalf of the employer, the wages earned by him be paid before the expiry of the second working day from the day on which his employment is terminated.

Where the employment of any person in an establishment is terminated due to the closure of the establishment for any reason other than a weekly or the recognised holiday, the wages earned by him shall be paid before the expiry of the second day from the day on which his employment is so terminated.

Under Section 5(3), the State Government may, subject to such condition as specified and to such extent as may be specified in the order, exempt the person responsible for the payment of wages to the person employed upon any railway, (otherwise than a factory), or persons employed as daily rate in the Public Works Department of the Central/State Government.

4.3.7 Mode of Payment

Section 6 lays down that all wages shall be paid in current coins or currency notes or in both. The employer may, after obtaining the written authorisation of the employed person, pay the wages whether by cheque or by crediting the wages in his bank account.

4.3.8 Deduction

Every payment made by the employed person to the employer or his agent shall be deemed to be a "deduction" for the purpose of this Act, as is made clear by Explanation I to Section 7. Reduction of wages on account of change in lower cadre would amount to deduction of wages.

According to Explanation II to Section 7, the penalties mentioned hereunder are not deductions if imposed for good and sufficient cause:

a) the witholding of increment or promotion including the stoppage of the increment at an efficiency bar;

b) the reduction to a lower post or time-scale or to a lower stage in a time scale or

c) suspension

4.3.9 Deductions Which May be Made From Wages

Section 7 of the Act provides that deductions from the wages of an employed person shall be made only in accordance with the provisions of this Act and may be of the following kinds only namely:

a) fines

b) deductions for absence from duty

c) deductions for damages to or loss of goods expressly entrusted to the employed person for custody or for loss of money for which he is required to account where such damage or loss is directly attributable to his neglect or default.

d) deductions for house accommodation supplied by the employer.

e) deductions for amenities and service supplied by the employer.

f) deduction for recovery of advances of whatever nature and the interest due in respect thereof or for adjustment of over payment of wages.

g) deductions for recovery of loans and interest due in respect thereof.

h) deductions for recovery of loans granted for house building and the interest due in respect thereof.

i) deductions of Income Tax payable by the employed person.

j) deductions required to be made by order of a Court or other competent authority.

k) deductions for subscription to and for payment of advances from any provident fund.

l) deduction for payment to co-operative societies or to scheme of Insurance maintained by the Indian Post Office.

m) deductions made for payment of any premium on the Life Insurance Policy to the Life Insurance Corporation of India.

n) deductions made, with the written authorisation of employed person for the payment of employees contribution to any fund constituted for the welfare of the employed persons or the members of their families or both.

o) deductions made, with the written authorisation for payment of the fees payable by the employee for the membership of any trade union registered under the Trade Union Act, 1926.

p) deductions for payment of insurance premium on fidelity Guarantee Bonds.

q) deductions for recovery of losses sustained by a railway administration on account of acceptance by the employed person of counterfiet or base coins mutilated or forged.

r) deductions for recovery of losses sustained by the railway administration on account of the failure of the employed person to invoice, to bill, to collect or to account for the appropriate charges due to that administration in respect of fares, freight, demurrage wherfage and Carnage or in respect of sale of goods in catering establishments or in respect of commodities in grainshops or otherwise.

s) deductions for recovery of losses sustained by a railway administration on account of any rebates or refunds is correctly attributable to his neglect or default.

t) deductions made for contribution to the Prime Minister's National Relief Fund or to such other fund with the written authorisation of the employed person.

u) deductions for contribution to any insurance scheme framed by the Central Government for the benefit of its employees.

4.3.10 Limit on Total Amount of Deduction

Section 7 (3) provides that the total amount of deduction which may be made in any wage period from the wage of an employed person shall not exceed:

i) 75% of such wages where such deductions are wholly or partly made for payment to co-operative societies

ii) in any other case, 50% of such wages.

Where, however, total deductions authorised under the section exceeds 75% as the case may, the excess may be recovered in such manner as may be prescribed.

Check Your Progress 2

1) Who is responsible for payment of wages in factories under the Payment of Wages Act, 1936?

.....

.....

2) Can wage period exceed one month under the Payment of Wages Act, 1936?

.....

.....

3) Can wages be paid through cheque?

.....

4.4 MINIMUM WAGE

4.4.1 Object

The Minimum Wages Act was enacted in the year 1948 to give effect to the recommendation adopted by the International Labour Conference in the year 1928. The fixation of minimum rates of wages is directed against exploitation of the ignorant, less organised and less privileged members of the society by the capitalist class. The anxiety on the party of the society to improve the general economic conditions of some of its less favoured members has resulted in enactment of the Minimum Wages Act, 1948.

4.4.2 Scope and Coverage

The Minimum Wages Act, 1948 extends to the whole of India. However, under Section 3 (1), the appropriate Government fixes the minimum rates of wages payable to workers employed in job specified in Part I or Part II of the Schedule and in any other employment added to wither part by notification under Section 27.

The employments are listed in Parts I and II of the Schedule appended to the Act which are as follows:

Employment in any:

1) Woolen carpet making or shawl weaving establishment;
2) Rice mill, flour mill or dal mill.
3) Tobacco (including bidi-making) manufacturing.
4) Plantation, that is to say, any estate which is maintained for the purpose of growing cincona, rubber, tea, or coffee.
5) Oil mill
6) Lac manufacturing
7) Mica works
8) Public motor transport
9) Tanneries and leather manufacturing
10) Employment under any local authority
11) Employment on the construction and maintenance of roads or in building operations
12) Employment in stone-breaking or stone-crushing
13) Employment in the mines of: (i) Gypsum, (ii) Barytes, (iii) Bauxite, (iv) Manganese, (v) China clay, (vi) Kyanite and, (vii) Mangnesite.

Part II of the Schedule includes employment in agriculture, that is to say, in any farming, including the cultivation and tillage of the soil, dairy-farming production, cultivation, growing and harvesting of any agricultural or horticultural commodity, the raising of live-stock; bees and poultry, and any practice performed by a farmer or on farm as incidental to or in conjunction with farm operations including any forestory or

timbering operations and the preparation for market any delivery to storage or to market or to carriage for transportation to market or farm produce.

4.4.3 Definition of Wages

The Minimum Wages Act does not define the term "minimum wage". However Section 2(b), defines "wages" mean all remuneration capable of being expressed in terms of money, which would, if the terms of the contract of employment express or implied were fulfilled, be payable to a person employed in respect of his employment or of work done in such employment and include:

i) the value of:

   a) Any house accommodation, supply of light, water, medical attendance, or

   b) Any other amenity or any service excluded by general or special order of the appropriate Government.

ii) Any contribution paid by the employer to any Pension Fund or Provident Fund or under any scheme of social insurance.

iii) Any travelling allowance of the value of any travelling concession.

iv) Any sum paid to the person employed to defray special expenses entailed upon him by the nature of his employment; or

v) Gratuity payable on discharge.

Fixation of minimum rates of wages

Section 3 lays down the provisions with respect to fixation of wages. The appropriate Government shall fix the minimum rates of wages payable to the employees employed in an employment specified in Part II of the Schedule and in an employment added to either part by notification under Section 27.

But regarding employees employed in an employment specified in Part II of the Schedule, the appropriate Government may instead of fixing minimum rates of wages under Section 3 (1) (a) for the whole state, fix such rates for a part of the state or for any specified class or classes of such employment in the whole of the state or any part thereof.

Review and Revision: The minimum rates of wages so fixed shall be reviewed by the appropriate Government at such intervals as it may think fit. Such intervals shall not exceed five years. However if the appropriate Government has not reviewed or revised the minimum rates within a period of five years, it may do so after the expiry of the said period of five years.

Sub-section (2) of Section 3 provides that the appropriate Government may fix:

i) a minimum rates of wages for time-work, to be known as minimum time rate;

ii) a minimum rate of wages for piece-work to be known as a minimum piece-rate;

iii) a minimum rate of remuneration to apply in the case of employees employed on piece-work for the purpose of securing to such employees a minimum rate of wages on a time work basis to be known as "guranteed time-rate".

iv) a minimum rate to apply in substitution for minimum rate which would otherwise be applicable in respect of overtime work done by employees, to be known as "overtime rate".

Section 3 (2-A) lays down that the fixed or revised rates of wages shall not apply to any of the cases mentioned here under when either the dispute is pending or an award by the tribunal is in operation:

i) Where a dispute in respect of rates of wages is pending before a Tribunal or National Tribunal under the Industrial Disputes Act or before any like authority under any other law; or

ii) Where such a Tribunal has made an award which is in operation.

From this it appears that an Industrial Tribunal is not bound by the fixation or revision of minimum rates of wages by the Government during the pendency of proceedings before it.

Section 3 (3) provides that in fixing and revising minimum rates of wages, different rates of wages may be fixed for –

i) different scheduled employments;

ii) different classes of work in the same scheduled employment;

iii) adults, adolescents, children and apprentices;

iv) different localities.

Minimum rates of wages may be fixed by one or more of the following wage periods, namely

i) by the hour;

ii) by the day;

iii) by the month; or

iv) by such other longer period as may be prescribed;

Where such rates are fixed by the day or by the month, the manner of calculating wages for a month or for a day, as the case may be indicated, but where any wage periods have been fixed under Section 4 of the Payment of Wages Act, 1936, minimum wages shall be fixed in accordance therewith.

Minimum rates of wages: The minimum rates of wages fixed or revised by the appropriate Government in respect of scheduled employments under Section 3 may consist, according to Section 4, of:

i) a basic rate of wages and a special allowance at a rate to be adjusted, at such intervals and in such manner as the appropriate Government may direct, to accord as nearly as practicable with the variation in the cost of living index number applicable to such workers (hereinafter referred to as the "cost of living allowances"); or

ii) a basic rate of wages with or without the cost of living allowance, and the cash value of the concession in respect of supplies of essential commodities at concessional rates where so authorised; or

iii) an all inclusive rate allowing for the basic rate, the cost of living allowance and the value of the concession, if any.

The cost of living allowance and cash value of the concessions in respect of supplies of essential commodities at concession rates shall be computed by the competent authority at such intervals and in accordance with such directions as may be specified or given by the appropriate Government.

Procedure for fixing and revising minimum wages: Section 5 lays down the procedure for fixing and revising the minimum rates of wages. The appropriate Government shall adopt any of the following procedures in fixing minimum rates of wages in respect of Scheduled employment for the first time or for revising it:

a) appoint as many committees and sub-committees, as it considers necessary, to hold enquiries and advise it in respect of such fixation or revision as the case may be, or

b) by notification in the official Gazette, publish proposals for the information of persons likely to be affected thereby, and specify a date not less than two months from the date of notification, on which the proposals will be taken into consideration.

After considering the advise of the committee or committees appointed and all representations received by it, before the date specified in the official Gazette, the appropriate Government by notification in the official Gazette may fix or, as the case may be revise the minimum rates of wages in respect of each scheduled employment, which shall come into force after the expiry of three months, unless differently mentioned in the said notification.

The appropriate Government shall consult the Advisory Board if it proposes to revise the minimum rates of wages by the mode provided under clause (b) above.

Composition of Committees: Section 9 lays down that each of committee, sub-committees and the Advisory Board shall consist of persons to be nominated by the appropriate Government, representing employers and employees in the scheduled employments, who shall be equal in number and independent persons not exceeding one third of its total number, one of such independent person shall be appointed the Chairman by the appropriate Government.

Wages in kind: Section 11 of the Minimum Wages Act, 1948 provides that minimum wages payable under this Act shall be paid in cash. However, where it has been the custom to pay wages wholly or partly in kind, the appropriate Government may, by notification in the official Gazette, authorise the payment of minimum wages either wholly or partly in kind. Likewise the appropriate Government may, by notification in the official Gazette, authorise the provision of supplies of essential commodities at concessional rates.

Payment of minimum rates of wages: Section 12 provides that where in respect of any scheduled employment a notification under Section 5 is in force, the employer shall pay to every employee engaged in a scheduled employment under him wages at a rate not less than the minimum rates of wages fixed by such notification for that class of employees in that employment without any deduction except as may be authorised within such time and subject to such conditions as may be prescribed.

Fixing hours for a normal working day etc.:

1) In regard to any scheduled employment minimum rates of wages in respect of which have been fixed under this Act, the appropriate Government may:

   a) Fix the number of hours of work which shall constitute a normal working day, inclusive of one or more specified intervals;

   b) provide for a day of rest in every period of seven days which shall be allowed to all employees on any specified class of employees and for the payment of remuneration in respect of such days of rest;

   c) provide for payment for work on a day of rest at a rate not less than the overtime rate.

2) The aforesaid provisions shall apply to the following classes of employees to such extent and subject to such conditions as may be prescribed:

   a) employees engaged on urgent work, or in any emergency, which could not have been foreseen or prevent;

   b) employees engaged in work in the nature of preparatory or complementary work which must necessarily be carried on outside the limits laid down for the general working in the employment concerned;

   c) employees whose employment is essentially intermittant;

   d) employees engaged in any work which for technical reasons has to be completed before the duty is over;

   e) employees engaged in a work which could not be carried on except at times dependent on the irregular action of natural forces.

3) For the purposes of clause (c) of sub-section (2) employment of an employee is essentially intermittent when it is declared to be so by the appropriate Government on the ground that the daily hours of duty as such for the employee the hours duty, normally includes periods of in action during which the employee may be on duty but is not called upon to display either physical activity or sustained attention.

Wage for two or more classes of work: Section 16 of the Act provides where an employee does two or more classes of work to each of which a different minimum rate of wages is applicable, the employer shall pay to such employee in respect of the time respectively occupied in each. Such class work, wages at not less than the minimum rate in-force in respect of each such class.

4) **Maintenance of registers and records:** Every employer shall maintain such register and records giving such particulars of employees employed by him, the work performed by them, the wages paid to them, the receipts given by them and such other particulars and in such form as may be prescribed. Further he is required to be exhibited, in prescribed manner in the factory, workshop or place where the employees in the scheduled employment may be employed, or in the case of out-workers, in such factory, workshop or place as may be used for giving out work to them notices in prescribed form containing prescribed particulars.

5) The appropriate Government may, by rules made under this Act, provide for the issue of wage books or wage slip to employees employed in any scheduled employment in resepct of which minimum rates of wages have been fixed, and prescribed the manner in which entries shall be made and authenticated in such wage books or wage slip by the employer or his agent.

Minimum time rate wages for piece-work

Overtime: Section 14 lays down that where an employee whose minimum rate of wages is fixed under this Act by the hour, by the day, or by such longer wage period as may be prescribed, works on any way, in excess of the number of hours constituting a normal working day the employer shall pay him for every hour or part of an hours so worked in excess at the overtime rate fixed under this Act or under any law of the appropriate Government for the time being in force, whichever is higher.

Wages of a worker who works less than the normal

Section 15 provides that if an employee whose minimum rate of wages has been fixed under this Act "by the day" works on any day on which he was employed for a period less than the requisite number of hours constituting a normal working day, he shall be entitled to receive wages in respect of work done by him on that day as if he had worked for a full normal working day. But he shall not be so entitled to receive wages for a full normal working day:

i) If his failure to work is caused by his unwillingness to work, and not by the omission of the employer to provided him with work, and

ii) such other case and circumstances as may be prescribed.

Minimum time rate wages for piece-work

Section 17 provides that where an employee is employed on piece-work of which minimum time-rate and not a minimum piece rate has been fixed under this Act, the employer shall pay to such employee wages at not less than the minimum time rate.

Adjudication of Claims

Under Section 20 (1), any one of the following persons may be appointed as an authority under the Minimum Wages Act to entertain and decide claims arising out of payment of less than the minimum rates of wages in a particular area by the appropriate Government:

i) Any Commissioner for Workmen's Compensation; or

ii) Any officer of the Central Government exercising functions as Labour Commissioner for any region; or

iii) Any officer of the State Government not below the rank of Labour Commissioner; or

iv) Any officer with experience as a judge of Civil Court; or

v) Any Stipendiary Magistrate.

Procedure

An Application for claim under Section 20 (2) may be made by an employee regarding:

a) Payment of remuneration for days of rest; or

b) Remuneration for work done on such days of rest; or

c) Wages at the overtime rate under section 14.

Who may apply: Under Section 20 (2) an application may be made by (i) the employee himself or (ii) any legal practitioner, (iii) or any official of a registred trade union, (iv) person authorised in writing to act on his behalf, or (v) any Inspector, or (vi) any person acting with the permission of the authority.

Limitation: Such an application may be made within six months from the date on which the minimum wages or other payment became payable. On showing sufficinet cause for not making it within time, it may be entertained even after his period.

Procedure and hearing of the parties: On presentation of an application under Section 20 (2), for claim, it has to be admitted. After admission, notice may be issued to the employer to show cause why the application should be allowed. If the employer does not appear an ex parte order may be passed. If the employer appears the Authority will hear both parties, make any further enquiry, and if necessary, make direction to the employer under Section 20 (3).

a) In the case of a claim arising out of payment of less than the minimum rates of wages for the payment to the employee of the amount by which the minimum wages payable to him exceed the amount actually paid together with the payment of such compensation as the Authority may think fit, not exceeding ten times the amount of such excess;

b) In any other case, for the payment of the amount due to the employee, together with the payment of such compensation as the Authority may think fit not exceeding ten rupees, and the Authority may direct payment of such compensation in cases where the excess or the amount due is paid by the employer to the employee before the disposal of the application.

Finality of the direction: A direction of the Authority under Section 20 (3) shall be final. It is not appealable.

Penalty for malicious or vexatious claims: Section 20 (4) lays down that if the Authority hearing any application under this section is satisfied that it was either malicious or vexations, it may direct that a penalty not exceeding fifty rupees be paid to the employer by the person presenting the application.

Powers of Authority: Section 20 (7) provides that every Authority appointed under section 20 (1) shall have all the powers of a Civil Court under the Code of Civil Procedure, 1908, for the purpose of taking evidence and of enforcing the attendance of witnesses and compelling the production of documents, and every such Authority shall be deemed to be a Civil Court for all the purposes of Section 195 and Chapter XXXV of the Code of Criminal Procedure, 1898.

Single application in respect of a number of employees: Section 21 provides that a single application may be presented under section 20 on behalf or in respect of any number of employees, employed in the scheduled employed in respect of which minimum rates of wages have been fixed. Under Section 20 (3), the maximum compensation to be awarded shall not exceed ten times the aggregate amount of such excess or ten rupees per head as the case may be.

Recovery of the amount payable: Sub-section (5) of Section 20 provides that any amount directed to be paid under this section may be recovered:

a) if the Authority is a Magistrate, by the Authority as it were a fine imposed by the Authority as a Magistrate, or

b) if the Authority is not a Magistrate, by any Magistrate to whom the Authority makes application in this behalf as it were a fine imposed by such Magistrate.

Inspection

Section 19 (2) lays down that subject to any rules made in this behalf, an Inspector may, within the local limits for which he is appointed:

a) enter, at all reasonable hours, with such assistants, if any, being persons in the

service of the Government, or any local or other public authority, as he thinks fit, any premises or place where employees are employed or work is given out to workers in any scheduled employment in respect of which minimum rates of wages have been fixed under Act, for the purpose of examining any register, record of wages or notice required to be kept or exhibited by or under this Act or rules made thereunder, and require the production thereof for inspection;

b) examine any person whom he finds, in any premises or place and who, he has reasonable cause to believe, is an employee employed therein or an employee to whom work is given out therein;

c) require any person given out-work and any out workers, to give any information, which is in his power to give, with respect to the names and addresses of the persons to, for and from the work is given out or received, and with respect to the payments to be made for work;

d) seize or take copies of such register, record of wages or notice or portions thereof as he may consider relevant in respect of an offence under this Act which he has reason to believe has been committed by employer; and

e) exercise such other powers as may be prescribed.

Every Inspector shall be deemed to be a public servant with in the meaning of the India Penal Code. Any person required to produce any document or thing to give any information by an Inspector under Section 19 (2), as mentioned above shall be deemed to be legally bound to do so within the meaning of Section 175 and Section 176 of the Indian Penal Code.

Offences and Penalties

Section 22 provides that any employer who:

a) pays to any employee less than the minimum rates of wages fixed for the employee's class of work, or less than the amount due to him under the provisions of this Act, or

b) contravenes any rule or order made under Section 13

shall be punishable with imprisonment for a term which may extend to six months, or with fine which may extend to five hundred rupees, or with both. But in imposing any fine for an offence under this section the Court shall take into consideration the amount of any compensation already awarded against the accused in any proceedings taken under Section 20.

Check Your Progress 3

1) When the minimum wages be revised?

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2) Is the capacity of employer to pay relevant in fixation of minimum wage?

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3) Can the minimum wage be paid in kind?

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4) Can single application be made in respect of a number of employees before the authority under the Minimum Wages Act, 1948.

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4.5 BONUS

4.5.1 The Perspective

The problem of bonus has assumed great significance in the present-day industrial set-up of India. Unlike personal disputes which, because of political, ideological and personnel rivalries between the unions are generally confined to a section of the establishment, bonus disputes tend to affect the entire labour force in the establishment and sometimes even the entire industry in the affected region.

4.5.2 The Concept of Bonus

The concept of bonus has undergone a marked change since the end of the World War I. Originally, it meant gratuitous payment made by the employer to his workmen at his pleasure to keep the worker contented. With the efflux of time, judicial wisdom has transformed it into a legitimate claim which the workers can demand as a matter of right.

4.5.3 The Definitions of Bonus

The term 'bonus' has not been defined in any legislative enactment. However, various Committees and Commissions and Courts have attempted to define the term. The Textile Labour Inquiry Committee defined bonus as follows:

> The term "bonus" is applied to a cash payment made in addition to wages. It generally represents the cash incentive given conditionally on certain standards of attendance and efficiency being attained.

The Bonus Commission has also defined bonus as follows:

> The concept of bonus is difficult to define in rigid terms, but it is possible to urge that once profits exceed a certain base, labour should legitimately have a share in them. In other words, we think it proper to construe the concept of bonus as sharing by the workers in the prosperity of the concern in which they are employed. This has also the advantage that in the case of low paid workers such sharing in prosperity augments their earnings and so helps to bridge the gap between the actual wage and the need-based wage.

The Payment of Bonus Act, 1965

The Object of the Act

The scheme of the Payment of Bonus Act, 1965, broadly stated, has four objectives:

i) To impose statutory obligation upon the employer of every establishment covered by the Act to pay bonus to employees in the establishment.

ii) To define principle of payment of bonus according to the prescribed formula.

iii) To provide for payment of minimum and maximum bonus and link the payment of bonus with the scheme of set-off and set-on.

iv) To provide for enforcement of the liability for payment of bonus.

The Scope of the Act

The Act covers all persons who are employed for hire or reward to do any work, skilled, manual, supervisory, managerial, administrative, technical or clerical work drawing a salary or wage not exceeding Rs. 25000 per month, in any factory or establishment employing more than 20 or more persons. The Act covers the probationer, but does not cover apprentice as he is not included within the term employee under Section 2 (13).

Applicability of the Act

The Act applies to every factory and every other establishment in which 20 or more

persons are employed on any day during accounting. However, the appropriate Government is empowered to apply the provisions of the Act to any factory/ establishment employing less than 20 but not less than 10 persons during the accounting year, after giving two months notice in the Official Gazette.

Section 2 (16) defines "establishment in public sector" as:

"establishment in public sector means an establishment owned, controlled or managed by:

a) a Government company as defined in Section 617 of the Companies Act, 1965

b) a corporation in which not less than forty per cent of its capital is held (whether singly or taken together) by:

   i) the Government or

   ii) the Reserve Bank of India, or

   iii) a corporation owned by the Government or the Reserve Bank of India

And Section 2 (15) defines "establishment in private sector" to mean an establishment other than an establishment in public sector.

The provision of this Act shall in relation to a factory or other establishment to which the Act applies, have effect of the accounting year commencing on any day in the year 1964, and subsequent accounting year. The Act once applicable to an establishment shall continue to apply notwithstanding that the number of persons employed therein falls below 20.

Calculation of Amount of Bonus

Section 10 of the Payment of Bonus Act, 1965 makes it obligatory on every employer in respect of the accounting year to pay minimum bonus which shall be 8.33 per cent of the salary or wage earned by the employee during the accounting year or one hundred rupees, whichever is higher, whether or not the employer has any allocable surplus in the accounting year. But where an employee has not completed fifteen years of age at the beginning of the accounting year, he shall be paid sixty rupees.

But where the allocable surplus of any accounting year exceeds the amount of minimum bonus payable to the employees, the employer shall in lieu of minimum bonus be bound to pay every employee in respect of that accounting year bonus which shall be an amount in proportion to the salary or wage by the employee during the accounting year subject to a maximum of 20% of such salary or wage.

Thus under the Act, in the absence of any allocable surplus in any accounting year the minimum bonus of 8.33% payable. But if the allocable surplus is available the amount of bonus shall be to a maximum of 20% of the salary or wage.

In computing the allocable surplus the amount set on or the amount set off under the provisions of Section 15 shall be taken into account.

Allocable surplus has been defined to mean:

a) in relation to an employer being a company other than a banking Company, which has not made the arrangement prescribed under the Income Tax Act for the declaration and payment with in India of the dividends payable out of its profits in accordance with the provisions of Section 194 of that Act, sixty seven per cent of the available surplus in an accounting year;

b) in any other case sixty per cent of such available surplus.

Rule of set on and set off of allocable surplus: The available allocable surplus for the relevant accounting year has to be arrived at after taking into account the figures of set on and set off in the previous year. It is as follows (Section 15):

1) Where in any accounting year, the allocable surplus exceeds the amount of maximum bonus payable under the Act to the employees in the establishment then the excess shall subject to a limit of 20% of the total salary or wages of the employees employed in the establishment in that accounting year, be carried

forward for being set on in the succeeding accounting year and soon up to and inclusive of the fourth accounting year to be utilised for the purpose of payment of bonus.

2) Where in any accounting year there is no available surplus or the allocable surplus in that year falls short of the amount of minimum bonus payable to the employees in the establishment and there is no amount or sufficient amount carried forward and set on which could be utilised for the purpose of payment of the minimum bonus, then such minimum amount or the deficiency as the case may be shall be carried forward for being set off in the succeeding accounting year up to and inclusive of the fourth accounting year.

3) This principle shall apply to all other cases not covered by the above provisions for the payment of bonus.

4) wherein any accounting year any amount has been carried forward and is set on or set off, then in calculating bonus for the succeeding accounting year, the amount carried forward from the earliest accounting year shall first be taken into account.

Special provisions: Under the Act bonus is payable to employees drawing wages exceeding Rs. 2500/- per mensem provided he has worked in the establishment for not less than thirty working days in that year (Section 8). Where however the salary or wage of an employee exceeds Rs. 1600/- per mensem, bonus for him shall be calculated as if his salary or wage is Rs. 1600/- per mensem (Section 12).

2) Where an employee has not worked for all working days in any accounting year, then the minimum bonus of one hundred rupees or sixty rupees as the case may be if that bonus is higher than 8.33 per cent of his salary or wage or wage for days he has worked shall be proportionately reduced (Section 13).

3) Where in any accounting year:

   a) an employer has paid any puja bonus or other customary bonus to an employee; or

   b) an employer has paid a part of the bonus payable to an employee under this Act, before the date on which the bonus becomes payable.

   Then the employer would deduct the amount of bonus so paid from the amount of bonus payable to the employee in respect of the accounting year and the employee would be entitled to receive the balance only (Section 17).

4) Where in any accounting year the employee is found guilty of misconduct causing financial loss to the employer then it shall be lawful for the employer to deduct the amount of loss from the amount of bonus payable by him to the employee under this Act, in respect of the accounting year and the employee shall be entitled to receive the balance, if any (Section 18).

The process of computation of the amount of bonus is as follows:

i) Gross Profit – Authorised deduction = available surplus

ii) Allocable surplus – Company (other than Banking Company) = 67% of available surplus and in others 60% of available surplus.

iii) Allocation surplus – Bonus already paid to employees = balance to be paid.

If there is allocable surplus then the maximum of it at the rate 20% of the wage or salary. If there is no allocable surplus then the minimum bonus at the rate of 8.33 per cent of wages or salary of Rs. 100 which is higher.

Disqualification for bonus: Under Section 9 of the Act a person is disqualified to receive bonus if he is dismised from service for:

a) fraud; or

b) riotous or violent behaviour while on the premises of the establishment; or

c) theft, misappropriation or sabotage of any property of the establishment.

Check Your Progress 4

1) Is the employer bound to pay minimum bonus even in case of loss in the establishment? If so how much?

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2) Whether the Payment of Bonus Act prescribes the maximum bonus? If so how much?

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3) Is the person disqualified to receive bonus if he is dismissed from service for violent behaviour?

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4.6 EQUAL REMUNERATION FOR MEN AND WOMEN

Equal pay for men and women for equal work is one of the significant human rights set out in the Universal Declaration of Human Rights which the General Assembly of the United Nations adopted and proclaimed on December 10, 1948 (with not a single country voting against it) as a common standard of achievement of all people and all nations. The Declaration stipulates that "everyone without discrimination, has a right to equal pay for equal work. In 1958 the ILO concluded Convention No. 111 against discrimination in matters of employment and profession.

In September 1958, India ratified the ILO Convention No. 111 concerning equal remuneration for men and women workers for work of equal value which requires a member-State ratifying the Convention to promote as well as ensure the application or regulations legally established or recognised machinery for wage determination, collective agreements between employers and workers, or a combination of these measures. It is significant to note that notwithstanding the ratification of the Convention in 1958, India incorporated, eight years prior to its ratification, Article 39 (d) of the Constitution of India which proclaims "equal pay for equal work for both men and women" as a Directive Principle of State Policy which has to be read into the fundamental rights as a matter of interpretation. Article 14 of the Indian Constitution enjoins the State not to deny any person equality before the law or equal protection of the Laws, and Article 16 declares that there shall be equality of opportunity for all citizens in matters relating to employment or appointment to any office under the State.

The Equal Remuneration Act, 1976 seeks to provide for the payment of equal remuneration to male and female workers and prevent discrimination on the ground of sex against women in matters of employment. Section 2 (g) defines "Remunerations" to mean the basic wage or salary and any additional emoluments whatsoever payable either in cash or in kind, to a person employed in respect of employment or work done in such employment, if the terms of the contract of employment, express or implied, were fulfilled.

And Section 2 (h) defines "same work or work of similar nature" to mean:

> work in respect of which the skill, and responsibility required are the same when performed under similar working conditions, by a man or a woman and the differences, if any, between the skill effort and responsibility required of a man and those required of a woman are not of practical importance in relation to the terms and conditions of employment.

Section 3 of the Act gives overriding effects to the provisions of this Act. Section 4 incorporates the basic principle of parity of payment for equal work when it provides, itnter alia that

i) no employer shall pay to any worker, employed by him in an establishment

or employment, remuneration, whether payable in cash or in kind at rates less favourable than those at which remuneration is paid by him to the workers of the opposite sex in such establishment or employment for performing the same work or work of a similar nature.

ii) no employer shall, for the purpose of complying with the provisions of sub-section (1) reduce the rate of remuneration of any worker.

Section 5 attempts to check the discrimination in recruitment in future on the basis of sex except where the employment of women in such work is prohibited or restricted by or under any law. Section 6 provides establishment of an Advisory Committee for the purpose of providing increasing employment opportunities for authority to hear and decide complaints and claims arising from the non payment of equal pay to both men and women. The Act also provides for appointment of Appellate Authority to hear appeal against the decision of the authority. Section 16 makes an exception where difference in remuneration of men and women workers in any establishment is based on factors other than sex.

Check Your Progress 5

1) Can the employer reduce the rate of remuneration of any workers for the purpose of complying with the provisions of the Equal Remuneration Act, 1976?

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2) Can the employer discriminate women when recruiting workers?

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4.7 LET US SUM UP

From the above study, you may draw several conclusions. The legislation concerning minimum wages and bonus seeks to assure minimum standards of living for the workers covered therein. However its coverage is very limited. Again the payment of wages seeks to ensure payment of wages at regular interval without any unauthorised deduction. But again the scope and coverage of the Act is narrow. However the Equal Remuneration Act which seeks to ensure equal pay for equal work is wider in its scope and coverage.

4.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Minimum, Living

2) Minimum Wages Act, 1948

Check Your Progress 2

1) Manager

2) No

3) Yes, provided there is a written authorisation of the employed person

Check Your Progress 3

1) At an interval not exceeding 5 years

2) No

3) Yes, provided there is a custom.

4) Yes

Check Your Progress 4

1) Yes, 8.33% of wages during the accounting year

2) Yes, 20% of the salary or wages in the accounting year.

3) Yes

Check Your Progress 5

1) No

2) No, unless prohibited under law

4.9 FURTHER READING

Srivastava, S.C. (1997), *Commentaries and Payment of Bonus Act, 1965*, Universal Book Co.: New Delhi.

UNIT 1 HUMAN RESOURCE DEVELOPMENT

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the concept of Human Resource Development (HRD) Systems;
- appreciate the need for human resource development;
- relate the contributions of various HRD sub-systems to various development dimensions; and
- understand the principles in designing effective HRD systems.

1.1 WHAT IS HUMAN RESOURCE DEVELOPMENT ?

Human Resource Development relates to overall development of an individual to the fullest extent possible and utilisation of the acquired capabilities by creating the right kind of environment.

Development is acquisition of capabilities—capabilities to do the present job or the future expected job efficiently. Development of human resources is essential for any organisation that would like to be dynamic and growth-oriented. Unlike other resources, human resources have rather unlimited potential. This potential can be developed only by creating a climate that can continuously identify, bring to surface, and nurture the capabilities of people. Human Resource Development Systems aim at creating such a climate.

The competence required in an organisational set up are—Technical, Managerial, Human and Conceptual. Psychologists further differentiate knowledge, attitudes and skill components in each of these categories. Of these, knowledge components are developed with relative ease in classroom settings and with good reading habits. Attitudes and skills can be developed and strengthened mostly on the job. Attitude attains utmost importance in service sector. Mechanisms like performance appraisal, interpersonal feedback, counselling potential development, career planning and development, organisational development, autonomous work groups, job-enrichment. on the job training and continuous education aim at developing such competencies in the employees.

Gone are the days when organisations paid maximum attention towards "training" as a mechanism of developing competencies. As they started realising the limitations of training in developing skill-based competencies, and the need for creating a

"development climate" that can develop and harness the total human resources, they began exploring other mechanisms. Now-a-days those organisations which are really development-oriented have paid more attention towards creating soft bed to encourage creativity and innovation.

Many dimensions of HRD have been integrated into research, training, and organisational design and change. Others are still being explored. Trainers, researchers and consultants utilise this knowledge effectively, as they understand the different mechanisms for developing human resources and the links between them. This unit is an attempt to provide such an understanding and also to present some consideration for designing HRD systems for organisation. Human Resource Development (HRD) has gained increasing attention in the last two decades from human resource specialists, training and development professionals, chief executives and line managers.

1.2 THE CONCEPT OF AND NEED FOR HRD

Human resource development in the organisational context is a process by which the employees of an organisation are helped, in a continuous and planned way, to:

- acquire or sharpen capabilities required to perform various functions associated with their present or expected future roles,
- develop their general capabilities as individuals and discover and exploit their own inner potentials for their own and/or organisational development purposes, and
- develop an organisational culture in which supervisor-subordinate relationships, teamwork, and collaboration among sub-units are strong and contribute to the professional well being, motivation, and pride of employees.

This definition of HRD is limited to the organisational context. However, in the context of a state or nation it would differ.

HRD is a **process**, not merely a set of mechanisms and techniques. The mechanisms and techniques such as performance appraisal, counselling, training, and organisation development interventions are used to initiate, facilitate, and promote this process in a continuous way. Because the process has no limit, the mechanisms may need to be examined periodically to see whether they are promoting or hindering the process. Organisations can facilitate this process of development by planning for it, by allocating organisational resources for the purpose, and by exemplifying an HRD philosophy that values human beings and promotes their development.

HRD is needed by any organisation that wants to be dynamic and growth-oriented or to succeed in a fast-changing environment. Organisations can become dynamic and grow only through the efforts and competencies of their human resources. Personnel policies can keep the morale and motivation of employees high, but these efforts are not enough to make the organisation dynamic and take it in new directions. Employees capabilities must continuously be acquired, sharpened, and used. For this purpose, an "enabling" organisational culture is essential. When employees use their initiative, take risks, experiment, innovate, and make things happen, the organisation may be said to have an "enabling" culture.

Even an organisation that has reached its limit in terms of growth, needs to adapt to the changing environment. No organisation is immune to the need for processes that help to acquire and increase its capabilities for stability and renewal.

As the focus of HRD changes from sector to sector, so also the HRD needs differ from segment to segment but no segment can afford to ignore HRD.

Activity 1

Why do you think HRD is important for any organisation and more so for a service organisation? Prepare a short note on your own assessment as to whether continuous

HRD process is important/required for a health care organisation? Substantiate your statement with examples.

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1.3 HRD MECHANISMS

In this section we make you aware with the various HRD mechanisms keeping in view the HRD goals, subsystems and beliefs.

Goals, Subsystems and Beliefs

The **goal of HRD systems** is to develop:

- the capabilities of each employee as an individual,
- the capabilities of each individual in relation to his or her present role,
- the capabilities of each employee in relation to his or her expected future role(s),
- the dyadic relationship between each employee and his or her supervisor,
- the team spirit and functioning in every organisational unit (department, group, etc.),
- collaboration among different units of the organisation, and
- the organisation's overall health and self-renewing capabilities which, in turn, increase the enabling capabilities of individuals, dyads, teams, and the entire organisation.

To achieve these objectives, HRD systems may include the following **processes, mechanisms or subsystems:**

- Performance appraisal,
- Potential appraisal and development,
- Feedback and performance coaching,
- Career Planning,
- Human resources information,
- Training,
- Organisation development (OD) or research and system development,
- Rewards,
- Employee welfare and quality of work life, and
- Continuing education for upgradation of knowledge and skills, etc.

These HRD mechanisms are capable of initiating the process of HRD in the organisation. The process may start with anyone of these mechanisms. In other words the goal is the same, but the means may be different.

All these processes/mechanisms are linked with corporate plans, particularly with human resources planning. The mechanisms are designed on the basis of the following **beliefs:**

a) Human resources are the most important assets in the organisation.

b) Unlike other resources, human resources can be developed and increased to an unlimited extent.

c) A healthy climate, characterised by the values of openness, enthusiasm, trust, mutuality, and collaboration, is essential for developing human resources.

d) HRD can be planned and monitored in ways that are beneficial both to the individual and to the organisation.

e) Employees feel committed to their work and organisation if the organisation perpetuates a feeling of "belonging".

f) Employees are likely to have this feeling if the organisation provides for their basic needs and for their higher needs through appropriate management styles and systems.

g) Employee commitment is increased with the opportunity to discover and use one's capabilities and potential in one's work.

h) It is every manager's responsibility to ensure the development and utilisation of the capabilities of subordinates, to create a healthy and motivating work climate, and to set examples for subordinates to follow.

i) The higher the level of the manager, the more attention should be paid to the HRD function in order to ensure its effectiveness.

j) The maintenance of a healthy working climate and the development of its human resources are the responsibilities of every organisation (especially the corporate management).

Activity 2

Do you feel HRD process can be initiated in health care system by introducing any of the subsystems explained above? Which of the above explained systems you feel are more important and why? Make a list of these systems as per your understanding of their priorities for health care system. Support your answer with examples.

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The HRD mechanisms or subsystems have been briefly explained below for your understanding.

Performance Appraisal

Performance Appraisal System (PAS) started with Annual Confidential Reports (ACRs), then moved to PAS and then it was restructured and called Performance Planning

Analysis and Review System, which involved maximum participation and commitment of both the parties. The latest form being 360° appraisal system.

Performance appraisal of some type are practiced in most organisations all over the world. A written assessment to which the employee responds is still common in many organisations. However, this is being replaced by performance appraisal interview between the manager and the subordinate. In such a system the subordinate's strengths and weaknesses are discussed, concerns are shared, and the subordinate is given the opportunity to defend or improve any deficits in his or her performance.

An HRD-oriented performance appraisal is used as a mechanism for supervisors to:

- understand the difficulties of their subordinates and try to remove these difficulties.
- understand the strengths and weaknesses of their subordinates and help the subordinates to realise these.
- help the subordinates to become aware of their positive contributions.
- encourage subordinates to accept more responsibilities and challenges.
- help subordinates to acquire new capabilities.
- plan for effective utilisation of the talents of subordinates.

In HRD organisations, every supervisor has the responsibility to ensure the development of his or her subordinates in relation to the capabilities required to perform their jobs effectively. Generally, the supervisor schedules individual meetings with each employee to discuss the employee's performance, communicate the performance areas that need attention, and jointly establish areas to be worked on or goals to be achieved by the next scheduled discussion.

Such performance appraisal interviews may be scheduled every three months or once or twice a year. Goals and objectives that have been agreed upon in each meeting are reviewed in the next meeting. During this review, the supervisor attempts to understand the difficulties of the subordinate and to identify his or her developmental needs.

Before each review, the employee is prepared for the discussion through self-assessment, identifying factors that have contributed to his or her performance and factors that have hindered it, as well as the types of support that he or she needs from the supervisor or others in order to do better in the next period.

The supervisor also prepares for the meeting by listing observations, problems, suggestions, and expectations. During the appraisal meeting, the supervisor and the subordinate share their observations and concerns. Each responds to the subjects raised by the other. Such discussions help to develop mutual understanding. The data generated is reported to the higher management and is used in making decisions about individual employee development as well as developmental needs of the work group or the entire organisation.

Potential Appraisal and Development

In organisations that subscribe to HRD, the potential (career-enhancement possibilities) of every employee is assessed periodically. Such assessment is used for developmental planning as well as for placement. It is assumed under this system that the company is growing continuously. It may be expanding in scale, diversifying its operations, introducing technological changes, or entering new markets. A dynamic and growing organisation needs to continually review its structure and systems, creating new roles and assigning new responsibilities. Capabilities to perform new roles and responsibilities must continually be developed among employees. The identification of employee potential to ensure the availability of people to do different jobs helps to motivate employees in addition to serving organisational needs.

Every year or two, the supervisor of a group of employees assesses the potential of each of them to perform different (usually higher level) functions on the basis of the supervisor's observations and experiences during that period. Of course, many supervisors see their subordinates doing only those jobs to which they are assigned. The ideal way to judge a person's potential would be to try the person on each job for

which his or her potential is being assessed. This is not feasible in most organisations, so simulation activities are prepared to provide some information about the potential of an employee in specific areas.

Any employee can request such assessment. It should be clear whether or not there is a position available in the company to which the employee could be transferred or promoted.

Feedback and Performance Coaching

Knowledge of one's strengths helps one to become more effective, to choose situations in which one's strengths are required, and to avoid situations in which one's weaknesses could create problems. This also increases the satisfaction of the individual. Often people do not recognise their strengths. Supervisors in an HRD system have the responsibility for ongoing observation and feedback to subordinates about their strengths and weaknesses, as well as for **guidance** in improving performance capabilities.

Career Planning

The HRD philosophy is that people perform better when they feel trusted and see meaning in what they are doing. In the HRD system, corporate growth plans are not kept secret. Long-range plans for the organisation are made known to the employees. Employees are helped to prepare for change whenever such change is planned; in fact, the employees help to facilitate the change. Major changes are discussed at all levels to increase employee understanding and commitment.

Most people want to know the possibilities for their own growth and career opportunities. Because managers and supervisors have information about the growth plans of the company, it is their responsibility to transmit information to their subordinates and to assist them in planning their careers within the organisation. Of course the plans may not become reality, but all are aware of the possibilities and are prepared for them.

Training

Training is linked with performance appraisal and career development. Employees generally are trained on the job or through special in-house training programmes. For some employees (including managers), outside training may be utilised to enhance, update, or develop specific skills. This is especially valuable if the outside training can provide expertise, equipment, or sharing of experiences that are not available within the organisation.

In-house training programmes are developed by in-house trainers or consultants hired for the task. Periodic assessments are made of the training needs within the organisation. The effects of all training programmes are monitored and added to the data concerning training needs. Managers and employees who attend in-house or outside training programmes are also expected to submit proposals concerning any changes they would like to suggest on the basis of their new knowledge. The training received by employees is thus utilised by the organisation besides enhancing the employees' skills and knowledge.

Organisational Development (OD)

This function includes research to ascertain the psychological health of the organisation. This is generally accomplished by means of periodic employee surveys. Efforts are made to improve organisational health through various means in order to maintain a psychological climate that is conducive to productivity. The OD or systems experts also help any department or unit in the company that has problems such as absenteeism, low production, interpersonal conflict, or resistance to change. These experts also revamp and develop various systems within the organisation to improve their functioning.

Rewards

Rewarding employee performance and behaviour is an important part of HRD.

Appropriate rewards not only recognise and motivate employees, but also communicate the organisation's values to the employees. In HRD systems, innovations and use of capabilities are rewarded in order to encourage the acquisition and application of positive attitude and skills. Typical rewards include certificates of appreciation, newsletter announcements, increase in salary, bonus, special privileges, and desired training. Promotions are generally not considered as rewards because promotion decisions are based on appraisals of **potential** whereas most rewards are based on **performance**. Rewards may be given to individuals as well as to teams, departments, and other units within the organisation.

Activity 3

In Healthcare sector the end product depends on the competence of the professional and the support system. Do you see any change in the trend of the reward management system? Critically evaluate the same, relating to the future prospects. Discuss in the peer group in the classroom.

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Employee Welfare and Quality of Work Life

Employees at lower levels in the organisation usually perform relatively monotonous tasks and have fewer opportunities for promotion or change. In order to maintain their work commitment and motivation, the organisation must provide some welfare benefits such as medical insurance, disability insurance, holidays and vacations, etc.

Quality-of-work-life programmes generally focus on the environment within the organisation and include: basic physical concerns such as heating and air-conditioning, lighting, and safety precautions; additional physical amenities such as food and beverage facilities, recreation, and aesthetics; and psychological and motivational factors such as flexible work hours, freedom to suggest changes or improvements, challenging work, and varying degrees of autonomy.

HRD systems focus on employee welfare and quality of work life by continually examining employee needs and meeting them to the extent feasible. Job-enrichment programmes, educational subsidies, recreational activities, health and medical benefits, and the like generate a sense of belonging that benefits the organisation in the long run.

Human Resources Information

All appropriate information about employees should be stored in a central human resources data bank (usually by means of computer). This inlcudes all basic information about each employee, training programmes attended, performance records, potential appraisals, accomplishments, etc. This data is utilised whenever there is a need to identify employees for consideration for special projects, additional training, or higher-level jobs.

The Contribution of Subsystems to HRD Goals

Each of the subsystems or mechanisms just defined contributes to the achievement of overall HRD goals.

Performance appraisal focuses primarily on helping the individual to develop his or her present role. Potential appraisal focuses primarily on identifying the employee's likely future roles within the organisation. Training is a means of developing the individual's personal effectiveness (e.g., through communication-skills laboratories) or developing the individual's ability to perform his or her present job role or future job roles. Training can also strengthen interpersonal relationships (through training in communications, conflict resolution, problem solving, transactional analysis, etc.) and increase teamwork and collaboration (through management and leadership training, team-building programmes, etc.).

Feedback and performance coaching helps the development of the individual as well as relationships. Organisation development is the mechanism for developing team collaboration and self-renewing skills. Efforts to promote employee welfare and ensure the quality of work life, along with rewards, promote a general climate of development and motivation among employees.

The HRD subsystems or mechanisms discussed so far should not be thought of in isolation. They are designed to work together in an integrated system although any of them may exist in an organisation that does not have an overall HRD plan. In isolation, these mechanisms do not afford the synergistic benefits of integrated subsystems. For example, outcomes of performance appraisal provide inputs for training needs, assessments, rewards, career planning, and feedback and performance coaching.

Activity 4

1) Discuss the HRD goals of a Hospital/Healthcare institution.

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2) As a health administrator what steps would you initiate for a performance appraisal interviews in your organisation?

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1.4 DESIGNING HRD SYSTEMS

Of course, HRD systems must be designed differently for different organisations. Although the basic principles may remain the same, the specific components, their relationships, the processes involved in each, the phasing, and so on, may differ from organisation to organisation.

Designing an integrated HRD system requires a thorough understanding of the principles and models of human resource development and a diagnosis of the organisation culture, existing HRD practices in the organisation, employee perceptions of these practices, and the developmental climate within the organisation. The following principles relate to focus, structure, and functioning should be considered when designing integrated HRD systems:

1.4.1 Focus of the System

a) **Focus on enabling capabilities:** The primary purpose of HRD is to help the organisation to increase its "enabling" capabilities. These include development of human resources, development of organisational health, improvement of problem solving capabilities, development of diagnostic ability (so that problems can be located quickly and effectively), and increased employee productivity and commitment.

b) **Balancing adaptation and change in the organisational culture:** Although HRD systems are designed to suit the organisational culture, the role of HRD may be to modify that culture to increase the effectiveness of the organisation. There always has been a controversy between those who believe that HRD should be designed to suit the culture and those who believe that HRD should be able to change the culture. Both positions seem to be extreme. HRD should take the organisation forward, and this can be done only if its design anticipates change and evolution in the future.

c) **Attention to contextual factors:** What is to be included in the HRD systems, how is it to be subdivided, what designations and titles will be used, and similar issues should be settled after consideration of the various contextual factors of the organisation—its culture and tradition, size, technology, levels of existing skills, available support for the function, availability of outside help and so on.

d) **Building linkages with other functions:** Human resource development systems should be designed to strengthen other functions in the company such as long-range corporate planning, budgeting and finance, marketing, production, and other similar functions. These linkages are extremely important.

e) **Balancing specialisation and diffusion of the function:** Although HRD involves specialised functions, line people should be involved in various aspects of HRD. Action is the sole responsibility of the line people, and HRD should strengthen their roles.

1.4.2 Structure of the System

a) **Establishing the identity of HRD:** It is important that the distinct identity of HRD be recognised. The person in charge of HRD should have responsibility for this function exclusively and should not be expected to do it in addition any other function. Multiple responsibilities produce several kinds of conflict. This person should report directly to the chief executive of the organisation.

b) **Ensuring respectability for the function:** In many companies, the personnel function does not have much credibility because it is not perceived as a major function within the organisation. It is necessary that HRD be instituted at a very high level in the organisation and that the head of the HRD department be classified as a senior manager. Both the credibility and usefulness of HRD depend on this.

c) **Balancing differentiation and integration:** The human resource development function often includes personnel administration, human resource development and training, and industrial relations. These three functions have distinct identities and requirements and should be differentiated within the HRD department. One person may be responsible for OD, another for training, another for potential appraisal and assessment, etc. At the same time, these roles should be integrated through a variety of mechanisms. For example, inputs from manpower planning should be available to line managers for career planning and HRD units for potential appraisal and development. Data from recruitment should be fed into the human resources information system. If salary administration and placement are handled separately, they should be linked to performance appraisals. Differentiation as well as integration mechanisms are essential if the HRD system is to function well.

d) **Establishing linkage mechanisms:** HRD has linkages with outside systems as well as with internal subsystems. It is wise to establish specific linkages to be used to manage the system. Standing committes for various purposes (with membership from various parts and levels of the organisation), task groups, and **ad hoc** committees for specific tasks are useful mechanisms.

e) **Developing monitoring mechanisms:** The HRD function is always evolving. It, therefore, requires systematic monitoring to review the progress and level of effectiveness of the system and to plan for its next step. A thorough annual review reappraisal every three years will be invaluable in reviewing and planning the system. It may be helpful to include persons from other functions in the organisation in the HRD assessment effort.

1.4.3 Functioning of the System

a) **Building feedback and reinforcing mechanisms:** The various subsystems within HRD should provide feedback to one another. Systematic feedback loops should be designed for this purpose. For example, performance and potential appraisals provide necessary information for training and OD, and OD programmes provide information for work redesign.

b) **Balancing quantitative and qualitative decisions:** Many aspects of HRD, such as, performance and potential appraisals, are difficult to quantify. Of course attempts should be made to quantify many variables and to design computer storage of various types of information, but qualitative and insightful decisions are also necessary and desirable. For example, in considering people for promotions, quantitative data are necessary inputs, but other factors must also be taken into consideration. Thus, a balance between the mechanical and the human factors is necessary.

c) **Balancing internal and external expertise:** A human resource development system requires the development of internal expertise and resources, specifically in content areas that are used frequently within the organisation. For expertise that is required only occasionally, the use of external resources or consultants may be most feasible. It is preferable to use internal personnel to conduct training; however, an organisation that uses only in-house expertise may not benefit from new thinking in the field. On the other hand, a company that relies solely on external HRD help does not develop the internal resources that are necessary for effective functioning. Hence, a balance should be maintained.

d) **Planning for the evolution of HRD:** Various aspects of HRD can be introduced into the organisation in stages, depending on its needs, size and level of sophistication. Some aspects may require a great deal of preparation. Rushing in the introduction of an aspect of HRD may limit its effectiveness. Each stage should be planned carefully, with sequenced phases built one over the other. This may include:

   i) **Geographical phasing:** Introducing the system in a few parts of the organisation and slowly spreading it to other parts. This may be necessary in a large or widely located organisation.

   ii) **Vertical phasing:** Introducing the system at one or a few levels in the organisation and expanding up or down gradually.

   iii) **Functional phasing:** Introducing one function or subsystem, followed by other functions. For example, introducing job specifications (identification of critical attributes of jobs) before introducing a complete potential-appraisal system.

   iv) **Sophistication phasing:** Introducing simple forms of subsystems, followed after some time by more sophisticated forms.

Activity 5

Having gone through this unit, do you feel carefully designing of HRD system will make any difference in the health sector? Prepare a short note and discuss with your colleagues and friends in your organisation.

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1.5 LET US SUM UP

It has now been proved beyond doubts that sustainable development cannot be achieved without paying proper attention to HRD function. Organisations have been turned around through HRD only. If the full benefits of HRD are to be experienced, it must be introduced as a total system within the organisation. The commitment of the top management to the HRD systems and its willingness to invest time and other resources is the most crucial aspect, top management must make it obvious that the human resources of the organisation are its most valuable resources. The values of openness, trust, mutuality, collaboration, and enthusiasm within the system should be recognised by every member of the organisation. If implemented properly, integrated HRD systems can contribute significantly to positive cultural changes, increased productivity, and excellence in organisation.

1.6 FURTHER READINGS

Khandelwal, A. (1988), *Human Resource Development in Banks*, Oxford & IBH: New Delhi.

Rao, T.V., *Strategies of Developing Human Resources : Experiences from 14 Organisations*, Working Paper, Indian Institute of Management: Ahmedabad.

Rao, T.V. and Abraham, E. (1985), "A Survey of HRD Practices in Indian Industry", in Rao, T.V. and Pereira, D.F., *Recent Experiences in HRD*, Oxford & IBH: New Delhi.

UNIT 2 DECISION MAKING

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the process of decision making;
- explain the styles of decision making;
- appreciate the individual differences in decision making;
- examine the essential values which are key to decision making; and
- describe the guidelines for effective decision making.

2.1 INTRODUCTION

The making of decisions by both individuals and groups is a fundamental aspect of life in organisations. It may be defined as the process of making choices from among several alternatives. It is the most common and crucial work role of executives. The ability to make timely decisions, to exercise independent judgement and to gain positive results is the basic nature of effective decision making. Though there is no magic formula for analysing data, considering option and making a winning determination, there is a multistep process to arrive at decision.

Decision making is an activity which all of us involve into almost day in and day out. Sometimes making a decision is facilitated by the background information and circumstances but there are occasions when one is left into blank and is forced to take a decision. Such decisions may not lead to the target and may also create undesirable situations and regulations which ultimately may mar the whole process. In the field of health services there are occasions when decisions have to be taken almost instantaneously as and when one comes across the situation. Normally such situations are also accompanied by high level of anxiety and various impulses. Knowing the process of decision making in such situations does come to useful rescue for the decision maker and hence it becomes very important to understand the dynamics of decision making which may help avoiding the situations referred above. It is said that collective wisdom is always better vis-a-vis individual one. But sometimes it may prove otherwise as well. In this unit we will explain the dynamics of decision making through an example (case) from the health services which will help you to understand the various aspects of decision making.

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2.2 PROCESS OF DECISION MAKING

There are generally eight steps in the process of decision making but all decisions might not fully conform to the neat eight step pattern. The steps, however, may be skipped or combined. These steps are:

i) **Identifying the problems:** To decide how to solve a problem.

ii) **Defining the objectives to be met in solving the problem:** To conceive the problems in such a way that possible solutions can be identified.

iii) **Making a predecision:** It is a decision about how to make a decision. By assessing the type of problem and other aspects of situation; the managers may opt to make decision themselves.

iv) **Generating alternatives:** The stage in which possible solutions to the problem are identified/whether to rely on previously used approaches which may provide readymade answer/to go for new approaches.

v) **Evaluating alternate solutions:** Some of the alternatives may be more effective and some may be more difficult to implement. The possibilities are evaluated depending on feasibility.

vi) **Choice to be made:** Out of several evaluated alternatives and approaches that choice is made, which is most acceptable.

vii) **Implementation of the chosen alternatives** i.e. chosen alternative is carried out.

viii) **Follow up:** Monitoring the effectiveness of any attempted solution, to review whether the chosen alternative works.

You can define decision making as the process of choosing between alternatives to achieve a goal. But if you closely look into this process of selecting among available alternatives, you will be able to identify three relatively distinct stages. Put into a time framework, you will find:

1) **The past**, in which problems developed, information accumulated, and the need for a decision was perceived;

2) **The present,** in which alternatives are found and the choice is made; and

3) **The future,** in which decisions will be carried out and evaluated.

Herbert Simon, the well-known Nobel laureate decision theorist, described the activities associated with three major stages in the following way:

1) **Intelligence Activity:** Borrowing from the military meaning of intelligence Simon describes this initial phase as an attempt to recognise and understand the nature of the problem, as well as search for the possible causes;

2) **Design Activity:** During the second phase, alternative courses of action are developed and analysed in the light of known constraints; and

3) **Choice Activity:** The actual choice among available and assessed alternatives is made at this stage.

If you have followed the nature of activities of these three phases, you should be able to see why the quality of any decision is largely influenced by the thoroughness of the intelligence and design phases.

Henry Mintzberg and some of his colleagues (1976) have traced the phases of some decisions actually taken in organisations. They have also come up with a three-phase model as shown in Fig. 2.1.

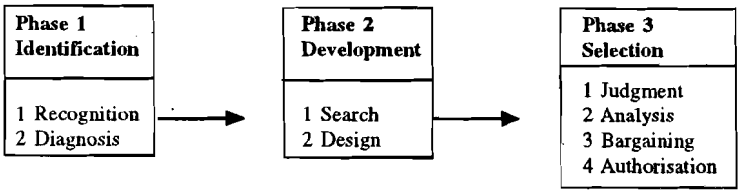

Figure 2.1: Mintzberg's empirically based phases of decision making in organisations

Source: Mintzberg, Raisinghani and Theoret, 1976.

1) **The identification phase,** during which **recognition** of a problem or opportunity arises and a **diagnosis** is made.

2) **The development phase,** during which there may be a **search** for existing standard procedures, ready-made solutions or the **design** of a new, tailor-made solution. It was found that the design process was a grouping, trial and error process in which the decision-makers had only a vague idea of the ideal solution.

3) **The selection phase,** during which the choice of a solution is made. There are three ways of making this selection: by the **judgement** of the decision maker, on the basis of experience or intuition rather than logical analysis; by **analysis** of the alternatives on a logical, systematic basis; and by **bargaining** when the selection involves a group of decision makers. Once the decision is formally accepted, an **authorisation** is made.

Note that the decision making is a dynamic process and there are many feedback loops in each of the phases. These feedback loops can be caused by problems of timing, politics, disagreement among decision-makers, inability to identify an appropriate alternative or to implement the solution or the sudden appearance of a new alternative etc. So, though on the surface, any decision-making appears to be a fairly simple three-stage process, it could actually be a highly complex dynamic process.

Activity 1

Evaluate the steps taken by you in most frequently made decisions. Whether you find all these steps are followed. Prepare a short note on making decision for treatment of a patient brought to you.

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2.3 TYPES OF MANAGERIAL DECISIONS

There are many types of decisions which you would be required to make as a manager. Three most widely recognised classifications are:

The first classification of **Personal** and **Organisational** decisions was suggested by Chester Barnard, nearly fifty years ago in his classic book: "The Functions of the Executive". In his opinion, the basic difference between the two decisions is that "personal decisions cannot ordinarily be delegated toothers, whereas organisational decisions can often, if not always, be delegated" **(Barnard, 1937).** Thus, the manager makes organisational decisions that attempt to achieve organisational goals and personal decisions that attempt to achieve personal goals. Note that personal decisions can affect the organisation, as in the case of a senior manager deciding to resign. However, if you analyse a decision, you may find that the distinctions between personal and organisational decisions are a matter of degree. Your are, to some extent, personally involved in any organisational decision that you make and you need to resolve the conflicts that might arise between organisational and personal goals.

Another common way of classifying types of decisions is according to whether they are **basic** or **routine**. Basic decisions are those which are unique, one-time decisions involving long-range commitments of relative permanence or duration, or those involving large investments. Examples of basic decisions in a business firm include

plant location, organisation structure, wage negotiations, product line, etc. In other words, most top management policy decisions can be considered as basic decisions.

Routine decisions are at the opposite extreme from basic decisions. They are the everyday, highly repetitive, management decisions which by themselves have little impact on the overall organisation. However, taken together, routine decisions play a tremendously important role in the success of an organisation. Examples of routine decisions are an accountant's decision on a new entry, a production supervisor's decision to appoint a new worker, and a salesperson's decision on what territory to cover. Obviously, a very large proportion (most experts estimate about 90 per cent) of the decisions made in an organisation are of the routine variety. However, the exact proportion of basic to routine types depends on the level of the organisation at which the decisions are made. For example, a first-line supervisor makes practically all the routine decisions whereas the chairperson of the board makes very few routine decisions but many basic decisions.

Simon (1977) distinguishes between **Programmed** (routine, repetitive) decisions and **Non-programmed** (unique, one-shot) decisions. While programmed decisions are typically handled through structured or bureaucratic techniques (standard operating procedures), non-programmed decisions must be made by managers using available information and their own judgement. As is often the case with managers, however, decisions are made under the pressure of time.

An important principle of organisation design that relates to managerial decision making is Gresham's law of Planning. This law states that there is a general tendency for programmed activities to overshadow non-programmed activities. Hence, if you have a series of decisions to make, those that are more routine and repetitive will tend to be made before the ones that are unique and required considerable thought. This happens presumably because you attempt to clear your desk so that you can get down to the really serious decisions. Unfortunately, the desks very often never get cleared.

After going through the three types of classification of managerial decisions, you could see that there is no single and satisfactory way of classifying decision situations. Moreover, the foregoing classifications have ignored two important problem-related dimensions: (1) How **complex** is the **problem** in terms of number of factors associated with it; and (2) how much **certainty** can be placed with the **outcome** of a decision. Based on these two dimensions, four kinds of decision modes can be identified: Mechanistic, Analytical, Judgemental, and Adaptive (See Fig. 2.2).

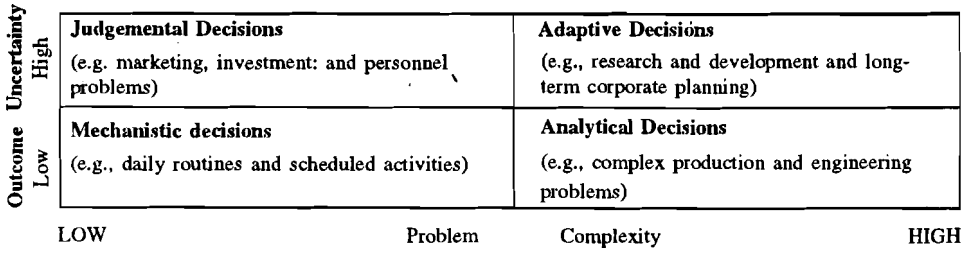

Fig. 2.2 : Types of Managerial Decisions

1) **Mechanistic Decisions:** A mechanistic decision is one that is routine and repetitive in nature. It usually occurs in a situation involving a limited number of decision variables where the outcomes of each alternative are known. For example, the manager of a bicycle shop may know from experience when and how many bicycles are to be ordered; or the decision may have been reached already, so the delivery is made routinely. Most mechanistic decision problems are solved by habitual responses, standard operating procedures, or clerical routines. In order to further simplify these mechanistic decisions, managers often develop charts, lists, matrices, decision trees, etc.

2) **Analytical Decisions:** An analytical decision involves a problem with a large number of decision variables, where the outcomes of each decision alternative can be computed. Many complex production and engineering problems are like this.

They may be complex, but solutions can be found. Management science and operations research provide a variety of computational techniques that can be used to find optimal solutions. These techniques include linear programming, network analysis, inventory reorder model, queuing theory, statistical analysis, and so forth.

3) **Judgemental Decisions:** A judgemental decision involves a problem with a limited number of decision variables, but the outcomes of decision alternatives are unknown. Many marketing, investment, and resource allocation problems come under this category. For example, the marketing manager may have several alternative ways of promoting a product, but he or she may not be sure of their outcomes. Good judgement is needed to increase the possibility of desired outcomes and minimise the possibility of undesired outcomes.

4) **Adaptive Decisions:** An adaptive decision involves a problem with a large number of decision variables, where outcomes are not predictable. because of the complexity and uncertainty of such problems, decision makers are not able to agree on their nature or on decision strategies. Such ill-structured problems usually require the contributions of many people with diverse technical backgrounds. In such a case, decision and implementation strategies have to be frequently modified to accommodate new developments in technology and the environment.

Activity 2

Refer to Fig. 2.2 and subsequent discussions on four types of managerial decisions. Answer the following questions.

1) Which types of managerial decisions correspond to "Programmed" decision?

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2) Which types of managerial decisions correspond to "Non-programmed" decision?

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3) Which types of managerial decisions correspond to "Basic" decision?

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2.4 DECISION MAKING UNDER DIFFERENT STATES OF NATURE

In the previous topic on types of decisions you have seen that a decision-maker may not have complete knowledge about decision alternatives (i.e., High Problem Complexity) or about the outcome of a chosen alternative (i.e. High Outcome Uncertainty). These conditions of knowledge are often referred to as states of nature and have been labelled:

1) Decisions under Certainty

2) Decisions under Risk

3) Decisions under Uncertainty

Fig. 2.3 depicts these three conditions on a continuum showing the relationship between knowledge and predictability of decision states.

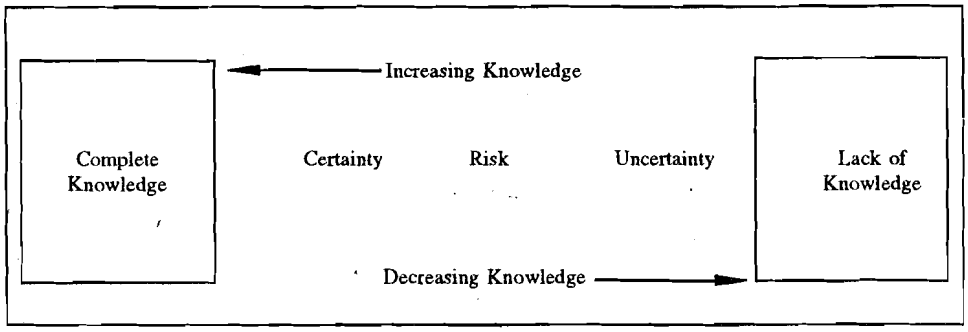

Fig. 2.3: Decision Making Conditions Continuum

Decisions making under certainty: A decision is made under conditions of certainty when a manager knows the precise outcome associated with each possible alternative or course of action. In such situations, there is perfect knowledge about alternatives and their consequences. Exact results are known in advance with complete (100 per cent) certainty. The probability of specific **outcomes** is assumed to be equal to one. A manager is simply faced with identifying the consequences of available alternatives and selecting the outcome with the highest benefit or payoff.

As you can probably imagine, managers rarely operate under conditions of certainty. The future is only barely known. Indeed, it is difficult to think of examples of all but the most trivial business decisions that are made under such conditions. One frequent illustration that is often cited as a decision under at least near certainty is the purchase of government bonds or certificates of deposit. For example, as per the assurance provided by Government of India, Rs. 1,000 invested in a 6-year National Savings Certificate will bring a fixed sum of Rs. 2,015 after six complete years of investment. It should still be realised, however, that the Government defaulting on its obligations is an unlikely probability, but the possibility still exists. This reinforces the point that very few decisions outcome can be considered 'a sure thing'.

Decision making under risk: A decision is made under conditions of risk when a single action may result in more than one potential outcome, but the relative probability of each outcome is known. Decisions under conditions of risk are perhaps the most common. In such situations, alternatives are recognised, but their resulting consequences are probabilistic and doubtful. As an illustration, if you bet on number 6 for a single roll of a dice, and have a 1/6 probability of winning in that there is only one chance in six of rolling a 6. While the alternatives are clear, the consequence is probabilistic and doubtful. Thus, a condition of risk may be said to exist. In practice, managers assess the likelihood of various outcomes occurring based on past experience, research, and other information. A quality control inspector, for example, might determine the probability of number of 'rejects' per production run. Likewise, a safety engineer might determine the probability of number of accidents occurring, or a personnel manager might determine the probability of a certain turnover to absenteeism rate.

Decision making under uncertainty: A decision is made under conditions of uncertainty when a single action may result in more than one potential outcome, but the relative probability of each outcome is unknown. Decisions under conditions of uncertainty are unquestionably the most difficult. In such situations a manager has no knowledge whatsoever on which to estimate the likely occurrence of various alternatives. Decisions under uncertainty generally occur in cases where no historical data are available from which to infer probabilities or in instances which are so novel and complex that it is impossible to make comparative judgements.

Examples of decisions under complete uncertainty are as difficult to cite as example of decisions under absolute certainty. Given even limited experience and the ability to generalise from past situations, most managers should be able to make at least some estimate of the probability of occurrence of various outcome. Nevertheless, there are undoubtedly times when managers feel they are dealing with complete uncertainty.

Selection of a new advertising programme from among several alternatives might be one such example. The number of factors to be considered and the large number of uncontrollable variables vital to the success of such a venture can be mind-boggling.

On a personal level, the selection of a job from among alternatives is a career decision that incorporates a great deal of uncertainty. The number of factors to be weighed and evaluated, often without comparable standards, can be overwhelming.

Activity 3

Identify six decisions that you have taken during last one year. Check which decisions were made under certainty, under risk and under uncertainty.

Decisions	Certainty	Risk	Uncertainty
1).....	( )	( )	( )
2).....	( )	( )	( )
3).....	( )	( )	( )
4).....	( )	( )	( )
5).....	( )	( )	( )
6).....	( )	( )	( )

2.5 DECISION MAKING STYLES

Vroom and Yetton have divided decision making process into five styles ranging from totally individualised decision by the manager on one extreme to totally participative decision making styles on the other hand.

AI (Autocratic I): The manager unilaterally makes the decision and his decision is based upon whatever information and facts are available to him.

AII (Autocratic II): The manager makes the decision himself but gets all the information needed personally from his subordinates. The role of the subordinates is input of data only. They do not take any part in the decision making process. They may not even know what the problem is. Even if they know about the problem, they have no input in generating or evaluating alternative solutions.

CI (Consultative I): While in all styles, manager simply gets the information from his subordinates, in CI style, he consults his subordinates who are expected to be involved with the outcome of the decision or who are knowledgeable about certain elements of the problems, individually getting their ideas and suggestions without bringing them together as a group. The decision-making is still up to him. He may or may not take their suggestions into consideration when making the final decision.

CII (Consultative II): In this style of decision making, instead of meeting with the subordinates individually, he meets with them together in a group gathering from them their ideas and suggestions related to the problem. His final decision still may or may not reflect their input.

GII (Group II): This is a participative style of decision making. The problem is shared with the group and solution alternatives are generated and evaluated together. The final solution is decided by the group and such solution is implemented.

There are a number of situational factors that would determine the style to be adopted. Some of these factors are:

i) The extent to which the manager possesses the information and expertise to make a high quality decision.

ii) The extent to which the subordinates have the necessary information to assist in generating a high quality decision.

iii) The extent to which problem is structured.

iv) The probability that a manager's decision will be accepted by the subordinates.

v) The extent to which the subordinates would go to attain organisational goals.

vi) The extent to which acceptance on the part of subordinates is critical to the effective implementation of the decision.

vii) The extent to which the subordinates are likely to disagree over preferred solutions.

2.6 INDIVIDUAL DECISION STYLE: INDIVIDUAL DIFFERENCES IN DECISION MAKING

Some people are primarily concerned with achieving success at any cost, others are more concerned about the effects of their decisions on others. Furthermore, some individuals tend to be more logical and analytic whereas others are more intuitive and creative. The important differences exist in the approaches, decision makers take to problems. There are four major decision styles:

i) **The directive style:** It is characterised by people who prefer simple, clear solutions to problems. Individuals with this style tend to make decisions rapidly because they use little information and do not consider many alternatives. They tend to rely on existing rules to make their decisions and aggressively use their status to achieve results.

ii) **Analytical style:** Individuals with the analytical style tend to be more willing to consider complex solutions based on ambiguous information. People with this style tend to analyse their decision carefully using as much data as possible. Such individuals tend to enjoy solving problems. They want the best possible answers and are willing to use innovative methods to achieve them.

iii) **Conceptual style:** Compared to the directive and analytical styles, people with the conceptual style tend to be more socially oriented in their approach to problems. Their approach is humanistic and artistic. Such individuals tend to consider many broad alternatives when dealing with problems and to solve them creatively. They have a strong future orientation and enjoy initiating new ideas.

iv) **Behavioural style:** Individuals with the behavioural style may be characterised as having a deep concern for the organisations in which they work and the personal development of their coworkers. They are highly supportive of others and very concerned about others' achievements, frequently helping them meet their goals. Such individuals tend to be open to suggestions from others and, therefore, tend to rely on meetings for making decisions.

2.7 WHAT MAKES INDIVIDUAL DECISIONS IMPERFECT?

Framing: Refers to tendency for people to make different decisions based on how problem is presented either in a negative term (leading to risk seeking) or positive term (leading to risk-aversion).

Heuristics: Simple decision rules (rules of thumb) used to make quick decisions about complex problems. The judgements are based on information that is readily available which may or may not be accurate, or by perceiving others in stereotypical way if typical representative appear to be of category to which they belong.

Bias towards favourites: People prefer the implicit favourite option (i.e. preferred alternatives) selected even before all the options have been considered.

Escalation of commitment phenomenon: The tendency for people to continue to support previously unsuccessful course of action.

2.8 WHAT MAKES GROUP DECISION MAKING IMPERFECT ?

Face to face **brainstorming** groups tend to inferior decisions on creative problems. However, when it is done electronically through computer terminals to send messages, the quality of decisions tend to improve.

Group think is a major obstacle to effective group decisions. It refers to tendency for strong conformity pressures within the groups to lead to the breakdown of critical

thinking and to encourage premature acceptance of questionable solutions. Group think can however be improved by promoting open enquiries, using sub-groups, admitting shortcomings, and holding second chance meeting.

2.9 ESSENTIAL VALUES : KEY TO DECISION MAKING

i) **Accountability:** The decision makers should be accountable not only for the decisions made but for how the decisions were arrived at i.e. what data was analysed and which course of action was pursued.

ii) **Adaptability:** This means flexible in considering options, being able to deal with a wide range of people, and having a versatile approach. Care should be taken, however, to avoid being too adaptable i.e. becoming wishy washy or irresolute by spending too much time considering options. The balance should be kept between rigid thinking and ineffective leadership.

iii) **Dependability:** A leader should see that timely decision-making is done without staffinput or shows constant reluctance to take stand.

iv) **Visibility:** Visible leaders are 'present' and in conducting studies they are around to hear cheers and the boos. The leaders visibility does not diminish in critical times.

2.10 GUIDELINES FOR EFFECTIVE DECISION MAKING

Some of the more useful guidelines to make the group decision making more effective are given below:

1) Be sure that the purpose of the group is well defined and clearly understood by all members of the group.

2) Be sure that the group members communicate freely with each other and that everyone understands each others' roles and aspirations.

3) Be sure that the group is representative of those individuals who will either implement the decision or be affected by it.

4) Be sure that the group has access to all the necessary resources of information and other supportive elements so as to reach an efficient and fast conclusion.

5) Be sure that the composition of the group is appropriate so that the members have the necessary skills and expertise in discussing and evaluating the problems at hand.

6) Be sure that each member is committed to the decision made, after all viewpoints have been thoroughly and rationally considered. Even if some members had different viewpoints prior to reaching the decision, the conflict should not be carried over after the decision has been made.

7) Be sure that the group is not dominated by any member including the leader so that all group members are encouraged to give input freely.

8) Be sure that the size of the group is adequate. Too many members would result in excessive waste of time and unnecessary diversification and too few members may not be enough to look at all angles of the problems. Usually, and for most groups, five members are considered to be adequate.

2.11 LET US SUM UP

In this unit, we have tried to assesss the dynamics of decision making. Decision making is a complex process which involves all the skills learnt by you, having gone through the inputs

given in this couse. In this unit we have basically talked about the process of decision making, the decision and its fall outs. All these stages have bearing on each other and are the part of a circle. Towards the end of the unit we have also tried to generate the check-list for effective decision making. We have tried to critically evaluate the pros and cons of the individual and the group decision making. We have concluded this unit with the essential values to be observed while taking a decision and also have developed the guidelines for effective decision making. The activities provided in this unit are particularly very important as they will require application of the knowledge and skills earned out of the unit's content. The activities have been basically drawn out of the day to day experiences in the organisational set up. Hence you should be very particular in attending the activities. There is also another purpose in keeping this unit as the last one, as now on when you take up the cases, at each and every step you would be confronted either by yourself in taking a particular decision or by the decision made by any character in the cases. Sometimes you will also be faced with dilemma of taking one or the other decision. At this juncture you will be rescued by the skills and knowledge gained through this unit.

2.12 FURTHER READINGS

Behling, O., and Schriesheim, C. (1976), *Organisational Behaviour, Theory, Research and Application.* Allyn and Bacon: Boston.

Drucker, Peter F. (1975), *Management Tasks, Responsibilities, Practices.* Allied Publishers: New Delhi.

Janis, I.L. and Mann, L. (1977), *Decision Making: A Psychological Analysis of Conflict, Choice and Commitment.* Free Press: New York.

Koontz, D. and Donnell, C. (1985), *Management: A System and Contingency Analysis of Management Functions,* McGraw-Hill, Kogakusha Limited: Tokyo.

Simon, H.A. (1960), *The New Science of Management Decision,* Harper: New York.

Introduction

You have gone through the unit on Human Resource Development. This unit has provided you with an insight into what is HRD, how it works, what are the mechanisms, instruments and processes. The most important thing in HRD is creating a climate of trust and development, wherein the worker feels secured and motivated to take risk with confidence. Security and motivation tremendously add to the success rate.

In this part of the block, we are giving few cases related to the units in the block. First few cases are related to various concepts/problems of HRD, followed by a few cases in the area of decision making. Sometimes you may feel that the cases given do not directly relate to the units or the topics discussed under the units but it is not so. You will realise going deep into the case/root cause of the problem, that one or the other fundamental aspects of these broad topics do apply in these cases. These concepts/application/practices may sometime form the central problem of the case and sometimes they may be part of the solution to be proposed by some of you. While analyzing these cases you may also refer to the other units/ blocks/concepts/explanations/application/practices etc. and take help thereof in either explaining the problem, developing the alternatives or proposing the remedies. A good case analysis should have the critical view of problem from various angles supported by logical reasoning. As you know in the field of medicine the two cases with the identical problem may be prescribed different treatment, looking at various factors e.g. the health of the patient, the history of the disease, the history of the family of the patient, the habit and immunity level of the patients and so on and so forth. In the same way in management also two similar problems may be solved differently by two different persons. It is, therefore, not likely that any problem should have a standard solution. Anybody may propose any type of solution to the problem. What is important is that how do you reason out or support your solution. It depends on the approach and perception of the problem solver.

It is advised that these cases may be discussed in peer groups for better understanding and analysis. Do write down the analysis of these cases and critically evaluate them in a classroom kind of situations. The objective is to make you aware of the case discussions method of finding solution. You may also take live cases from your day to day working environment and also discuss them in the light of the knowledge you have gained by going through this course.

The basic objective of this part of the block is to make you work and apply the knowledge gained in this course till now in analyzing the cases. Most of the cases being given here have been taken from the medical environment, which relate to your day to day working and the problems faced in administration of health-care institutions. Since most of you are experienced in this area, you have your own perceptions and beliefs which is most likely to affect your analysis of the situation given in the cases. You may certainly draw upon the same to reach the solutions. The solutions proposed by others may be quite different from the one you are prescribing, however, all of them may be taken as practical solutions if supported by sound logic.

CASE 1 : Savitri Trains Dais*

Padampur Block, the tehsil headquarters of Gonda District in Uttar Pradesh, has a population of 1,20,000. The main town has a population of 27,000, and the rest of the population is distributed unevenly in 110 villages. The PHC is located at the block headquarters and has 15 sub-centres. The PHC has three medical officers, three health assistants (F), 15 health workers (F) and other staff.

Mohini is a health assistant (F) posted at the PHC headquarters. She is married and has come from a cadre of lady health visitors. She is considered by her colleagues to be an effective training administrator, and for this reason she is incharge of the dai training programme. She has a good image in the community and the dai training programme has shown remarkable success under her leadership.

The training of dais is conducted by Savitri, a health worker (F), who acts as the chief trainer. She is middle-passed and has three years' experience on the job, but no formal training.

Asha, an illiterate and traditional midwife, is in the final week of dai training. She is married and aged about 50 years.

Asha and Savitri have gone to a village woman Rekha to attend to a normal pre-natal case. This is part of Asha's supervised field training. Mohini, the health assistant (F), happens to be present in the village on a routine supervisory visit, and so she also enters the house of Rekha. At this moment, the case writer arrived, and proceeded to conduct the following interview:

Case Writer: "Smt. Mohini, medical officer PHC tells me you are a good training administrator, and you are organising the training of dais in this block. I presume you have received some guidelines and support for the training from the MO/PHC?"

Mohini: "Sir, I.....(long silence)."

Case Writer: "Do you receive any guidance and support from the medical officers of the PHC?"

Mohini: "Well, Sir, I get some overall guidance from MO/PHC. A meeting on dai training was once held under the chairmanship of MO/PHC. I pointed out the difficulty of conducting the sessions on the varandah and requested a foetal doll and other audio-visual aids. After all, the quality of training depends on all these factors. But nothing tangible.....(another long silence)."

Case Writer: "Smt. Mohini, do you yourself conduct the training of dais?"

Mohini: "No. The training is actually conducted by the health worker (F), Smt. Savitri. She is a good worker. Of course, I plan out the whole programme, and Savitri merely teaches."

Case Writer: (Looking at Smt. Savitri) "Well, Smt. Savitri, as you conduct the training, may I please ask you a few questions? Can you tell me something about the venue and duration of the training and the staff responsible?"

Smt. Savitri: (Looking at Smt. Mohini for a moment) "Sir, the training is conducted at Padampur, the PHC headquarters, and is for four weeks: four days a week in the classroom and two days in the field. Sunday is observed as a holiday. Clinic demonstration is held at the sub-centre, and home visits and supervised delivery are conducted in the field. Smt. Mohini, my supervisor, provides me guidance whenever I am in difficulty.

Case Writer: "But Smt. Savitri, do you have other responsibilities? For example, do you not conduct once a week clinics at your sub-centre?"

Smt. Savitri: (Looking at Smt. Mohini) "Yes, Sir, I always utilise the day for demonstration."

Case Writer: "Have you received any training in how to teach dais/or any kind of training of trainers courses?"

Smt. Savitri: "No. I am not trained. I have learnt by doing. Madam (looking at Smt. Mohini)

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* Roy, Somnath *et al.*, *Case Studies in Health Management*, National Institute of Health and Family Welfare, New Delhi, 1987.

also helps me. Copies of the training guide and handbook of dais are available at the PHC. They are quite useful. I would like to have some training so that I can conduct the training of dais in a more effective manner."

Case Writer: "Where do you hold classes? Do you have some teaching aids and demonstration materials?"

Smt. Savitri: "There is no separate classroom at the PHC. I hold sessions on the verandah, which is partly enclosed by a moveable curtain. But the verandah is also a walkway for patients attending the out-patients clinic. I have a black-board, a few charts, and a dai kit. I am yet to be provided further aids like a foetal doll. As these conditions are not very good for training, I prefer sometimes to organise training at my sub-centre."

Case Writer: "How do you teach the subject areas such as managing normal labour, care of breasts, cutting the cord, etc.? Have you prepared any lesson plans? Tell me some of the methods you use during the training."

Smt. Savitri: (Looking at Smt. Mohini) 'Well, Sir, I discuss the subject area in the classroom and then give actual demonstration at my sub-centre or during home visits. I do not have any lesson plan, but that is a good suggestion. I would like to make lesson plans. Also, I have a mind to use a role-play in future, but as yet I have not felt confident to use a role-play."

Case Writer: "What supplies and equipments do you have? Can you use them for demonstration during the training?"

Smt. Savitri: "Well, Sir, I have been supplied with a dai kit. There is a boiling pan and a stove in working condition, but kerosene is often not available. I have test tubes and spirit lamp, but the re-agents are in short supply. I have a clinical thermometer, but no blood pressure recording apparatus. Of course, an enema bag is there. I have requested MO/PHC through my supervisor for a weighing scale. Whatever is available, Sir, I utilise them for classroom instruction and demonstration."

Case Writer: "What are some of the family planning devices you use for demonstration?"

Smt. Savitri: "Nirodh, oral pills and IUD, I always use, Sir, but I am sorry to say that the foam tablets and the contraceptive jelly are not available."

Case Writer: "Have you received any training in family planning?"

Smt. Savitri: "No, Sir."

Case Writer: (Turning to Asha, the dai undergoing training) "Well, Smt. Asha, tell me, are you confident of handling a normal delivery?"

Smt. Asha: "Well, Sir, I am yet to conduct a normal delivery under the guidance of my supervisor. I also want to know how to follow up a case after delivery."

Case Writer: (With astonishment in his voice) "Have you not covered these things so far? Only three or four days are left for the completion of your training."

Smt. Asha: "Well, Sir, I could not attend the field training for two days as my child was sick."

Case Writer: "Can you tell me, Smt. Asha, what hygienic practices will you use while conducting a delivery?"

Smt. Asha: "I will wash my hands with clean water, boil the equipment and use the mackintosh rubber sheet to conduct the delivery."

Case Writer: "What about washing your hands with soap and water?"

Smt. Asha: "I think that there is no need for soap, so long as I wash my hands with clean water."

Case Writer: "Were you involved during your training in motivating mothers to accept family planning?"

Smt. Asha: Yes, Sir, during the field visit, once I saw Savitri advising mothers to accept a family planning method. But I did not advise them personally. Perhaps that will come later in my training."

Case Writer: (Looking at Smt. Savitri) "Smt. Saviri, what techniques do you adopt to reinforce learning?"

Smt. Savitri: "I usually ask questions during and after the training session. If I have time, I ask for demonstration."

Case Writer: "Do you conduct evaluation?"

Smt. Savitri: "No evaluation is conducted, but I follow-up in the field after training."

Case Writer: (Looking at Asha) "Have you received any stipend?"

Smt. Asha: "No, Sir. I enquired from Savitri, but she told me that it would be available only after the completion of my training. I am worried about the stipend and cannot fully concentrate on my training."

Case Writer: (Looking at Rekha, the mother in whose house all are assembled) "Well, Rekha, are you satisfied with the service rendered by Smt. Asha?"

Smt. Rekha: "Well, Sir, Smt. Asha is a dai of my village. I know she is at present undergoing training at the PHC. I hope she will render better service in future. The other day I had some pain in my abdomen. I called for Smt. Asha, but she was away at the PHC. My neighbour gave me a 'puria' to swallow with water. This relieved my pain immediately."

Questions for Discussion

1) How did Smt. Mohini visualise her role as training administrator for the dai training programme?
2) A principle of management is to delegate responsibility to subordinates whenever possible. Comment on Smt. Mohini's delegation of training responsibilities to Savitri.
3) How do you react to the role played by the MO/PHC?
4) What actions would you take to improve this dai training?
5) How would you convert such opportunities into HRD opportunity to invert the weaknesses into strengths?
6) What kind of HRD intervention would you recommend and introduce for the purpose?

CASE 2 : Dr. Mahajan's Transfer*

It was January 1985. The country was in the midst of an election. The political parties have pressed into service audio-visual media. The place is a big town situated right in the heart of the country. Its location has made it a railway junction of national importance. The election added to its role as a distribution point for political parties. Colourful flags, varied symbols, and big and small processions filled the streets of the town. A section of one procession suddenly turned violent and before the local leaders could pacify their respective groups, one man was stabbed. A group of supporters carried the wounded man to a nearby government dispensary.

The dispensary is poorly equipped, and the general mismanagement of the dispensary is suddenly and unexpectedly thrown open to critical political eyes. The crowd immediately turns the situation into a very rewarding issue against the ruling party. Slogans are raised, denouncing the government and the absence of the doctor, Dr. Mahajan (The doctor had left the dispensary after a full day's work).

The opposition leaders decided not to waste this rare opportunity to embarass the government, and they quickly formed a procession and marched toward the main market street of the town. Only four days remained before the balloting was to begin. Partly real, but mostly imaginary, deficiencies of the government dispensary now became a vital issue in the election battle. The dispensary was suddenly in the centre of the election campaign.

Meanwhile at the dispensary, Dr. Mahajan treated the wounded political party worker. He remained with the patient for the whole night, but early in the morning he left for home. The local political boss, before starting the election round for the day, visited the dispensary. He found the condition of the party worker very critical. Dr. Mahajan was summoned, but before he could reach the dispensary, the patient died. The death further infuriated the political party workers. The news spread like wild fire throughout the district. The local press, as is expected during election time, gave full exposure to the charge and carried details of views that the political party worker in the government dispensary had been neglected and allowed to die unattended.

The press reports and rumours greatly unnerved the otherwise composed Chief Medical Officer (CMO) of the district. Being an experienced and seasoned administrator, he at once realised the possible serious implications of the whole situation. In normal times he would have allowed such a situation to cool off. But during the election time this approach could prove quite costly. He got completely carried away by the newspaper account of the incident. He did not wait for any official report or message from Dr. Mahajan. His immediate response was to rush to the scene. As soon as he entered the town he was completely overpowered by the agitated crowds. Rather than going to the dispensary and finding out at first hand what had happened, he instead went to the party office. The party boss could not be satisfied with anything less than suspension and dismissal of the doctor. The CMO immediately called for Dr. Mahajan and on the spot ordered his transfer to the District Office.

This transfer was affected in spite of the fact that Dr. Mahajan was dutiful on the day of the incident, attended the patient personally throughout the night, and hastened to the dispensary in the morning when told of the critical condition of the patient. Even otherwise, he seemed to be quite acceptable to the local population as evidenced by the fact that he has been serving for the last five years in this town, and there had been no complaint against him.

Dr. Mahajan was shocked on getting the transfer order. A stream of questions rushed one after another through his mind. Is this the reward of good service? Is it not my humiliation before the public? Why is the CMO playing sweet to the political boss at the cost of a good doctor? Is it not necessary for the CMO to know the facts at first hand in the dispensary? Why did the CMO not give me a chance to explain the situation? Finding no satisfactory answers, Dr. Mahajan felt very much demoralised and confused. However, he said nothing and accepted the transfer to the District Office.

The transfer pacified the local political boss, and gave a sense of pride and achievement to the political party which used the instantaneous transfer as evidence of its strength and power. In the four days remaining until the voting, the CMO feared similar violence and,

* Roy, Somnath *et al.*, *Case Studies in Health Management*, National Institute of Health and Family Welfare, New Delhi: 1987.

therefore, could not leave the dispensary without a doctor in-charge in case another political party worker was injured and needed treatment. There were two other doctors in the dispensary in addition to the one (Dr. Mahajan) already transferred. The CMO had to put one doctor as in-charge of the dispensary before returning to district headquarters. Instead of appointing one of the two local doctors, he decided to bring in an outside doctor from the District Headquarters. He thought of three possible candidates, but as he had no strong personal knowledge of any of the three doctors, he could not choose one from amongst them. He shared his predicament with a Multipurpose Worker (MPW), who suggested the name of Dr. Puri. The CMO immediately wrote a transfer order of Dr. Puri, and then sent the MPW in his jeep to District Headquarters to bring Dr. Puri immediately for taking charge of the dispensary.

When the jeep arrived at District Headquarters, all the three candidates happened to be present, and they were surprised at Dr. Puri's sudden promotion. The two senior doctors could not understand why Dr. Puri, who was junior to them, had been given this promotion. According to accepted norms, one of the senior doctors should have received this promotion. However, this could not be discussed as the MPW had instructions to bring Dr. Puri immediately to take charge of the dispensary.

When Dr. Puri, accompanied by the CMO, arrived at the dispensary to take charge, the two local doctors were also surprised and upset. The senior most doctor of the two thought that he was being deprived of his rightful claim. He even tried to bring up the issue with the CMO, who quickly and sternly brushed it aside. The CMO left the town after he had installed Dr. Puri as in-charge of the dispensary. While leaving he wished Dr. Puri success in handling very difficult situations.

The departure of the CMO meant the beginning of problems for Dr. Puri. His subordinate doctors, as might be expected, not only refused to cooperate but tried to create problems for Dr. Puri by encouraging other dispensary staff not to cooperate with him. As luck would have had it, there happened to be a compounder in the dispensary who belonged to the same village where the parents of Mrs. Puri lived. Making use of this informal relationship, Dr. Puri requested and readily got full cooperation from the compounder, and also from one of the Ayas of the dispensary who was friendly with the compounder. The three of them worked overtime and somehow were able to pass peacefully the election phase.

After the election, Dr. Puri, who was considered an unlawful claimant of the position by the other doctors, started using his authority to streamline the services at the dispensary and enforcing discipline among the dispensary and medical and para-medical staff. While he got good cooperation from the para-medical workers, he faced problems with his doctor colleagues. The dispensary became a 'divided house' providing poorer and poorer services to the people. The disgruntled doctors at the dispensary floated rumours about mismanagement in the dispensary and misuse of drugs and medicines. It became accepted in the minds of many local people that Dr. Puri was using drugs supplied by the government for patients in his private clinic.

While this was happening in the town, Dr. Puri also faced problems at District Headquarters, where Dr. Mahajan agitated against him. Dr. Mahajan was determined to get back as in-charge of the dispensary and built up pressure on the CMO using his contacts with local leaders for undoing his transfer. In summary doctors at the dispensary and at the District Office teamed up against Dr. Puri. They were convinced that the transfer was a wrong decision of the CMO and were determined to get it reversed.

Once again, the CMO gave into pressure after several representations to higher authorities at the State level. In order to save himself from the wrath of the State authorities and non-cooperation from his medical officers, he decided to reverse his ordres. After all, the election was finished and the crisis of the dispensary was over.

The CMO waited for about two months until the popularly known 'mass transfer season' arrived. This usually happened in the months of April-May in all State departments, including the health department. He made use of this opportunity and transferred Dr. Puri back to the District Office and reposted Dr. Mahajan at the dispensary. On receiving the unexpected transfer order, Dr. Puri was utterly surprised and dismayed. He realised that the CMO had played a game with him and in the process had earned him several enemies in the department. He felt angry, because he had saved the CMO in a crisis situation, and now the CMO did not care for his reputation and career.

Questions for Discussion

1) How far do you agree or disagree with the decision of the CMO and why?
2) Imagine yourself to be Dr. Puri. How would you go about winning the cooperation of the medical and para-medical staff in favour of the decision?
3) List out at least three different ways in which this decision will adversely affect the delivery of health services.
4) How would you describe the management style of the CMO?
5) Imagine yourself to be Dr. Mahajan. How would you have reacted to the decision of transfer to the District Office?
6) How do you feel the decision making under political pressure will affect the climate of the organisation?

CASE 3 : A Quest for Pragmatism *

This is the true story of Dr Sathyan, a Senior Professor of a Medical College in South India. He is a super-specialist and is one of the renowned experts in his field all over India. As a student he had excellent reputation among his classmates and teachers. He was also a well-known sportsman and represented his College, his University and State in sports events for several years. His parents also stemmed from the upper middle-class strata of the society.

We see Dr Sathyan, an energetic and enthusiastic young man of very high personal objectives of academic recognition and expertise, as he enters the services of his State in a Medical College as a member of faculty. He was quite aware of the image of the medical profession and felt uneasy about the reputation several doctors have in matters related to private practice. So he had taken a decision that he would as much as possible get out of the rut that many of his colleagues and teachers have fallen into. Even though, in his opinion, there was nothing wrong in accepting consultation fee for practice undertaken at his home, he felt that this would end up in his being forced to receive money by patients or their relatives in anticipation of special personal care in the hospital. Dr Sathyan tried his level best to live up to his convictions and resisted every instance where he would be trapped in matters related to special patient care. So whenever patients admitted to the hospital or their relatives approach him with money, he used to scold them severly and ask them to leave his house without wasting any time. But then the reaction that he has seen with the people who approached him with money made him think that they had a feeling that he was unwilling to understand problems and their attitudes in connection with the sickness of their dear ones. So Dr Sathyan decided to mellow down by trying to give them opportunity to speak to him and he tried to patiently listen to them and try to convince them that he would not receive any money from them and that he would ask them to take the money back and spend it on more useful things. He also made sure to reassure the patients and their relatives that his attitude towards the money they pay will in no means affect the way by which he will treat the patients.

Once Dr Sathyan explained his problems in accepting money to a by-stander at his home. The by-stander seem to have taken it in good spirit and left his home. This made Dr Sathyan very happy. But within about one and half hours, the man came back with a small bag full of coconuts and a bunch of bananas which might cost Rs 50/-. Now Dr Sathyan was in a dilemma because he thought if he asked the man to take it away, that man would have the problem of selling it and recovering the money. Dr Sathyan also felt that had he accepted Rs 25/- (normal consultation fee at that time), the man would not have gone to buy things worth Rs 50/- and thus he had only made the man spend double the money that he would pay the doctor initially. So Dr Sathyan had no other way but to accept the bag of coconuts and bananas on humanitarian grounds.

Similar experiences made Dr Sathyan wonder whether he was doing the right thing in allowing the patients or by-standers to meet him at his home. So he decided to ask a few of his close friends about the way they were feeling about private practice and also whether he was reaching any where with his principles regarding not acccepting money. He got a lot of advice from his colleagues and thus Dr Sathyan was willing to give a second look at his own principles and practices.

Once a by-stander of one of his patients came to his house and explained all the problems of his relative (the patient), to which Dr Sathyan gave patient hearing. At the end of the conversation he offered Dr Sathyan an envelope. Immediately Dr Sathyan told him: "Will you please do me a favour? I will be extremely happy if you will do it for me".

By-stander: "Doctor, I will only be happy to do anything for you, anything under the sun".

Dr Sathyan: "What I want is that as I put this envelope in your pocket, I want you to turn around and walk out of my house without uttering another word".

The shocked by-stander suddenty burst into tears. Dr Sathyan had to watch this unpleasant scene and had to console the man. He said to himself: "Here I am trying to behave as my close friend advised me. I am only paining my clients more and it is paining me also. Sadly I am not successful either".

* Philip, Oommen, *Management of Hospitals : Text and Cases*, Institute of Management in Government, Trivandrum, 1990.

At this point, Dr Sathyan felt like adopting an advice given to him by another friend. The advice of his friend was for Dr Sathyan to decide to receive money from those who can afford it. In other words, if the patient who offers money is a poor person, he will not accept the money. So when a close relative of a rich patient came to Dr Sathyan's house, one evening with an envelope, he told him that he would accept the money in it if it would in any way comfort the visitor and the patient and that his acceptance of the money would by no way mean that the patient would receive any added benefit in the hospital. The patient would be taken care of like any other patient, with as much effficiency as possible. With this clear understanding, Dr Sathyan accepted the money. As soon as the envelope was placed on the doctor's table, the by-stander said: "Sir, if you will kindly telephone the Blood Bank tomorrow and ask them to issue blood from the Blood Bank, I don't have to donate for which I need to find a donor". At this point, Dr Sathyan got furious and he took the envelope and threw it on the face of the by-stander and asked him to get out of his house.

As years went by, Dr Sathyan was slowly learning a big lesson that none of his sincere efforts could save him from accepting money from relatives of patients and that it was a part of the prevailing culture, for which probably his own profession was responsible.

As Dr Sathyan became a consultant and started receiving reference from other doctors, he started receiving consultation fee. This was done without much hesitation because the Government has allowed consultation at homes. But even in such circumstances, Dr Sathyan faced problems in that once a patient who came to his house for consultation later came up for surgery in the hospital. A day before his admission the patient came to Dr Sathyan's house to remind him that he was going to be admitted on the next day and that he may kindly see him in the hospital. As the patient was leaving his consultation room at home, he left an envelope on the doctor's desk. Dr Sathyan was wondering whether this envelope was to be considered as consultation fee for the examination of the patient at home or bribery for taking care of him properly in the hospital.

Once an emergency case was referred to Dr Sathyan. As the reference was in his name, the patient came to see him at his home. It was evident that the patient has to be operated upon within a couple of days. He also left an envelope which could have been either for consultation at home or as a bribery for the surgery to be conducted shortly. Dr Sathyan was again confused. He would not accept the envelope nor could he reject it.

Once a referral case of emergency came to Dr Sathyan at his home while he was away. The patient straight away went to the hospital and saw the duty doctor and got himself temporarily admitted. The next day he came to Dr Sathyan's consulting room, with the reference letter and, of course, an envelope. Dr Sathyan was again agitated as to whether the envelope the patient gave him contained consultation fee or bribery.

As years went by, his experience helped Dr Sathyan's conscience grew harder and he didn't seem to bother whether any envelope given to him was consultation fee or bribery. He still doesn't want to accept bribery, but he has no way of discerning whether the money he receives is consultation fee or bribery.

Questions for Discussion

1) What is the conflict Dr Sathyan is facing regarding consultation fee? Critically evaluate.
2) Is it right to justify the confusion in Dr Sathyan's mind regarding consultation fee?
3) If you were Dr Sathyan, what would have been your way of looking at the problem and the solution thereof?
4) Does Dr Sathyan need any counselling or any other intervention to come out clear of his conscience?
5) Would you suggest any systemic improvement in the organisation so that any other doctor may make his/her decision without bothering his/her conscience?

CASE 4 : Learn a Lesson from me *

"I have been working in the Medical College Hospitals for the last 15 years as a doctor, and have come to the conclusion that if I am conscientious and honest, I would not be in a position to judiciously discharge my duties."

"A good example is the case of admissions, that too in the Casualty Department. There, even for minor ailments, people expect admission and treatment as in-patients, and the moment one refuses to admit them, he becomes public enemy number one. He is also accused of non-admittal due to non-payment of bribery. It is interesting to see how I learned my good lessons."

"While I was working in the Casualty Department at Medical College Hospital, Trivandrum as second-on-call, on one afternoon after attending to a serious accident case, I was confronted by a lady of about 72 years old. She had a minor head injury. In my judgement, she needed only simple dressing, and so I instructed the staff to give her dressing, and she had gone from the Casualty. About half-an-hour later, I was confronted by a middle aged man with a complaint that I had not admitted his mother who had a serious head injury. Amidst his shouts, I tried in vain to explain to him the situation. He soon left the Casualty Department warning me of the consequence."

"In about ten minutes, a small procession of about ten khaki-clad men came to the front entrance of the Casualty shouting slogans and abusing the doctor for partiality and bribery. The procession dispersed itself in a few minutes. And we thought the trouble for the day was over."

"Exactly half an hour later, the Hospital Superintendent came to the clinic where I was attending to emergency services and called me out. We moved to another room where he told me that the Minister of Health had received a serious complaint through the local MLA and some union leaders of KSRTC (Kerala State Road Transport Corporation). Then only I realised that the man who threatened me was a staff of KSRTC and that the woman with the head injury was his mother."

"Subsequently I was put under suspension. A detailed enquiry was conducted and finally I was acquitted of all charges."

"I had another experience when I was working in the Casualty Department of Medical College Hospital, Kottayam. While I was busy with emergency services on one afternoon, a middle-aged man approached me with a cold and cough. After preliminary examination, I prescribed some cough syrup, and told the patient to visit the Out-patient department the next day. The man got really furious and started shouting at me. He loudly asked me whether I was not admitting him because he didn't give me money. He went away without the prescription and we never saw him again."

"Slowly I was learning my lessons. Now-a-days, when patients come to me, I try my best to admit them irrespective of the fact that they don't need admission and that there are tremendous lack of facilities to accommodate even emergency cases."

"Recently, while working in the Casualty Department of Medical College Hospital, Calicut, I admitted a man who came with a complaint of cold and cough. I had examined his lower and upper respiratory system. He seemed to be happy that I had used my stethoscope sparingly on him. While admitting him, I also instructed that his blood be examined, and that he be given a bottle of glucose, and that he may be administered with penicillin injection for five days. He was discharged after five days."

"You may probably think that my attitude to my profession is very bad. But I have learned from experience that nobody will protect me, so I should protect myself. Now that I have learned by big lessons, and that I know how to play games, I am enjoying my job a lot better and my tension and frustrations have diminished considerably, and that my patients seem to be enjoying me very much."

Questions for Discussion

1) Is this doctor justified in having a negative attitude to work? Why or why not?

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* Philip, Oommen, *Management of Hospitals : Text and Cases*, Institute of Management in Government, Trivandrum, 1990.

2) How could this doctor have avoided the situation to deteriorate to this level?

3) What policy should the hospitals adopt so that the employees will not degenerate and that their attitude will not degenerate and that their attitude will not be negative?

4) What kind of training programme or HRD intervention would you like to suggest for this organisation to improve and revive attitudinal problem?

5) In your opinion what is the root cause of such negative attitude to work of the doctor? Do you think the organisational climate is responsible? Critically evaluate.

CASE 5 : The Boomeranged Medical Certificate *

April 1st is universally "celebrated" as All Fools Day. It is only coincidental that many are meaningfully fooled by the turn of events of the day. Such an incident took place at General Hospital, Ernakulam, in 1983.

Dr Chandra Kumar, the senior physician was taking his wards rounds in the morning. As he was moving from bed to bed at about 9.30 am, one of his nursing assistants told him that a doctor from the Taluk Headquarters Hospital, North Parur, was waiting to see him urgently. Dr Chandra Kumar completed his examination of the particular patient he had started examining, and excused himself from the ward to see the visitor. He went to the side room of the ward where Dr Suresh from the Taluk Headquarters Hospital, North Parur was waiting anxiously to see him. Dr Suresh was not previously known to Dr Chandra Kumar. So he introduced himself and said "Well Doctor, what can I do for you? You seem to be very much agitated".

He said "Sir, I have got a very serious problem only you can help me. Please do something to save me".

"Well, Dr Suresh, what is the problem? Let me see whether I can help".

Then Dr Suresh started narrating his problem. Dr Suresh has been working at the Taluk Headquarters Hospital, North Parur as an Assistant Surgeon for the last three years. He had developed for himself a good image within a short period in and around the hospital. He also has a fairly good-size private practice.

One day one of his hospital attenders, Smt. Sulochana, 45 years old, came to him and asked him to help her to secure a transfer to a Primary Health Centre near her home at Cherai, where she will have much lighter workload and no night duty. In order for her to get such a transfer, she requested a medical certificate saying that she has chronic rheumatic problem and that it was difficult for her to walk around and do her work. Smt. Sulochana presented her case in a touching manner to Dr Suresh. Dr Suresh felt sympathetic towards her and felt it his responsibility to oblige the hospital staff wherever possible. So within a few days, after careful thinking, he gave her a medical certificate stating that Smt. Sulochana is a chronically rheumatic patient and that because of her illness she cannot do any manual work and cannot walk properly.

This was written even when Smt. Sulochana was healthy and had never suffered from rheumatism. Dr Suresh gave the certificate in good faith, feeling that he had helped one of his subordinates and forgot about this whole episode until the present problem crept in.

Smt. Sulochana got a mercy petition written on her behalf by the Lay Secretary which she sent to the Honourable Minister of Health, enclosing the medical certificate (through proper channel), requesting for a transfer to the Primary Health Centre, Cherai, which was very close to her home. When the file reached the Honourable Minister of Health with comments from the Health Secretary, the Minister himself wrote the order on her application which reads as follows:

"The medical board constituted by the District Medical Officer of Health (DMOH), Ernakulam will examine Smt. Sulochana within 48 hours and if the medical certificate is correct, the services of Smt. Sulochana may be terminated on medical grounds. If the medical certificate is false, disciplinary action may be taken against the Doctor who had issued the false medical certificate."

Unfortunately, the comments from the Minister came two days ago and that the emergency meeting of the Medical Board was fixed for the 1st April. The membership of the board included Dr Chandra Kumar and two other doctors from the District Hospital, Ernakulam, with the DMOH as the Chairman.

As they were still talking, Smt. Sulochana also appeared at the door of the side room, introduced herself and started sobbing and petitioning to Dr Chandra Kumar to save her. Dr Suresh and Smt. Sulochana had already seen another member of the Medical Board. They wanted Dr Chandra Kumar also to help them to get out of this extremely difficult situation.

* Philip, Oommen, *Management of Hospitals : Text and Cases*, Institute of Management in Government, Trivandrum, 1990.

The problem before the Medical Board was a difficult one. If the Board concludes, as can only happen, that Smt. Sulochana does not suffer from rheumatism, the medical certificate will prove itself to be false and that disciplinary action will have to be taken against one of their junior colleagues, Dr Suresh. If the Board concludes that Smt. Sulochana is actually suffering from rheumatism, in order to save one of their colleagues, the poor Smt. Sulochana will lose her job.

Smt. Sulochana pleadingly told Dr Chandra Kumar that she only wanted a transfer and she never thought that such an action would cause so much of a problem. She said "Sir, please help me somehow. If I lose my job, my whole family including my disabled husband will starve because we have no other income". At the same time Dr Suresh said, "Sir, please do something to get me out of this trouble, as I did this in good faith and only wanted to help the poor woman, out of nobility and sympathy".

Another problem that the Medical Board faced was that if both of these people were not helped, the Unions will trouble them as both were members of strong Unions in the Health Services. Dr Chandra Kumar was in a dilemma. He got really confused and was wondering as to what to do. Anyway he told Smt. Sulochana and Dr Suresh that he would look into the matter, study the files and see what he could do in cooperation with his senior colleagues in the Medical Board.

Questions for Discussion

1) What is the problem in the case, explain?
2) Since Dr Chandra Kumar knows the case, what are the alternatives available with him?
3) If you were Dr Chandra Kumar or a member of the board, what decision would you have taken and why?
4) Do you think the HRD policy of the organisation is responsible for such a situation? Would you recommend any change or intervention in the policy to help out both Dr Suresh and Smt. Sulochana?

CASE 6 : Whither Practical Training *

Teaching Hospitals are especially meant to provide practical training to medical and paramedical students. The clear understanding between trainers, trainees, other functionaries, patients and by-standers in a teaching hospital is that patients will be subjected to examination and treatment by various levels and types of medical and paramedical students along with staff. The trainers normally help, guide, counsel, correct, monitor and evaluate students as they acquire practical training in the teaching hospitals. But all concerned are probably not adequately aware of the attitude of patients, by-standers and the trainers about the viability of subjecting oneself, one's relatives or one's patients to semi-trained or partially trained students no matter which category they belong to.

For the nursing students of the Nursing College attached to the Medical College, Calicut, there are a lot of interesting experiences in this regard. They seem to feel that they are attached to their supervisors and are basically loyal to them only. They are alleged not to have adequate loyalty to the ward sisters or the hospital in which they are getting their training. They generally feel that they are ignored by the medical and paramedical staff of the hospital and that they are often found fault with by other functionaries for what they are or they are not responsible for. They usually feel that they are second class citizens in the hospital.

On other hand, the medical and paramedical staff have the feeling that the nursing students do not take their practical training very seriously and that they show only loyalty to their College and not to the hospital.

There have been arguments and counter-arguments by the college staff and the hospital staff about the ineffectiveness of practical training for nursing students. But, Professor Sulochana was not willing to stay in either of these groups to accuse anybody for any lapse of any sort. She has been very conscientious and devoted and always wanted to make sure that her nursing students are adequately trained to take up the challenges of any hospital floor any where in the world.

One of Professor Sulochana's students, by the name of Sujatha, a second year BSc Nursing student was posted to ward number 5 of the Medical College Hospital, Calicut. As part of her practical training, at that time while working in ward number 5, she was attending to a patient by the name Soman, 52 years old, among many other patients (Soman had undergone an exploratory laparotomy for acute abdomen). Sujatha had already got adequate exposure, during her first year of studies, in fundamental nursing procedures and need-based care. She has also been exposed to pre and post-operative care of patients with abdominal surgery during the beginning of the second year. Thus Sujatha was expected to and was technically capable of providing total patient care to Soman on the basis of her own assessment of the patient's needs.

Soman was admitted a few days ago and Sujatha had the opportunity to look after him during the pre-operative period, on the day of the operation and the first post-operative day, providing necessary nursing services like administering prescribed drugs, injections, intra-venous fluids, maintaining fluid intake and output etc. She has also helped him with movements/exercises for limbs and post-operative breathing exercises, to prevent complications like phlebitis and hypostatic pneumonia, apart from attending to the hygienic and comfort needs of the patient. These were planned and undertaken in consultation with the ward sisters and also Professor Sulochana who was her supervisor.

On the second post-operative day, at about 8.30 am, Sujatha took her rounds and came to Soman's bed. She realised that the intravenous drip was removed and kept aside the patient. She took care of some of the hygiene needs of the patient. After attending to the hygiene needs and making the patient comfortable, she took the vital statistics and recorded those, to be normal. The patient was cheerful and making progress, the by-standers were observed to have been happy with the progress made by the patient and the care Sujatha was imparting.

When Sujatha looked into the case sheet she found that the intravenous drip for Soman had to be continued. She immediately came to the ward sister's room where Professor Sulochana and the ward sister were chatting. Immediately Sujatha consulted the need for continuing the intravenous drip and went back to the patient with a new drip set. Professor

* Philip, Oommen, *Management of Hospitals : Text and Cases*, Institute of Management in Government, Trivandrum, 1990.

Sulochana walked with her to the patient and helped her in starting the drip. As she was piercing the patient to introduce the needle for the drip, there came a loud voice from behind:

"Sister, I don't want this student to give intravenous drip for my patient".

Professor Sulochana and Sujatha got startled for a second, and lifted their head to find that the Professor and Head of the Department of Gastroenterology was standing at the front of the bed. The shocked and fearful Sujatha just could not be successful in peircing the patient properly for the drip. As the student nurse wanted assurance and support, Professor Sulochana took over the needle and started the drip. In the meanwhile, the Professor and Head of the Department (Dr Narayanan Kutty) was fuming and grumbling. He was even shouting at Professor Sulochana. He also called the ward sister and shouted at her, but the ward sister replied nothing. In the meanwhile, Professor Sulochana completed the work of the drip and turned to Dr Narayanan Kutty and said: "Sir, our students practice these procedures only in the presence of the supervisors and also after consultation with the ward sister. As you can see, I am standing here and helping her".

Dr Narayanan Kutty: (furious) "I asked you not to do it. I don't want students to practice on my patients".

In the meanwhile, a few undergraduate students, registrars and post graduate students assembled there.

Professor Sulochana: "Sir, this is a teaching hospital, and if the students are not allowed to practise, how can they learn and gain confidence in these techniques? But they practice only in the presence of the supervisor".

Dr Narayanan Kutty: "Madam, you think I will allow a surgeon trainee (postgraduate) to do a Gastrectomy in my presence simply because this is a teaching hospital? Don't you try to argue your case with me. I will not allow you or your students to practice on my patients".

Professor Sulochana: "Sir, would you please give me one good reason for it. In my opinion this patient is making tremendous improvement and we are giving him great care and the by-standers and the patient have not so far complained".

Dr Narayanan Kutty: "I don't want to talk to you any more nor do I want to listen to you".

Dr Narayanan Kutty turned to the ward sister and said: "Sister, I don't want the nursing students to practice on my patients, you understand".

The ward sister shook her head in the affirmative.

This has created quite a scene in the ward. The patient and the relatives didn't know how to react. In fact, they seem to have felt sorry for this nursing student who looked after the patient for the last few days. The Medical students who assembled there with Dr Narayanan Kutty also could not respond.

The nursing students felt thoroughly humiliated and frustrated. As they were prevented from practice and they are rebuked in front of other professionals, they immediately left their work and gathered in the duty room with a feeling of guilt and shame. They asked for permission to leave the hospital, and requested that they be posted in another ward.

Questions for Discussion

1) Evaluate the role played by Dr Narayanan Kutty, Professor Sulochana and Sujatha in this case.
2) Is Dr Narayanan Kutty right in asking that nursing students be kept out from practising on patients?
3) How does this incident affect the image of the Professionals among the patients and by-standers in the Medical College Hospital, Calicut?
4) How would you handle this conflicitng situation, as an administrator of the hospital?
5) Do you think the system is not in place in the hospital and it needs proper restructuring? Explain why.
6) Is this the right kind of training environment for overall development of human resources?
7) Would such incidents affect the morale and motivation of trainees and will lead to not-so-sound decision-making?

CASE 7 : The Maulavi Supports Family Planning *

The Primary Health Centre Sultanpur had Dr Swarup as Medical Officer in-charge, Sri Avtar Singh as Block Extension Educator (BEE), four Lady Health Visitors (LHVs), ten Auxiliary Nurse Midwives (ANMs) and 14 Male Health Workers. Dr Swarup was worried because he was falling behind the target of sterilizations fixed for his PHC. He called a meeting of his staff to review progress of family planning target achievement. The meeting was organised to identify workers and villages giving very poor response. Dr Swarup wanted to make use of suggestions by his staff for improving the performance of villages with poor response.

In this meeting concern was expressed because in the past eight months the relatively big village of Sultanpur had no case of sterilization. Transferring another male health worker to Sultanpur village was one of the several suggestions made at the meeting. Dr Swarup considered all the suggestions and decided in favour of transferring an additional health worker. He presented this decision of transfer in the form of a challenge, which motivated several good male health workers to volunteer for the transfer.

The BEE explained in the meeting that Sultanpur village was mostly populated by Muslims, and one of the reasons for the poor performance was the fact that Muslims as a group were not coming forward to accept the family planning programme. After further discussion, Dr Swarup selected one male health worker, Mr Rajababu, who had excellent family planning performance records in the past several years, as the new health worker for Sultanpur. Mr Rajababu was given the transfer order at the end of the meeting.

Next week Mr Rajababu with his family and all their belongings shifted to Sultanpur. The village was fairly big with a population of about 5000 people. Roughly 95 per cent of the population were Muslim. Illiteracy in the village was very high. A large majority of the population worked as poor agricultural labourers. There was a big, important Jama Masjid in the centre of the village. The maulavi of this masjid, Mr Farooqi, was a highly respected person in the village and several other neighbouring villages. The Jama Masjid and its maulavi dominated the happenings within the village. The maulavi also ran a Madrasa for village children, and practically every family sent their children to this school. In case of severe illness or misfortune, Mr Farooqi was invariably consulted and approached for his blessings. In all important matters such as births, deaths, marriages and divorces people sought his advice. He was invariably involved in all major decisions in the village.

Mr Rajababu decided, on the basis of past experience, that the only way he could make family planning services available to the community was through their recognised leader, Mr Farooqi. He also knew that success depended on giving highest regards and respects to the religious values of the population. Therefore, one of the first things he did was to contact Mr Farooqi, introduce himself and explain the type of health services he can give to the village. He explained that his programme gave special emphasis to the health of women and children. He assured Mr Farooqi that before doing anything in the village, he would ask his approval and also his involvement. Mr Rajababu also shared his concern about the poverty and very poor health of mothers and children in some families. The mention of children touched a sympathetic cord in the heart of Mr Farooqi. Very recently, several children of the village had suffered a heavy attack of diarrhoea and measles. Some children had even died. But Mr Farooqi asked how a male can work among the women and children. Mr Rajababu assured him that a clinic for mothers and children could be organised with the assistance of a lady health worker. After more discussion, it was agreed to begin such a clinic on a weekly basis.

The weekly clinic soon became popular. Acceptance of the EPI programme was quick, because of the recent sad experiences with the epidemic of diarrhoea and measles. Mr Farooqi and Mr Rajababu developed mutual respect and confidence. One day Mr Farooqi asked Mr Rajababu about the possibility of posting a female health worker permanently at the clinic. Mr Rajababu took Mr Farooqi to Dr Swarup, and in the course of their discussion, Dr Swarup agreed to keep a lady health worker permanently at the clinic and make it a health sub-centre. During the inauguration of the sub-centre, Mr Farooqi was given the place of honour on the dias. On that day Mr Rajababu distributed free literature to

* Roy, Somnath *et al.*, *Case Studies in Health Management*, National Institute of Health and Family Welfare, New Delhi: 1987.

the guests explaining about the maternal and child health programme, including the need to space children for better health of both mothers and children. He distributed the literature quietly and the guests were allowed to carry home any booklet they wanted.

One evening, about a week after the opening of the sub-centre, Mr Rajababu was surprised to find Mr Farooqi coming to his home. Mr Rajababu welcomed Mr Farooqi warmly in his home, and then took the initiative of talking about how family planning was necessary for the health and economic welfare of the families in the village. He specifically referred to poor families with a large number of children and their pitiable condition. He mentioned about the family planning services that could be made available at the sub-centre, and encouraged Mr Farooqi to talk about family planning with people in the village. Mr Rajababu also gave examples of other villages where family planning was being accepted by people of all religions, castes and economic groups.

About a month after the discussion, Mr Farooqi agreed that this sub-centre could give family planning services to women who needed it. He gave his permission only after Mr Rajababu assured him that there would be no unusual propaganda.

Questions for Discussion

1) How does leadership make a difference, in deciding right or wrong for a group?
2) How do you see the role of Dr Swarup?
3) What differences do you find in the leadership of Mr Farooqi and Mr Rajababu?
4) Does effective leadership and decision making lead to higher motivation?
5) From a management point of view, what are the advantages and disadvantages of working through traditional leaders such as Mr Farooqi?

NOTES

UNIT 1 ACCOUNTING CONCEPTS AND APPLICATION

Structure

1.0 OBJECTIVES

After going through this unit you should be able to:

- describe the process of accounting;
- explain the objectives of financial reporting;
- explain and apply the basic concepts of accounting in your health system; and
- distinguish between the types of accounts and their applications.

1.1 INTRODUCTION

It is somewhat unusual to begin a text on Financial Management with a discussion of Accounting principles and concepts and one may ask "Why do so here?" The answer quite simply, is that if hospital managers are to understand the value of financial management for improved hospital operations and feel comfortable in its use, they must have a full understanding of the financial workings of the hospital. The best way to obtain such an

understanding is to begin with a review of the definition of Accounting, the objectives of financial reporting and the related Accounting concepts and conventions. An understanding of these is critical to the knowledgeable use of financial data, for they determine the nature and character of the financial information that hospital managers receive. Therefore, if managers are to be able to understand, evaluate property and utilise financial data. They must first understand the objectives that guide the collection and presentation of these data.

1.2 WHAT IS ACCOUNTING

Accounting is often called the language of business. The basic function of any language is to serve as a means of communication. In this context, the purpose of Accounting is to communicate or report the results of business operations and its various aspects. Accounting has been variously defined and one commonly accepted definition is "Accounting is the art of recording, classifying and summarising in a significant manner and in terms of money, transactions and events which are in part at least, of financial character and interpreting the results thereof."

Another less restrictive definition is "Accounting is the process of identifying, measuring and communicating economic information to permit informed judgements and decisions by the uses of information."

1.3 ACCOUNTING PROCESS

The process of Accounting involves the following steps:

a) Data creation and collection which provide the raw material for Accounting. The data collected is 'historic' is the sense that it refers to events that have already taken place.

b) Recording of data, which is done in accordance with the laid down concepts and conventions of Accounting as stated later in this unit. A large number of transactions or events have to be entered in the books of original entry (journals and ledgers.) The recording and processing of information usually accounts for a substantial part of total accounting work. The processing methods employed for recording may be manual, mechanical or electronic computer are generally taking to the primary method of recording and processing.

c) Data evaluation is regarded as the most important activity in Accounting these days. Evaluation of data includes controlling the hospital activities with the help of budgets and standard costs, analysing the flow of funds and analysing the accounting information for decision making purposes by choosing among alternative courses of action. The analytical and interpretation work of Accounting may be for internal or external use and may range from snap answers to elaborate reports. Data evaluation has another dimension and can be known as auditor work which focuses on verification of transactions as entered in the books of Account and authentication of financial statements. Auditing will be discussed separately as a different unit in this block.

d) Data reporting consists of two parts–external and internal. External reporting refers to the communication of financial information viz. earnings financial and funds position about the hospital to outside parties i.e. trustees, Government agencies and regulatory bodies. Internal reporting is concerned with the communication of results of financial analysis and evaluation to hospital management committee for decision making purposes.

1.4 OBJECTIVES OF FINANCIAL REPORTING

The objectives of financial reporting are as follows:

a) It should provide information that is useful to present and potential investors, creditors, and other users in making national investment credit and similar decision.

b) It should provide information about the economic resources of an enterprise, the claims to those resources and the effects of transactions, events and circumstances that change resources.

c) It should provide information about an enterprise's financial performance during a period.

d) It should provide information about how an enterprise obtains and spends cash, about its borrowing and repayments, about its capital transactions and about other factors that may affect its liquidity or solvency.

e) It should provide information that is useful to managers and directors in making decision in the interest of the enterprise and the owners.

The emphasis of these objectives is on the information needs of external users common to for profit publicly held enterprise or corporate sectors. However, you may substitute the terms hospital for enterprise and community for owners and the objectives are equally applicable.

1.5 ACCOUNTING CONCEPTS

Any activity that you perform is facilitated if you have a set of rules to guide your efforts. When you are driving your vehicle you keep to the left, you are infact following a standard traffic race. Without the drivers of vehicles following this rule, there would be chaos on the roads. Similarly without general rule or guides for the recording of business activities and the preparation of accounts, it would be impossible for the accounting information to be understandable and useful to various parties. There would be no common basis for recording transactions. Similar transactions if accounting records are to be understood, must agree at least in terms of Accounting records, similar results. If this end is to be attained certain basic concepts must be used in preparing accounting records. Accounting practices have developed over a long period of years. During the time accountants have accepted and adopted several basic concepts as fundamental guides that define the manner in which accounts should be kept.

Presented below are basic accounting principles or concepts, with which hospital managers should be familiar and that they should understand if they are to be able to use accounting data and reports. It should be pointed out that accounting is not a static art, these principles are continually being questioned and reviewed and in time will be modified. However, they are currently the accepted guidelines, and while the reader may question the propriety of some, he or she should at this point accept and attempt to understand these principles so as to be able to utilise accounting data and financial reports knowledgeably.

1.5.1 Entity Concept

In accounting we make a distinction between business and the owner. The hospital or for that matter any business is named as an entity capable of taking economic actions. The hospital is an entity separate and distinct from its employee contributors and governing board. Accounts are kept for this entity and not for the persons associated with the entity.

1.5.2 Continuity Concept or the Going Concern Concept

It's a corollary to the entity concept, accountants have also assumed that the entity will continue to operate for a long time in the future unless there is good evidence to the contrary. The hospital or the enterprise is viewed as a going concern to continue in operation at least in the foreseable future. The persons associated with the entity may come and go but the entity will remain. Thus in preparing statements and reports the accounting method and valuations should reflect the continuity assumption instead of the assumption that the entity will be liquidated and its assets and liabilities should be valued at their liquidation price.

1.5.3 Cost Valuation Concept

The resources in terms of land, buildings, machinery etc. that a hospital owns are called assets. The money value, that are assigned to the assets are derived from the cost concept. This concept states that an asset is worth the price paid for or cost incurred to acquire it. Thus assets are recorded at the original purchase price and this cost is the basis for all subsequent accounting for the assets. The assets shown on the financial statements do not necessarily indicate that present market costs (or market values). This is contrary to what is often believed by an uninformed person reading the statement or report. The term book value is used for the amount shown in the accounting records. In case of certain assets the book and the market values may be similar, e.g. cash. In general the longer an asset has been owned by the hospital, the lesser are the chances that the accounting or the book value will correspond to the market value.

Admittedly, the use of this cost as the basis for valuation has some drawback. Overtime, especially during periods of fluctuating economy, the value of an item can vary substantially.

In this situation, the accounting value of an item as indicated earlier will accurately referral only the value of an item as of the time it is acquired and will not show its current months.

Recognising the problem some have argued that a different basis be used–a basis that should at all time, show the current value of the operation or asset. Cost valuation, has however the important advantage over all other basis of valuation in that it is determinable, definite, objective and verifiable. It is not a matter of conjecture or opinion and judgement and it would be a costly and laborious task for determining the value of each item acquired at the end of an accounting period. Thus, if accounting records are to provide consistent and factual figure cost should be used as a basic of valuation.

The cost concept does not mean that all asset remain on the accounting records at their original use for all times to come. The cost of an asset that has a long but linked life in systematically reduced during its life by depreciation i.e. a process by which the cost of the asset is gradually reduced or written off by allocating a part of it to expense in cash accounting period the purpose of depreciation is to allocate the cost if an asset over its useful life and not to adjust its cost so as to bring it closer to the market value.

1.5.4 Double Entry Concept

The Accounting records should not only reflect on a cost basis of all transactions of the entity but also be constructed in such a manner as to reflect the two aspects of each transaction i.e. the change in asset forms or the change in assets and the source of financing–liabilities for e.g. if a hospital acquires an ambulance for cash not only the cash account be adjusted but also an entry must be made to show the acquisition of a fixed asset i.e. the ambulance. This is one concept with which every hospital manager should be familiar for it is really no more than just requiring that the debit entries balance the credit entries.

1.5.5 Accrual Concept

Just as the cost valuation concept provides the guide for recording assets and liabilities, the accrual concept provides the guide for accounting the revenue and expenses. Simply stated the accrual concept rule says that:

i) revenues and losses should be recorded in the period in which they are realised, and

ii) expense are to be recorded in the period that they contribute to operations.

Realisation of its revenue or loss mean that the gain or loss must be definitely established and the amount must be determined before an accounting entry is made. Thus, for e.g. assets must be sold before the gains or loss from holding the assets is entered into the accounting period.

In allocating expenses, a different guide is used i.e. expenses are recognised in the period during which they contribute to operations. This notion can be illustrated by assuming that employees are paid in January for the work performed in December. The expense should be allocated to December, the month in which the contribution to operations was made, not to January.

The use of these two rules allow accountants to allocate revenue and expenses to the proper accounting period.

1.5.6 Matching Concept

The matching concept build upon the logic underlying the accrual concept. The use of realisation and contribution rules allows accounting to bring together related income and expense in an accurate manner in the same accounting period. If the results of a particular operation are to be described objectively, not only the income and expense of the same accounting period be brought together but also associated revenue and expense items must be matched in order to properly determine the income.

If it were not necessary to match related items of revenue and expenditure, then it would be possible to manipulate income from different types of activities to produce whatever type of operating picture is desired. Thus, it is only by matching expense against related revenue, the results of a particular operating activity can be accurately and objectively presented.

Activity 1

Study the final accounts of your own hospital or any other hospital that you are familiar with. Note how the various concepts just studied by you have been applied in preparing these accounts.

1.6 ACCOUNTING CONVENTIONS

The foregoing concepts should not be regarded as infallible rules to be followed in every situation. Instances may arise wherein it would be desirable to make certain exceptions in the application of these concepts. Additionally, in practice, the above concepts are modified by certain conventions. The most important of which are presented below.

1.6.1 Relevance

Accounting is not intended to capture information from an infinite and unstructured range of sources. The information must be logically related to management decisions and to financial viability to be relevant. Accounting information can be utilised either by improving the decision maker's ability to predict a future occurrence or by confining an earlier judgement. In both situations, the relevance of the information contributes to the ultimate certainty of the decision and its potential outcomes. Thus, for Accounting information to be relevant it should be capable of helping users to form a more precise assessment of their past or future efforts. Timeliness in a necessary aspect of relevance. Untimely data are irrelevant because they have no capacity to influence decisions. If information is not available when it is needed or becomes available only after it no longer has any value, it lacks relevance.

1.6.2 Reliability

In being reliable, Accounting information warrants only what it purports to represent verifiable information for establishing informed decisions. Reliability does not guarantee certainty in decision making. Accounting merely functions as a means of representing the economic decision and financial condition of the enterprise through the selection of alternatives, yet generally accepted methodologies.

1.6.3 Materiality

There are many activities in the hospital which are of trivial and insignificant nature and the cost of recording and reporting such events will not be justified by the usefulness of the information desires. In other words the accounting report should not attempt to reflect a great number of events that are so insignificant that the cost of recording them are not justified by the benefits received. For e.g., the matching principle requires that expenses be matched against relevant revenues. However, in a hospital, an significant amount of revenue may be obtained from the selling of scrap material, adherence to accounting concepts would require that the expense involved in collecting and selling such scrap material be offset against the revenue obtained. However, unless the revenue from the sale or the expenses related to those revenues are of real importance it is neither particularly helpful nor necessary to adherence strictly to theory. The point involved here is of materiality.

Where to draw the line between material and immaterial events is a matter of judgement and common sense. There are no hard and fast rules in their respect. It is desirable to establish and follow uniform policies covering such matters.

1.6.4 Comparability and Consistency

In practice there are several ways to record an event or a transaction in the books of Account, e.g. there are several methods to charge depreciation on an asset or of valuing inventory. The consistency concept requires that once an organisation has decided one method and has used it for same time, it should continue to follow the same method or procedure for all subsequent events of the same events character unless it has sound

reason to do otherwise. If any change is made the departure and its effect must be clearly indicated in the financial statements in the year of the change.

If the full benefits of Accounting reports are to be obtained, one must be able to compare reports across similar organisations and between years. To attain such comparability the reports must be prepared on in consistent basis.

1.6.5 Conservatism

This concept is often stated as "Anticipate no profit, provide for all losses. Only recently has the accounting profession realised that this introduces a performance has that conflict with the other accounting conventions. Conservatism is now applied in conjunction with the measurement of the uncertainty attached to the decision alternatives of a specific situation. If the value of an asset or an income item is in doubt and any of the possible estimates is likely to occur, then conservation dictates the selection of the least optimistic estimate. If any estimate is more likely to occur than the others, then conservatism is not applicable to the situation.

1.6.6 Periodicity Concept

Although the results of operations of a specific enterprise can be known precisely only after the business has ceased to operate, its assets have been sold off and liabilities paid off, the knowledge of the results periodically is also necessary. Those who are untested is the operation of the hospital is business, obviously cannot wait till the end which may not come at all the requirements of these parties, therefore, force the accountant to report for the change in the health of a firm or enterprise for short time period. These time periods is actual practice very, though a year is the must common internal and community adjusted is the financial year concept.

1.7 CRITICAL APPRAISAL OF THE CONCEPTS AND CONVENTIONS

While going through all these concepts, probably you have developed a feeling that they come in conflict with each other. You are right. We illustrate this by considering some of these concepts in the content of valuation of hospital properties. Suppose a hospital acquired a piece of land in 1985 for a price of Rs. 6,00,000. Hospital premises were constructed in 1986 and the hospital operations commences in 1987. The hospital has been a great success with a profit profile for the past 12 years. The Balance Sheet for the year 1999 is being prepared and 'Land' is required to be valued. The estimated current market price of the land i.e. 60,00,000.

Should you recommend that the land be valued at Rs. 60 lakh. The answer is 'No' obviously. Land would be carried on the Balance sheet at its original costs of Rs. 6 lakh only. This decision is supported by several of the concepts discusses in this unit. In the first place, the stability of purchasing power of money implies in the *cost valuation concept* prevents us from recognising accretion in values as in result of changing price levels. The *accrual concept* will not allow unrealised profits to be included as long as the land is held by the hospital and not sold away. You may note that the continuity and the *ongoing concern concept* makes any possible market value of land for balance sheet because the hospital has to continue in business and land will be needed by it for its own use. In this connection, it could be argued that if land were shown on the balance sheet at its estimated current market value, the owner might decide to discontinue the hospital sell the land and retire, the principle of objectivity is now introduced into the argument. It can be easily seen that in a situation like this the cost of acquisition of land at Rs. 6 lakh in 1985 is the objective fact because it is based on the transaction that actually took place and this objective evidence is capable of being verified in contrast the estimate of the current market value to give may be suspect. It raises many questions. Do you have a market quotation for an identical plot of land. Has a similar plot of land been sold recently and can we pick it up as a verifiable evidence of the current market price? Further complications may be noticed if buildings and facilities have been erected on the plot of land. Is it possible to estimate the value of land without factory building and other facilities constructed on it. The answer is a flat 'no' and the *conservation concept* will deter you from accepting an estimate of market value since it cannot be ascertained with reasonable accuracy.

Activity 2

1) Name the accounting convention isolated if any in each of the following situations:
   a) The Rs. 1,00,000 figure for inventory on a balance sheet is the amount for which it could be sold on the balance sheet date.

      Hospital A does not change annual depreciation preferring instead to show the entire difference between original cost and process of sale as a gain or loss in the period when the asset is sold. It has followed this practice for many years.

2) Answer whether the following statements are True or False:
   a) The Materiality concept refers to the state of ignoring small items and values from accounts.
   b) Timeliness is not an important aspect of relevance.
   c) Conservation concept forbids the inclusion of unrealised gains but advocates provision for possible losses.
   d) Objectivity principle requires that only the information based on definite and verifiable facts be recorded.
   e) Periodicity concept envisages that accounting information should be prepared on a consistent basis from period to period and in these periods there should be consistent treatment of similar items.
   f) Reliability concept guarantee certainly in decision making.

1.8 TYPES OF ACCOUNTS AND THEIR APPLICATIONS

Accounts are divided into the groups:

a) Personal Account

b) Impersonal Account which is further divided into:
   i) Real or Property Account
   ii) Nominal or Fictitious Amount

1.8.1 Personal Account

Relate to persons or organisation which are distinct legal entities. These include patients, creditors and employee account.

Rule: Debit the receiver and credit the giver. Let us illustrate an example, A sold goods to B for Rs. 5000/-

Explanation: Here there are two parties affected. Mr. A is selling the goods and Mr. B is at the receiving end. In the books of A the entry will be as follows.

A Account Rs. 5000/-
To Goods Rs. 5000/-
In the books of B the entry will be as follows
Goods Account Rs. 5000/-
To A Rs. 5000/-

The point to note is that in the book of A, B is debited and goods account is credited. A should not credit himself in his own books. Likewise similar treatment is given in B's books.

1.8.2 Real or Property Account

Aspect Accounts are formal Real Account. Here the properties like cash book, buildings furniture and other allied assets are included.

Rule: Debit what comes in and credit what goes out.

Example: A hospital purchased furniture for Rs. 2,00,000/-

Here there are two heads-one is furniture and the other is cash.
The entry will be as follows.

Furniture Account Rs. 2,00,000/-
To Cash 2,00,000/-

Explanation: Furniture account is debited because it is coming into the hospital and cash is credited because it is going out of the hospital.

1.8.3 Nominal or Fictitious Account

Expenses Income and losses are formal nominal account.

Here the items like Rent, Rates, Taxes, Salaries, Discount and Commission are affected. Income from hospital advances, investment etc. is included.

Example
Paid Rent for building Rs. 50,000/-
The entry will be

Rent Account Rs. 50,000/-	
To Cash	Rs. 50,000/-

Explanation: Rent Account is debited because it is an expense and cash account is credited because it is a real account where credit should be given for an item that gives out.

1.9 ACCOUNTING BOOKS

The objectives of keeping the Accounting books are to enable the hospital manager to ascertain easily and conveniently the following at a glance.

a) The financial position of the hospital

b) The assets and liabilities of the hospital

c) Profit earned or loss incurred for a given period

d) The amount owed by others to the hospital and by the hospital to others

e) The financial requirement of the hospital

In a hospital thousands of transaction may take place every day. They are generally of a repetitive nature like pools purchase etc. They are reflected on vouchers that could be any of the following.

a) The document which serves as evidence of the disbursement or receipt of cash e.g., Cash receipt of the hospital or cash memo for purchase note etc. or an approved invoice from supplier.

b) The form or a voucher to which bills receipts and other evidence of purchases are often attached sharing the authority for payment, the terms for settlement etc.

These vouchers are often listed out in various books, a few of items are briefly described in succeeding paragraphs.

1.9.1 General Ledger

This is the main or basic book of accounting. It contains a record of all transactions for the accounting period analysed under various accounting heads each referring to a separate nature of transaction. The general ledger contains all accounts: Personal, Real and Normal.

1.9.2 Cash Book

In any business all the transactions that affect the cash are entered in a book called the cash book which is kept separate from the other book. When cash book is maintained the cash transactions are not journalised but entered directly in the cash book and then a corresponding entry is posted in the Ledger Receipts and Payments are generally written on the opposite side of the cash book. The number of columns provided for amount depend upon the number of bank accounts being maintained at a regular basis from the receipt books, the daily collection is analysed as under.

a) Cheques and Cash

b) Nature of Receipts such as patient bills, donations, deposits, grants etc.

In the main cash book individual entries are made for each cheque times. Summary totals are posted in respect of cash receipts.

Let us prepare simple cash book.

Example

01-04-99	Cash in hand	Rs.	1,00,000
02-04-99	Paid rent	Rs.	1,000
03-04-99	Purchased medicine for cash	Rs.	1,000
10-04-99	Car sold scrap for cash	Rs.	800
12-04-99	Received cash from patient A	Rs.	900
14-04-99	Purchased stationery	Rs.	750
20-04-99	Paid to daily wager	Rs.	50
24-04-99	Paid maintenance	Rs.	550
29-04-99	Paid electricity charges	Rs.	1,050
30-04-99	Paid salaries	Rs.	50,000

Cash Book

Receipts				Expenditure			
Date	**Receipt**	**Folio**	**Amount Rs.**	**Date**	**Payment**	**Folio**	**Amount Rs.**
01-04-99	To Balance B/d		1,00,000	02-04-99	By Rent		1,000
10-04-99	Scrap taken		800	03-04-99	By Purchase		1,000
12-04-99	Patient		900	14-04-99	By Purchase		750
				20-04-99	By Daily wager		50
				24-04-99	By Maintenance		550
				29-04-99	By Electricity charges		1,050
				30-04-99	By Salaries		50,000
					By Balance C/d		**46,300**
	Total		**1,00,700**		**Total**		**1,00,700**

01-05-99 Balance B/d 46,300/-

1.9.3 Petty Cash Book

The popular system of controlling petty cash expenses is through imprest system. Under this system the petty cash is provided as a round sum in cash, turned as a float sufficient to cover the estimated petty cash expenditure from a week or a fortnight. Payments made by the cashier are entered into a petty cash book or register which has several analysis column. At periodic intervals written the cash balance with them is nearly exhausted, he prepares a petty cash voucher analysing the expenditure incurred under various head and the total expenditure incurred is down from the new cashier. This voucher is entered in the main cash book. Petty cash book is in effect a branch of the main cash book in the sense that the balance of small surgical entries are shown by it.

The format generally used for maintenance of petty cash book is as under:

Date	Particular	Cash Book Folio	Amount Received	Rate	Particular	Voucher Total	Petty Cash

1.9.4 Subsidiary Book

Entries are not made directly into the General Ledger. Every entry in the Ledger should be based on an originating entry in a subsidiary book. The purpose of subsidiary book is to record the transactions as they occur and then to make the posting therefrom to the ledger. They are a number of subsidiary books. These are briefly discussed below:

a) **Purchase Book**

In the purchase book only credit purchase are recorded and cash purchase are excluded. The monthly total is posted to the ledger under head purchaser A/c. The invoice number as given by the supplier is recorded in the purchase book.

Format of Purchase Book

Date	Particular	Invoice No.	LF	Amount

Example

01 Apr. 99	Purchased medicines from Chugh Brothers	Rs. 7,000
10 Apr. 99	Purchased Stationery from Murthy Brothers	Rs. 8,000
15 Apr. 99	Purchased Surgical Glasses from Delhi Surgical	Rs. 10,000
30 Apr. 99	Brought Stationery from Sahu by cash	Rs. 600

Purchase Book

Date	Particular	Invoice No.	LF	Amount
April 01	Chugh Brothers			Rs. 7000.00
April 10	Murthy Brothers			Rs. 8000.00
April 15	Delhi Surgical			Rs. 10,000.00
				Rs. 25,000.00

It is important to note here that the stationery purchased from Sahu by cash is not included in purchased Book can you tell why?

b) **Sale Book (Income System)**

Income Register maintained by hospital are more in the nature of statistical record rather than an Accounting book which demands considerable accuracy. The Income Register provides for analysis of Income by department without any additional clerical effort. The patient bills are entered serially. Some of them are paid in cash some after the bills are raised (almost simultaneously) and some later. They are posted to the relevant parties' accounts in the patient ledger once entries are made. Changes, therefore, made through using of credit/ debit note rather than by altering figures in original books. That is so because only credit sale entries are recorded in the sales book, but in the hospital context there are very few entries of credit sales.

c) **Purchase Return Book**

Here the goods returned to the suppliers are entered. A debit note stating the details prepared are intimated to the suppliers.

d) The other subsidiary books like cash book and petty cash books have already been discussed earlier.

e) General Journal to record transaction not falling in out of the above categories like depreciation charges entries. After having discussed, the principles of double entry and after being acquainted with the various Accounting Books, you must briefly acquaint yourselves with journalising the various transactions. Since journal is the primary step in the Accounting principle.

Example

Let us journalise the following transaction

01.01.99	Commenced a nursing home with cash	Rs. 10,00,000/-
15.03.99	Deposits made in State Bank	Rs. 5,00,000/-

Journal

Date	Particular		LF	Debit	Credit
01.01.99	Cash Account	Dr		10,00,000	
	To Capital				10,00,000
	(Being the cash introduced in hospital)				
15.03.99	Credit Account	Dr		5,00,000	
	To Cash				5,00,000
	(Being the amount deposited in Bank)				

Activity 3

1) Briefly discuss the various types of Accounts.

2) Enumerate the various Accounting books and briefly discuss how they are maintained in your hospital.

1.10 LET US SUM UP

In this unit you have learnt about the concepts of accounting. The foregoing concepts and conventions have been developed primarily for use by profit making enterprises. These guidelines, however are equally applicable to hospitals and hospital accounting. Hospitals though differing in orientation from commercial enterprises are still a form of business. Therefore, the principles of sound business management as mentioned in this unit are just as applicable to hospitals as to private enterprises. The non profit operating philosophy of most hospital should neither constitute an excuse nor be used as a justification for irresponsible management or accounting practices. Hospital accounting practices should thus be based upon the above rules and conventions.

Accounting is the language of business and the process of Accounting involves data creation, collection, evaluation and data reporting. There are several concepts and conventions of Accounting which hospital management understand as the building of any hospital Accounting system. The entity concepts makes a distinction between the business and the owner and the ongoing concern of continuity concepts. You have also learnt about the cost evaluation concept, and need for recording the costs of assets at the price incurred to acquire it, and the double entry concept. You have also learnt that on the logic of the accrual concept the matching concept evolved to match the related items of revenue and expenditure. Apart from the accounting concepts there are certain accounting conventions like reliability, materiality, consistency, conservation which a manager should be familiar with to enable him to understand the basics of accounting practices. There are basically three types of accounts viz. Personal, Real and Nominal Accounts. The personal accounts relate to individual or organisational account, real account relates to various aspects of organisational assets and the nominal account relates to income, expenses and losses.

Subsequently you learnt that there are a variety of Accounting books which are required to be maintained in any organisation including the hospital. The General Ledger is the main or the basic book of accounting in which a record of all transactions for the accounting are recorded. The general ledger is supported by various subordinate books like the cash book, petty cash book, the purchase and sale book, the purchase return book and the general journal.

1.11 SELF ASSESSMENT QUESTIONS

1) "An understanding of these is critical to the knowledgeable use of financial data". What does the word 'these' in this statement implies?
2) Define Accounting? Enumerate the steps involved in the process of Accounting.
3) Briefly state the objectives of financial reporting.
4) Enumerate the basic Accounting Principles.
5) Match the following

Column 'A'	Column 'B'
a) Entity concept	i) Comparing expenses against related revenue
b) Going concern concept	ii) Simultaneous recording of debit and credit entries
c) Cost valuation	iii) Make clear distinction between the hospital and owner
d) Double Entry	
e) Accrual	
f) Matching	

6) Match the Following:

Column A	Column B
a) Personal Account	i) Release to Assets Account
b) Real Account	ii) Release to personal and organisations that are distinct legal entities

c) Normal Account
d) Voucher
iii) Entry of disbursement or receipt of cash
iv) Release to Income and Expenses

7) State True or False:

a) Cash book is the basic book of Accounting

b) In purchase book only cash purchases are recorded

c) Petty cash book is a subsidiary of the main cash book

d) The Govt. returns to applicants are recorded in the purchase return book

e) Vouchering is not a pre-requisites for any transaction to be recorded in the general ledger.

f) All transactions for the accounting period are recorded in the General Ledger.

g) General Journal and General Ledger are the same accounting book.

UNIT 2 UNDERSTANDING COST AND THEIR BEHAVIOUR

Structure

2.0 OBJECTIVES

After reading this unit you should be able to:

- classify costs and their elements;
- define cost accounting; and
- describe the various cost accounting techniques and their applications.

2.1 INTRODUCTION

A hospital is a complex task oriented socio-economic system whose major objective is personalised care and professional treatment to individual patients and ultimately providing high quality service to the community at an optimum cost.

Developing countries have invested heavily on health in recent decades. They have constructed hospitals and buildings and purchased equipment to run them and employed

trained doctors, nurses, and other health care professionals and set up new systems to supply drugs, research and information. Over the years the number of hospital beds and health personnel have increased tremendously. Such investments have created new opportunities, but they have also led to various problems. Once built, hospitals are extremely difficult to close. Once trained, physicians create pressure to be employed. In virtually every developing country, facilities, equipment, human resource and drugs are skewed towards the top of the health system pyramid, i.e. the specialised hospitals. Also in our country the principal tertiary teaching hospital in the city consumes a large proportion of the total resources available for health. Hospitals absorb a significant amount of public spending on health in developing countries and various studies document that out of which about 50 - 70 per cent of the hospital budget is contributed towards salaries of health functionaries. A large amount of money is being spent on medical equipment. Efficiency losses from poor selection and maintenance of medical equipment can be very large. Equipment failed prematurely because maintenance budgets were very low. Always there is an advancement of medical knowledge in the fields earlier not known, resulting in the establishment of new disciplines in the hospital which ultimately leads to high cost of medical care.

Increasing demand for health care system in India has in its wake highlighted a number of management problems in its existing health care institutions. Since there is always scarce resource it is required to make the most economic use of the available resources. Hospitals have felt additional financial pressure as a result of international efforts to shift spending towards primary health care and reduce dominance of hospitals' share of public health budget. With rapid changes in economic structure more and more emphasis is being laid on the financial matters of hospitals so that maximum amenities can be provided at minimum cost. In this environment, attention has been focussed in this unit on studying costs, elements of cost, methods of analysing costs of hospitals and understanding how different types of costs behave differently in different situations, and the way they change with the level of activity. This unit will also familiarise you with the concepts of cost accounting and cost volume profit analysis.

2.2 COSTS

In general, people understand costs in terms of monetary prices or the amount of expenditure incurred on goods and services. But economists understand the cost as the sacrifice made in order to obtain a good or a service.

In some cases the expenditure incurred on a good or service may be good indicator of the sacrifice made to obtain the same but there are situations where it is not. For example:

- in some situations resources used do not have monetary value.
- some resources do have monetary value but they cannot be exactly measured.
- some activities may have 'spillover effects'. These can be either positive or negative. Money price may reflect only the positive ones or the benefits for consumers and producers and does not reflect on the existence of benefits to the society.

2.3 ELEMENTS OF COST

There are three broad elements of cost:

2.3.1 Material

It is the substance from which the product is made. It may be raw product or product of output. It can be direct or indirect.

Direct Material

All material which becomes an integral part of the finished product or service and which can be easily assigned to specific physical units is termed as *direct material*. Examples are all materials purchased, produced or requisitioned from stores; primary packing material, etc. In hospitals cost of medicines, operation theatre material, x-ray plates etc. which can be identified when rendering treatment to patients could be *considered* as *direct* material.

Indirect Material

All material which is used for purposes ancillary to the production or service and which

cannot be easily assigned to specific physical units is termed as *indirect material.* Consumable stores, oil and waste, printing and stationery material, etc. are some of the examples of indirect material.

2.3.2 Labour

For conversion of material into finished products or producing service outputs human effort is required. These are called *labour.* Labour can also be direct or indirect.

Direct Labour

Labour, which takes an active and direct part in the production of a particular commodity or in provisioning of a service is called direct labour. In hospitals physicians, nurses etc. can be considered to be direct labour while providing treatment to the patients.

Indirect Labour

Labour employed for the purpose of carrying out activities incidental to the goods produced or services provided is called indirect labour. It cannot be easily traced to specific units of output. Wages of storekeepers, security, management etc. are examples of indirect labour.

2.3.3 Expenses

These may be direct and indirect.

Direct Expenses

These are expenses that are directly, easily and wholly allocated to specific cost centres or cost units. Example is like hiring of some instrument for a particular purpose either diagnostic or therapeutic.

Indirect Expenses

These are expenses that cannot be directly, easily and wholly allocated to costs centres or cost units. Examples of such expenses are rent of building, lighting, insurance etc.

The above elements of costs may be shown by means of Chart 1.

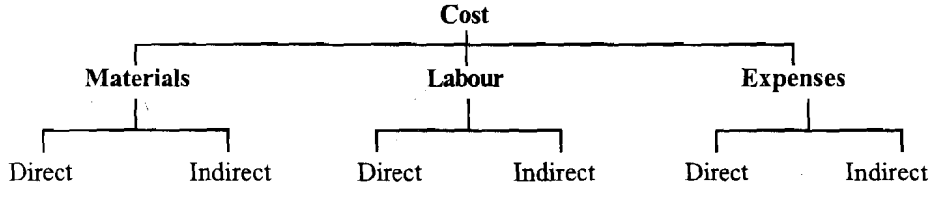

Chart 1: Elements of Cost

Overheads

The term overheads includes indirect material, indirect labour and indirect expenses. Thus all indirect costs are overheads. Overheads may be of three types:

Works or factory overheads— where hospital operations are performed. They are:

- Indirect Material used in the hospital, e.g. lubricants, oil etc.
- Indirect Labour such as gatekeeper-salary of security officers and personnel salary.
- Indirect Expenses such as rent of hospital building, lighting of works departments etc.

Office and administration overheads— where hospital routine and policy matters are decided. They include:

- Indirect Material used in the offices e.g. stationery and rooms/housekeeping material.
- Indirect Labour such as salaries payable of hospital manager, accountant, clerks etc.
- Indirect expense such as office rent, lighting etc.

Selling and distributing overheads: They considered:

- Indirect Material such as printing and stationery material for hospital information system/guiding systems.
- Indirect Labour such as salaries of Public Relation Officers.
- Indirect Expense such as Advertising expenses etc.

Components of Total Cost

Prime cost which consists of Direct Material, Labour and Expenses.

Works or Production costs which is Prime cost plus works or factory overheads. Office costs which consists of work cost plus office and administration overheads. Total cost which comprises office costs plus selling and distribution overheads.

2.4 CLASSIFICATION OF COSTS

Costs can be classified in different ways depending on the purpose for which it is required. But in general costs can be classified broadly into fixed and variable costs, direct and indirect costs, and capital and recurrent costs.

2.4.1 Variable and Fixed Costs

Variable costs are items of costs that vary directly and proportionately with production volume. If the total amount of costs increases as volume increases, the item is a variable cost. The percentage of cost increase or decrease that results in proportionate to the percentage change in the volume of production or the services provided.

Fixed costs do not vary with change in production volume. Fixed cost, in aggregate, will remain the same even though increases or decreases of production volume may occur. Building depreciation, taxes, salaries, and overheads (water, electricity, etc.) are examples of expenses that behave in a fixed manner.

Fixed costs can be further divided into:

Committed fixed costs are those costs that arise from the possession of building, equipment. For example, once a hospital building is constructed nothing can be done to reduce depreciation, insurance, salaries of staff, etc.

Discretionary fixed costs are related to specific time periods. They directly reflect management policies and are not related to output. Examples are costs incurred on research and development, advertising, etc. These can be completely eliminated.

Semivariable costs are costs that vary with changes in volume, but the increase or decrease in the percentage of change in cost is not the same as the increase or decrease in production capacity or service outputs. The change is, of course, always in the same direction and is normally lower than the percentage change in production or services provided. They have both fixed and variable elements. These are costs such as catering, laundry, linen, repair and maintenance, etc. They tend to be constant for each patient day but there may be some variation depending on the diagnosis and patient characteristics.

2.4.2 Direct and Indirect Costs

Direct costs are those costs that can be identified entirely to a particular department or a product or a service.

Indirect costs cannot be entirely identified to a particular department, product or service. Cost of administration is an example of indirect cost. The salary of departmental head is an example of direct cost. However, within the department if there are a number of services to be delivered, then for each service, his salary will be indirect cost.

It is important to note that direct costs are controllable costs whereas indirect costs are not controllable.

2.4.3 Capital and Recurrent Costs

Capital costs are usually defined as costs for items with a life of more than one year. Typical examples include costs of construction of building, purchase of equipment, basic manpower training, etc.

Recurrent Costs are those costs that are necessarily incurred each year. These include items such as salaries and wages, drugs and supplies, water and electricity, in-service training, etc.

2.5 SOME OTHER CONCEPTS OF COSTS

2.5.1 Product Costs and Period Costs

Costs which become part of the cost of product rather than an expense of the period in which they are incurred are called as product costs. Such costs are treated as assets until the goods they are assigned to are sold. They may be fixed or variable. These are cost of raw materials and direct wages, depreciation on equipment, etc.

Costs that are not associated with production are called period costs. They are treated as an expense of the period in which they are incurred. They can also be fixed or variable. These are costs of general administration, depreciation on office facilities, etc.

2.5.2 Decision-making Costs and Accounting Costs

Decision-making costs are special purpose costs that are applicable only in the situation in which they are incurred. They need not be included in routine financial accounts.

Accounting costs are compiled primarily for financial statements. They are basically historical costs and show what has happened under an existing set of costs.

2.5.3 Shut Down and Sunk Costs

An organisation rendering service may have to suspend a particular operation for a period on account of some temporary difficulties, e.g., shortage of raw material, repair of an Operation Theatre, etc. During this period though no work is done yet certain fixed costs, such as, rent and insurance of building, depreciation, maintenance, etc., for the entire activity or service will have to be incurred. These costs are called shut down costs.

Sunk costs are historical or past costs. These are costs that are created by a decision made in the past, which cannot be changed, by any decision made in future. These are irrelevant for decision-making. Investments in plant and machinery, building, etc. are same prominent examples of sunk costs.

2.5.4 Imputed or Hypothetical Costs

These are costs that do not involve any cash outlay. They are not included in cost accounts but are important for taking into consideration while making management decisions. For example, interest on capital is ignored in cost accounts though it is considered in financial accounts.

2.5.5 Differential, Incremental and Decremental Costs

The difference in total costs between two alternatives is termed as differential cost. In case the choice of an alternative results in increase in total cost, such increased costs are known as incremental costs. In case the choice results in decrease in total costs, such decreased costs are termed as decremental costs.

2.5.6 Opportunity Costs

Opportunity cost represents the benefits foregone by not choosing the second best alternative in favour of the best one. When we decide to follow one alternative, we are also deciding not to follow another. As a result, all the benefits that would have accrued are given up. To the extent they can be quantified or measured, they are opportunity costs of the decision. Assume that a company owns a building; it would be either used for business purposes or be rented to others. If a decision is taken to use the building the amount of rent foregone constitutes the opportunity cost. The lost rent is an opportunity cost only if there are potential tenants willing to hire the building. Since they are hypothetical/theoretical costs, they are not entered in accounting records. But the cost of the second best alternative must be taken into account before taking a decision.

Activity 1

Classify each of the following as Direct or Indirect Cost (D or I) *Direct/Indirect.*

a) Cost of medicines provided for patient care

b) Cost of x-Ray films while treating patients

c) Cost of lab reagents while assessing cost of patient care

d) Raw material for food served in a hospital

e) Salary of medical stores keeper

f) Salary of a doctor

g) Oil used for lubricating machine

h) Cost of air conditioning plant

i) Cost of training programmes

j) Salary of nursing officers

(Answers: (a), (f), and (j) are direct: cost and others are indirect cost)

2.6 COST ACCOUNTING

Cost accounting is a branch of accounting information system that records, measures and reports information about costs. The primary purpose of cost accounting is cost ascertainment and its use in decision-making and performance evaluation. A cost accounting system provides data for both financial accounting and management accounting. As a major financial information system for management analysis and decision-making, the hospital's cost accounting system provides:

1) Internal reporting to managers for use in planning and controlling routine operations.

2) Internal reporting to managers for use in making non-routine decisions and formulating policies and plans for future activities.

3) Information useful for external reporting to stockholders, government agencies and creditors.

The initial step in the implementation of cost accounting system is to assemble revenues, costs and standard performance criteria. Three basic methods of assembling cost accounting data are given below:

a) **Responsibility costing** traces the costs of the individual organisational units called responsibility centres. Estimates of future responsibility centre costs are initially established during the hospital's budgeting process. A historical accounting of the actual costs incurred in a responsibility centre is used during the hospital's fiscal year to measure the performance of the responsibility centre and to analyze deviations from the approved budget. Responsibility centre reports are extremely useful for organisational control and objective settings because they present both the goals for specific production functions and centre's performance relative to these goals.

b) **Full costing** of goods manufactured or services provided sums the direct costs related to the production process plus an allocated share of the indirect costs that the organisation incurs as overhead.

c) **Differential costing** estimates how the costs and revenues in one situation will differ in alternative situations. It, therefore, focuses management's analysis on the incremental costs that come with adding or deleting products or programmes.

There are various advantages and limitations of cost accounting system. An efficient cost accounting system can have the following advantages:

a) Identification of costly activities provides an opportunity to the management for considering alternatives or modifications.

b) Determination of standards and allow comparisons.

c) Detailed investigations of costs in health care further lead to estimation of benefits derived from the resources spent.

d) Reductions in cost of patient care without compromising quality.

e) A comprehensive financial management plan of an organisation covering financial planning, budgeting and resource allocation can be developed.

Limitations of a cost accounting system could be:

a) A costing system does not itself make an organisation more efficient, but provides information to the management to take decisions.

b) The information supplied may refer to the costs incurred in the past i.e. historical costs. Care should be taken while planning future costs because they may not be the same.

c) The problems of case mix because medical specialities are not homogenous and costs vary greatly between different patients, specific groups and specialities.

d) Incompletely recorded information has its own limitations.

2.7 COST OUTPUT RELATIONSHIP

In studying the relationship that exists between cost and output it is useful to separate it into two components. The first looks at the physical relationship that exists between inputs and outputs (production) and the second looks at the costs attached to it. To understand it better it is important to know three measures of cost:

1) *Total cost* (TC) is a measure of all the costs entailed in producing a given level of output. It is derived by summing up all the costs incurred during production. An example would be the cost of providing an immunisation service.

2) *Average cost* (AC) is a measure of the total costs of production associated with each unit of output. Average costs indicate the resource requirement for each unit of output and are calculated by dividing total costs (TC) by the number of units of output (Q) (AC=TC/Q). An example would be the cost per immunisation provided.

3) *Marginal cost* (MC) is a measure of the resources associated with a small incremental change in output. In fact, it is a measure of the change in costs associated with increasing or decreasing output by one, and is derived by calculating the change in total costs for that one unit. An example would be the incremental cost of adding an additional vaccine to the existing service, or of extending the service to an additional village.

Suppose, production consists of using two inputs to produce some good or service. As one input varies, three alternatives are possible within the quantitative relationship between inputs and outputs. Output can rise proportionately faster than the input, proportionately slower, or at the same rate.

The second part of the relationship between output and cost is the relationship between the resource inputs and price. Although it is assumed that the price of resources will remain constant as output rises, it is possible that they will not. They may fall if it is possible to negotiate discounts through bulk purchases; or they may rise if more needs to be paid to attract scarce resources as the demand for them increases.

2.8 COST ANALYSIS

Cost analysis is the process of rearranging data or information in the existing accounts to obtain the costs of the services rendered by the hospital or any health set-up. There are five prerequisites for cost analysis.

1) There should be an organisation chart and a chart of accounts relating to it.

2) There should be an identification of all cost centres as either general service cost centres or as final cost centres to which all costs are ultimately assigned.

3) There should be an accurate accounting system.

4) There should be a comprehensive information system capable of collecting non-financial data by cost centre and by the total hospital, providing: a) the basis for distribution of costs from general service centres to final cost centres; and b) the basis for calculating unit cost by final cost centres.

5) A methodology for cost analysis should be chosen that is most practicable for the situation.

There are two general approaches of cost analysis in health sector.

1) The Direct Accounting Approach

It makes use of accounting information and reanalysis of health or hospital service records to examine costs and performance. It focuses on the costs directly associated with a particular activity. It attempts to calculate the costs of the resources that are actually used in an activity or those that are consumed by a particular patient. In practice this often proves

difficult because it is difficult to identify the resources used in many activities and to calculate what proportion of the costs of the shared items or facilities should be apportioned to individual activities. Examples of the direct accounting approach include:

a) *Activity costing* – detailed costing of the activities of different cost centres, such as whole hospitals, speciality departments, or health centres

b) *Disease costing* – attempts to identify the cost incurred in treating particular diseases, or particular types of patient, or even in carrying out certain types of procedures.

2) **The Statistical Approach**

This approach focuses on the costs associated with types of activity or types of patient and not on the costs associated with individual activities or individual patients. Rather than addressing the issue of how much something costs and how these costs are incurred, the statistical approach addresses the issues of why costs differ, and by how much. The accounting approach can be applied to a single hospital and involves a labour intensive, detailed examination of hospital accounts, staffing pattern and admissions. Less detailed data are needed in the statistical approach, but it requires observations of costs and service use for many years.

The statistical approach can be illustrated by the following example. In studying, say, the costs associated with providing hospital care, it is very likely that there will be wide variations in cost between different hospitals. Why should this be the case? Some hospitals may be more effective or more efficient than others, or there may be other reasons why these costs vary. Hospitals may differ with respect to:

- size (number of beds)
- number of cases treated in a given time period
- case-mix
- case-severity
- quality of care
- type of treatments offered
- teaching or research activities
- age and/or location of hospital facilities
- occupancy levels
- manpower availability
- length of stay

One or more of these factors may account for differences in measured costs between hospitals.

2.9 METHODS OF COST ANALYSIS

There are several methods of cost analysis that are commonly used in direct accounting approach. These are as follows:

1) Direct apportionment

2) The step-down method

3) Double apportionment

4) Algebraic or multiple apportionment

1) **Direct Apportionment**

Allotting the cost incurred by non-revenue producing departments to revenue departments by direct apportionment can be done by any one of the several methods. The simplest and least logical way is for administration to determine arbitrarily the percentage of the non-revenue connected expense each revenue centre has to bear. Other yardsticks can be based on the percentage each revenue department represents of the total square footage of the hospital's building or of the number of employees, payroll, pounds of laundry, patient days or number of purchase requisitions.

Direct apportionment, though administratively and clearly simple is an inappropriate cost finding methodology because, it a) ignores the exchange of services between non-revenue

producing departments, and b) does not compensate for the different demands for services by revenue departments on non-revenue departments.

2) **The Step-down Method**

The step-down method is more advanced cost finding technique than direct allocation, for it involves the distribution of costs of non-revenue producing departments to other non-revenue departments and, in turn, finally to revenue departments. The term step-down is used because of the format in which distribution of non-revenue department costs are made. The costs of non-revenue department serving the most departments (both revenue and non-revenue) are distributed first; the non-revenue department serving the second largest number of departments is distributed next; the one serving the third largest number next, and so on.

It should be noted that the step-down method has been criticized as not allowing fully for interdepartmental charges between the different non-revenue departments.

3) **Double Apportionment**

Double apportionment or double distribution was designed to correct one of the major weaknesses of the step-down method. In double apportionment two separate cost distributions are used. In the first distribution all direct and indirect costs of all departments are distributed to the various cost centres according to the agreed upon basis of allocation. After the first distribution is completed, the costs that have been allocated to the non-revenue departments are then redistributed to the revenue producing departments using the same basis of allocation as before (square footage, etc.).

Basically double distribution is two distribution of costs to reflect as accurately as possible the interchange of services between non-revenue departments before costs are finally allotted to the revenue producing departments.

4) **Multiple Apportionment (Algebraic Method)**

Multiple distributions are made of expenses between non-revenue departments and then, finally to revenue departments in an attempt to refine the cost analysis to the greatest possible degree of exactness. Although 10 to 12 distributions are made in some methods, it is generally agreed that after 4 distributions there is little change in the ultimate cost figure. These distributions can be done manually but from a practical standpoint double distribution remains the most feasible manual method.

This type of cost analysis is the most accurate method yet devised, but it is beyond the capabilities of the average hospital accountant. On the basis of accuracy alone, the order of preference of cost analysis would be:

1) multiple apportionment,
2) double apportionment,
3) step-down, and
4) direct apportionment.

From a practical standpoint of time and cost of the analysis, however, it would be better to consider the selection of manual method as:

1) Double apportionment, and
2) Step-down method.

Cost Effectiveness Analysis

It is a form of economic evaluation where the costs are expressed in monetary terms but some of the effects are expressed in physical units (e.g. life years gained, cases detected). It is usually used to compare different ways of achieving the same objective (e.g. saving lives) and assumes the objective that is worth achieving.

Cost effectiveness analysis involves organising information so that the costs of alternatives and their effectiveness in meeting a given objective can be compared systematically. It involves three distinct sub-processes: (a) Developing comprehensive costing details and analysis of cost of each alternative; (b) An analysis of effectiveness of each alternatives; and (c) An analysis of the relationship between the costs and effectiveness of each

Cost Benefit Analysis

Cost benefit analysis is an economic technique applicable to health planning, health management and evaluation. It is a form of economic evaluation where all the costs and benefits are expressed in money terms. In principle, this form of analysis enables one to assess whether a particular objective is worth achieving. However, estimation difficulties often reduce cost-benefit analysis to a consideration of those costs and benefits that are easy to express in money terms. It determines which scheme or combination of schemes will contribute most to the achievement at a given investment, or the magnitude of benefits that can result from schemes requiring the minimum investment.

Cost benefit analysis attempts to value all socially relevant outcomes in monetary terms. In day-to-day use, cost benefit analysis is primarily utilised to justify if a particular health services programme is relatively more beneficial. Although it is difficult to express all possible health and social benefits in financial terms, it helps in taking technical decisions backed by economic logic.

Activity 2

1) What is Cost Accountancy?
2) List the Advantages of Cost Accountancy.

2.10 COST BEHAVIOUR IN RELATION TO HOSPITAL OUTPUT

Whatever method of costing is used, the unit of analysis (such as patient days, admissions or outpatient visits) and consideration of both average and marginal costs are important, because the use of any single output may produce misleading results. Recurrent hospital inpatient costs are considered to have three components:

a) **Overhead costs:** These costs remain essentially constant regardless of whether a bed is occupied. Typically, they include items such as heating and maintenance, but for public hospitals in developing countries, personnel may be a large component of overhead costs, because it may not be possible for staff to be reduced in the short run during periods of low occupancy. The magnitude of overhead costs is related to the hospital size.

b) **Hotel costs:** These are costs, such as catering, laundry, and linen that are incurred for each patient day in the hospital. They tend to be constant for each day of a patient day, though there will some variations related to the diagnosis and patient characteristics.

c) **Treatment costs:** These are case-dependent costs associated with a particular diagnostic, therapeutic and other treatment services provided to the patient. These costs tend to peak in the first few days of a patient stay, when, for example, there might be an operation, and then diminish thereafter. The actual pattern of treatment costs in any hospital will vary depending on the clinical management of the hospital.

The hospital in which the length of stay of patients is longer, other things equal, would tend to have a lower average cost per day because the treatment costs for the additional days would likely be far below the average for the case. The extra days stay in the hospital would probably contribute little to the improvement of the patient's condition, and thus the lower average cost would actually mask inefficient hospital performance.

Assuming that the treatment cost profile is similar, high occupancy rates tend to result in lower average costs per patient day because overhead costs are spread over beds that are actually filled. If high occupancy results from relatively few admissions but very long stay, however hotel costs will be high in relation to the number of patients and average cost per day per admission will be high. The expected marginal cost per bed per day will be low because the treatment costs at the end of a long hospital stay tend to be minimal. Alternatively, if the bed turnover rate is high, average cost per admission is apt to be lower because hotel costs are spread over a large number of patients, whereas the marginal cost per day will be relatively high. Increasing the bed occupancy rate through a greater number of admissions per day rather than longer stays will allow more patients to be served and thus improve hospital productivity.

Low occupancy rates are a commonly observed feature in many developing countries.

85-90 per cent occupancy at which they operate most efficiently. In the short run, a relatively small percentage of hospital costs can be varied; most costs are fixed and determined by the scale of the facility and the personnel establishment (the overhead costs). Personnel costs, which make up the bulk of fixed cost, represent a range of about 35-75 per cent of total recurrent costs. The effect of low occupancy is to spread the cost of personnel and other fixed inputs over a smaller number of service units and raise the average cost of services. Even if hospital inputs are being used with technical efficiency low occupancy implies economic inefficiency.

A high bed occupancy rate does not necessarily indicate better hospital performance. Indeed, bed occupancy rates can be too high, in the sense that the volume of services is above the design level of the hospital. The implications of high occupancy for average costs and hospital efficiency are ambiguous without information on the other service indicators. The reason for this is that a high occupancy rate may reflect a relatively efficient situation as many patients with modest lengths of stay are served (i.e. the hospital has a high bed turnover rate), or an inefficient situation, as when high proportion of filled beds largely results from long length of stay. The latter situation is signaled by a low average cost per day but a relatively high average cost per admission.

There are other reasons why a high occupancy rate does not by itself imply a relatively efficient hospital. For example, with high occupancy rates, scheduling of individual service activities, maintenance, and management becomes more difficult and are more costly. The measured average costs from accounting based studies do not provide sufficient evidence to support or reject the hypothesis that average costs are regularly lower for hospitals with extraordinarily high occupancy rates. More likely is that the quality of services is compromised as staff attention, laboratory and ancillary services are divided among a greater number of admissions that exceeds the hospital's design capacity. In addition, very high occupancy rates may reflect overcrowding, which can facilitate the spread of hospital acquired infection.

2.11 COST VOLUME PROFIT ANALYSIS

Cost volume profit analysis is a valuable tool of profit planning. It provides information about the following:

1) Cost behaviour in relation to volume of production.
2) Break even point in relation to volume of production or sales.
3) Amount of profit for a projected sales volume.
4) Quantity of production and sales for a target profit level.

Cost volume profit analysis is defined as a managerial tool showing the relationship between various components of profit planning, viz. cost (both fixed and variable), selling price and volume of activity.

It is useful to the management in the following situations:

1) It helps in forecasting the profit fairly accurately.
2) It can ascertain the costs, sales and profits at different levels of activity so it is easier to set up flexible budgets.
3) It helps in performance evaluation for the purpose of management control.
4) It helps in formulating price policy.
5) It helps in determining the amount of overhead cost to be charged at various levels of operations.

2.12 BREAK EVEN ANALYSIS

Cost volume profit analysis is also popularly known as break even analysis. The difference between the two is very narrow. Cost volume profit analysis includes the entire gamut of profit planning while break even analysis is a widely used technique to study this process. *Break even point* is the point that breaks the total cost and the selling price evenly to show the level of output or sales at which there shall be neither profit nor loss. In other words it is the point where revenue and expenditure are same. If production is increased beyond this

level then there shall be profit and if it is decreased then loss shall be suffered.

Break even point = Fixed cost divided by selling price per unit minus variable cost per unit.

Costing of various services and departmental accounting are the bases on which the structure of break even analysis can be made. Cost centre is the fulcrum for such analysis. Let us take the example of radiology department as a cost centre. With reference to the number of investigations done in the radiology department income is known. On the basis of departmental accounting the revenue and expenditure of the radiology department can be ascertained. To find out whether the department of radiology is financially viable, work out the fixed and variable cost of the cost centre. By dividing the total cost by the number of investigations done during a specific period we can found out the cost of an investigation i.e. cost per unit. The selling price of an investigation is also known. From the above equation it is possible to know the exact point from where one can make profit. Let us assume the figures as: Fixed costs = Rs. 32,00,000; variable costs per unit = Rs. 200 and the selling price = Rs.1000. Break even point = 32,00,000 divided by 1000 minus 200 = 4,000 units. That means when number of investigations reach 4,000 units (tests) the break even point is reached. In other words, if the total number of investigations increase beyond 4,000 then there shall be profit and if it decreases beyond 4,000 then there shall be loss.

It will be easier to understand from the table. The bold row is the break even point.

No. of units Rs.	Fixed cost Rs.	Variable cost Rs.	Total cost Rs.	Revenue cost Rs.
1,000	32,00,000	2,00,000	34,00,000	10,00,000
2,000	32,00,000	4,00,000	36,00,000	20,00,000
3,000	32,00,000	6,00,000	38,00,000	30,00,000
4,000	**32,00,000**	**8,00,000**	**40,00,000**	**40,00,000**
5,000	32,00,000	10,00,000	42,00,000	50,00,000

2.13 LET US SUM UP

For providing high quality services in the hospital at an optimum cost it has become essential to understand the concepts of costs and the way they behave in different situations. Cost is the sacrifice made in order to obtain a good or service. There are mainly three elements of costs, viz., material, labour and expenses. All indirect costs are called overheads. Costs can be classified into variable and fixed costs, direct and indirect costs, and capital and recurrent costs. Each classification has its own significance in management decisions.

Cost accounting is a branch of accounting information system that records, measures and reports information about costs. Relationship between costs and output can be understood through total cost, average cost, and marginal cost concepts. Cost analysis is basically a technique of cost accounting. There are various methods of cost analysis. From a practical standpoint two methods of cost analysis are commonly used i.e., double apportionment and step-down method.

Cost volume profit analysis is valuable tool for profit planning. It forecasts the level of profit quite accurately. It is also popularly known as break even analysis. In fact, cost volume profit analysis includes the entire process of profit planning whereas break even analysis is a widely used technique to study this process.

2.14 KEY WORDS

Accounting : The art of recording, classifying and summarising in a significant manner and in terms of money, transactions that are, at least in part, of a financial character and interpreting the result thereof.

Budget : A formal, written estimate of income and expenditure for a future period, leading to the allocation of funds to budget holders.

Capital : The stock of goods which are man-made and used in production (as opposed to consumption). In accounting conventions, capital goods are usually taken as those with a life of more than one year.

Cost : What has to be given up to achieve something, either:

a) the value of opportunities which are forgone in order to achieve something (the economic definition); or

b) the total money expenditure required to achieve something (the accounting definition).

Cost benefit analysis : A form of economic evaluation where all the costs and benefits are expressed in money terms. In principle, this form of analysis enables one to assess whether a particular objective is worth achieving.

Cost effective analysis : A form of economic evaluation where the costs are expressed in money terms but some of the effects are expressed in physical units. It is usually used to compare different ways of achieving the same objective and assumes the objective is worth achieving.

Depreciation : Decrease in value of a capital good because of passage of time, wear and tear, etc. An allowance for depreciation may be included as an operating cost in accounts.

Efficiency : Relates to output per unit cost of the resources employed. Resources are being used efficiently if a given output is produced at minimum cost, or maximum output is produced at a given cost ('operational' efficiency). Economists also use the term in their wider sense of cost-effectiveness and cost-benefit analysis ('allocative' efficiency).

Expenditure : Outlay of money to purchase goods or services.

Fiscal : To do with public expenditure and with raising government revenue, for instance through taxation.

Fixed cost : Costs which do not vary with the level of output in the time period considered (usually one year).

Inputs : Goods and services used in production, such as capital goods (buildings, equipment), labour, raw materials, etc.

Marginal cost : The change in total cost at a given scale of output when a little more or little less output is produced.

Operating cost : The cost of operating an enterprise or service, also called recurrent costs.

Opportunity cost : The benefits to be derived from using resources in their best alternative use. It is therefore a measure of the sacrifice made by using resources in a given programme. When economists use the term 'cost' they mean opportunity cost. This may not be the same as health care expenditure.

Outputs : The end-result of production, that is what is produced.

Recurrent costs : Costs that 'recur' i.e. the costs of running an enterprise, such as salary and raw material costs. Also known as operating costs.

Resources : The inputs that are used to produce and distribute goods and services. They are conventionally classified into land (including natural resources), labour (people) and capital (goods made to produce other goods).

2.15 SELF ASSESSMENT QUESTIONS

1) What is cost?
2) What are the elements of cost?
3) Classify costs and define them.
4) What is opportunity cost?
5) Define cost accounting.
6) What are the various methods of assembling cost accounting data?
7) Define total cost, average cost and marginal cost.
8) Define cost analysis. What are the various pre-requisites of cost analysis?

9) Describe the methods of cost analysis.

10) Define cost-effectiveness analysis and cost-benefit analysis.

11) Define cost volume profit analysis. Enumerate the various uses of cost volume profit analysis.

12) What is break even analysis? What do you understand by 'break even point'. Illustrate with suitable examples.

13) State whether the following statements are true or false.

a) Opportunity cost is cost of sacrificed alternative.

b) Sunk costs are very important for decision making.

c) An item of cost which is direct for providing lab services may be indirect for patient care.

d) Fixed cost per unit remains fixed.

e) Variable cost does not vary with change in output.

14) Fill in the blanks:

a) ..... is a measure of all costs involved in providing a given level of service.

b) ..... is a measure of resources associated with a small incremental change in output.

c) ..... traces the costs of the individual organisational units called responsibility centre.

d) ..... estimates now the costs and revenues in one situation will differ is alternative situations.

e) ..... is the process of rearranging data or information is the existing accounts to obtain the costs of the services rendered by the hospital.

15) State whether each of the following statements is true or false.

i) Cost Volume Profit relationships aid is planning (T/F)

ii) In CVP analysis cost is an irrelevant variable (T/F)

iii) Lower selling prices will push up the break even point if volume remains constant (T/F)

iv) To be able to 'control' costs must be segregated into fixed and variable (T/F)

v) The higher the break even point the lower the fixed costs (T/F)

vi) Semivariable costs connot be separated into fixed and variable elements (T/F)

vii) Where total costs are Rs. 60,000, fixed costs are Rs. 30,000 and sales are Rs. 1,00,000 the break even point in rupees would be:

a) Rs. 50,450

b) Rs. 42,857

c) Rs. 45,332

d) Rs. 60,000

e) None of the above.

2.16 ANSWERS TO SELF ASSESSMENT QUESTIONS

For answers to SAQs 1 to 12, refer respective sections/sub-sections from this unit.

13) a) T b) F c) T d) F e) F

14) a) Total Costs

b) Marginal Costs

c) Responsibility Costing

d) Differential Costing

e) Cost Analysis

15) i) T ii) F iii) T iv) T v) F vi) F

vii) b) BEP in Rs = $\frac{\text{Fixed Costs} \times \text{Sales}}{\text{Sales} - \text{Variable Costs}}$

$= \frac{30,000 \times 1,00,000}{1,00,000 - 30,000} = \text{Rs. } 42,857$

2.17 FURTHER READINGS

Barnum, Howard and Kutzin, Joseph (1993): *Public Hospitals in Developing Countries, Resource Use, Cost Financing*; The John Hopkins University Press, Baltimore and London.

Berman, Howard J; Weeks, Lewis E. and Kukla, Steven F. (1990): *The Financial Management of Hospitals;* Health Administration Press; Ann Arbor, Michigan, U.S.A.

Khan, M.Y. and Jain, P.K. (1996): *Management Accounting;* Tata McGraw-Hill Publishing Company Limited, New Delhi.

Maheshwari, S.N. (1995): *Principles of Management Accounting;* Sultan Chand and Sons, New Delhi.

Seawell, L. Vann (1975): *Hospital Financial Accounting: Theory and Practice*, Hospital Financial Management Association, Chicago.

Trisolini *et al.* (1992): "Methods of Cost Analysis, Cost Recovery and Cost Control for a Public Hospital in Developing Country: Victoria Hospital, St. Lucia"; *International Journal of Health Planning and Management*, Vol.7, 103-32.

World Health Organisation (1992): *Hospital Economics and Financing in Developing Countries;* W.H.O.

UNIT 3 BUDGETING

Structure

3.0 OBJECTIVES

After going through this unit you should be able to:

- explain the concept and role of budgeting in managing hospitals and health care institutions;
- develop an appreciation of the budgetary procedures and administration and how to apply them to the existing health care set-up; and
- implement various budgetary techniques and approaches.

3.1 INTRODUCTION

The process of managing any hospital or health care institution to achieve its objectives necessitates a systematic approach to financial planning. For financial planning reviewing the past information alone is not sufficient since as hospital and health care administrator's job involves not only predicting but also shaping the future of their organisation. This involves proper planning of all the activities of the hospital or the health care set-up. A budget is an important tool for financial planning and control. It is an integral part of management which seeks to regulate the flow of its funds to the desired ends, since inspite of a good financial plan, the desired results may not be forthcoming if there is no effective control to ensure its implementation. The budget thus acts as a set of yardsticks or guidelines for use in controlling the internal operations of the hospital or a health care institution. The management through a budget can evaluate the performance of every department or level of utilisation of the hospital or health care set-up. The discrepancy between plan performance and actual performance can be highlighted through budgets. The organisation may also have to change the course of its operations in a particular area or revise its plans keeping in view of the changing conditions or environment. It, therefore, will be useful for you to understand the complete budgeting process and what actually a budget is?

UNIT 3 BUDGETING

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3.2 WHAT IS A BUDGET

Historically the word "budget" referred to a leather pouch or the leather bag in which the chancellor of exchequer in Britain carried to parliament the statement of Government's needs and its resources. Today, in Government, the budget refers to the statement of anticipated receipts and payments of the Government during a year and forms the basis of appropriations by the legislature. The budget of a commercial organisation has a wide connotation and we can generally equate budget with prompt planning in such organisations.

Hospital administrators are generally familiar with budgeting as an activity or exercise undertaken by their financial managers or accountants in the nature of a forecast of the income or expenses of their organisation for the ensuing financial year. In public sector or government owned hospitals, the primary purpose of the budget is to secure finances or grants from appropriate competent authorities. It is also used as an authorisation to incur expenditure on specified items or activities upto the amounts as indicated against each of them. After having understood what a budget is and what it means to different set ups we must now define a budget and identify its main characteristics.

3.2.1 Budget Defined

Simply defined, a budget is a statement of plans expressed in quantitative, usually monetary terms, covering a specific period of time, usually one year. It can also be described as a financial and/or quantitative statement, prepared and approved prior to a defined period of time of the policy to be pursued during that period for the purpose of attaining that objective.

3.2.2 Main Characteristics of a Budget

a) It is prepared in advance and is derived from the long-term strategy of the hospital or health care organisation.

b) It focuses on the future i.e., it is future oriented.

c) It is expressed in quantitative forms, physical or monetary unit or both.

3.2.3 How Does a Budget Help Us

A properly planned and prepared budget helps us in the following ways :

a) It brings about the efficiency and improvement in the working of the health care organisations.

b) It is a way of communicating the plans to various units or subunits of the health care organisation by establishing the divisional, departmental, unit or sectional budgets, exact responsibilities for incurring expenditures or generating revenue are assigned. It thus minimises the possibilities of buck passing if budget figures are not met.

c) It is a way of motivating various heads of health care organisations, the departmental or unit heads to achieve the goals set for them.

d) It serves as a benchmark for controlling ongoing operations.

e) It helps in developing team spirit where participation in budgeting is encouraged.

f) It helps in reducing wastages and losses by revealing them in time for corrective actions.

g) It serves as a basis for evaluating the performance of the managers.

3.3 CLASSIFICATION OF BUDGETS

Budgets can be classified in different categories on the basis of time, function or flexibility :

3.3.1 Time Based Budgets

These can be :

a) Long-term budgets which contain financial estimates over a 3-5 years or even a longer period of time.

b) Short-term budgets which have implication for one year or lesser duration of time depending over the management philosophy.

advance will always be there. Immediately after a month or a quarter passes, as the case may be, a new budget is prepared for a twelve month period. The figures for a month or a quarter which have rolled down are dropped and the figures for the next month or the quarter are added.

3.3.2 Function Based Budgets

These can be further subclassified as under :

a) **Capital Based or Planned Budgets**

These are directed towards proposed expenditures for new projects and often require special financing e.g., setting up a MRI unit or CT Scan centre in a hospital providing tertiary level care.

b) **Operational Budgets or Non-Plan Budgets**

These are directed towards achieving short-term operational goals of the organisation. Simply put it should plan operations for the forthcoming period i.e., the finances required for running a particular health care organisation during a defined period of time.

c) **Cash Budget**

This is a summary of health care organisation's expected cash inflows and outflows over a particular period of time. In other words cash budget involves a projection of future cash receipts and cash disbursements over a period of time intervals. The overall objective of a cash budget is to enable the health care organisation to meet all its commitments in time and at the same time prevent the accumulation of large cash balances with it. A cash budget helps the management in :

- determining the future cash needs of the health care organisation.
- planning for financing for these needs.
- exercising control over cash and liquidity of health care organisation.

d) **Sales or Revenue Budget**

This generally forms the fundamental basis on which all other budgets are built especially in case of the corporate hospitals and private nursing homes/hospitals. The budget is based upon projected revenues or sales that are to be achieved in a budget period. It is desirable to break up the entire sales budget on the basis of different departmental or services and time periods.

e) **Expenditure or Production Cost Budget**

These can be further subdivided into :

i) Materials requirement budget

ii) Materials procurement or purchase budget

iii) Labour or personnel budget

iv) Overhead including distribution overhead budget

v) Research budget

All the budgets refer to the expenditure that is likely to be incurred under these various heads for providing health care service facilities to the designated or targetted community by a health care organisation.

f) **Master or Final Budget**

This is a summary budget which incorporates all financial budgets in a capsule form. It sets out plan of operations for all departments in considerable details for the budget period. The budget may take the form of a profit or loss account, fund flow statement and balance sheet at the end of the budget period. The master budget requires the approval of the Budget Committee, about which you will read a little later in this unit, before it is put into operation. It may happen sometime that a number of master budgets have to be prepared before the final one is agreed upon.

3.3.3 Flexibility Based Budgets

a) **Fixed Budget**

A fixed budget is required to remain unchanged irrespective of the level of activity actually attained. In other words a budget prepared based on a standard or a fixed level of activity is

called a fixed budget. In relation to a health care organisation which projects that it will be capable of providing appropriate services to say one lakh clientele in a year, the budgeted requirement will be projected to meet the expenditure involved for catering to one lakh clientele only. Since the budget does not change with the change of level of activity (say one and a half lakh clientele in the aforementioned case), it becomes an unrealistic yardstick in case the level of activity actually attained does not conform to the one assumed for the budgeting purposes. The management will not be able to assess the performance of different departments on the basis of budgets prepared by them, because they can serve as yardsticks only when the actual level of activity corresponds to the budgeted level of activity.

b) **Flexible Budgets**

This is a budget designed to change with the level of activity actually attained. The budget prepared catering to the budgeted costs for any level of activity is known as flexible budget. For preparation of flexible budgets the fixed and variable elements of cost changes that may have to be expected for each item at various expected levels of operations are arrived at and taken into account. Let us take an example :

An x-ray machine can take out say 10,000 x-rays at 100% capacity with the cost composition of :
Fixed Rs. 5,00,000
Variable Rs. 30 per unit
Semivariable Rs. 40 per unit of which 40% i.e., Rs. 16 per unit is variable and Rs. 24 is fixed.
Flexible budget for 80%, 90% and 100% activity level will be

Flexible Budgets

Units	8000 80%	9000 90%	10,000 100%
Fixed Costs	500000	500000	500000
Variable Costs	240000	270000	300000
Semivariable Cost–Fixed (Rs. 24@ 10000)	240000	240000	240000
Variable (40%) Rs. 16 per unit	128000	144000	160000
Total Cost	1108000	1154000	1200000

Within the range of 80% to 100% the computation has been given. If the increase in the actual level of activity is only 95% the computation of cost for the level of activity is easily possible as given below:

Fixed Cost	Rs. 500000
Variable Cost	Rs .285000
Semivariable Cost	
Fixed Cost	Rs. 240000
Variable Cost	Rs .152000
(Rs. 16@ 9500/unit)	
Total Cost	**Rs. 1177000**

Thus you can see that in a system of flexible budgets adjustments are provided for varied activity levels. Infact flexible budget is nothing but a series of fixed budgets catering to the estimates of revenues and costs at different activity levels. Based upon the flexible budgets the performance budgets can be prepared indicating revenues and costs for the actual level of activity.

3.4 BUDGET PROCEDURE AND ADMINISTRATION

Before we discuss the budget administration and procedure, we must be aware that if any benefits are to accrue out of budgeting, certain prerequisites are mandatory.

3.4.1 Prerequisites for Budgeting

They are :

- Clear identification of financial and service goals.

clearly defines all accountability.

- Participation of the staff members in the formulation of the budget.
- An accurate accounting system capable of accummulating and appropriately assigning all financial data.
- A chart of accounts that corresponds to the organisation structure and allows for the accummulation of actual cost data by cost and responsibility centre.
- A management information system capable of collecting non-financial data relative to total volume of services demanded and per cost centre workload.
- Management determination to make the budgeting process work.

It is critical to recognise that while organisation structures, data and procedures are all necessary, they are all of secondary importance when compared to capable management. Budgeting is fundamentally a people moving as opposed to a paper moving process. If budgeting is to be successful all levels of management must understand its value and limitations, how the budget is to be developed and used and their own specific roles and responsibilities in relation to the budgeted activity/output.

3.4.2 Budget Administration

The following steps are essential for administration :

a) **Preparation of Budget Manual**

Since a budget is formulated at the instance of top management, and details provided and compliance ensured by the subordinates, there has to be formal communication between the two. These could be in the form of oral as well as written instructions. A budget manual is an orderly presentation of these instructions or directives. The work relating to budget manual preparation should be coordinated by the budget officer. The details should be provided by the heads of the operating departments and the final outcome approved by the management. Each subsequent change, there after, should be approved by the management.

A budget manual is tailored to fit the needs of each hospital or a group of hospitals or the health care organisations/unit where it is to be used. The contents of a typical budget are outlined below :

- General statement of hospital objectives and budget procedures
- Identification of persons involved in the budget exercise, and definition of their powers, duties, responsibilities and area of their operations
- Routine for departmental budget preparation, their review and approval
- Time schedule for budget preparation
- Procedure for budget revision
- Budget reports
- Performance reviews
- Feedback for future budget planning

b) **Appointment of Budget Officer**

He acts as a coordinator when the budget is being prepared. He reports monthly actual performance comparing it with the budget, analysing the variables between the two by responsibility and cost centre and organises follow up action. The budget officer works under the guidance of the budget committee.

c) **Budget Committee**

The budget committee comprises the heads of the various departments with the chief executive officer or the Director Administration or the Medical Superintendant or the Finance Manager as the chairman. The budget committee has the following responsibilities:

- Identify various opportunities and set goals.
- Set specific targets to be achieved during the course of the year.
- Provides the guidelines for the preparation of the budget.
- Set time table for the completion of the budget exercise.

- Approve the budget of the department and consolidates departmental budgets into a total master budget.
- Review actual performance.
- Establish long-term budgets.

d) **Budget Calendar**

This indicates specific dates for preparing individual parts of the budget, discussing them with the concerned department heads and getting them approved. This ensures that each of the department receives adequate and appropriate attention and the whole exercise is completed by the due date.

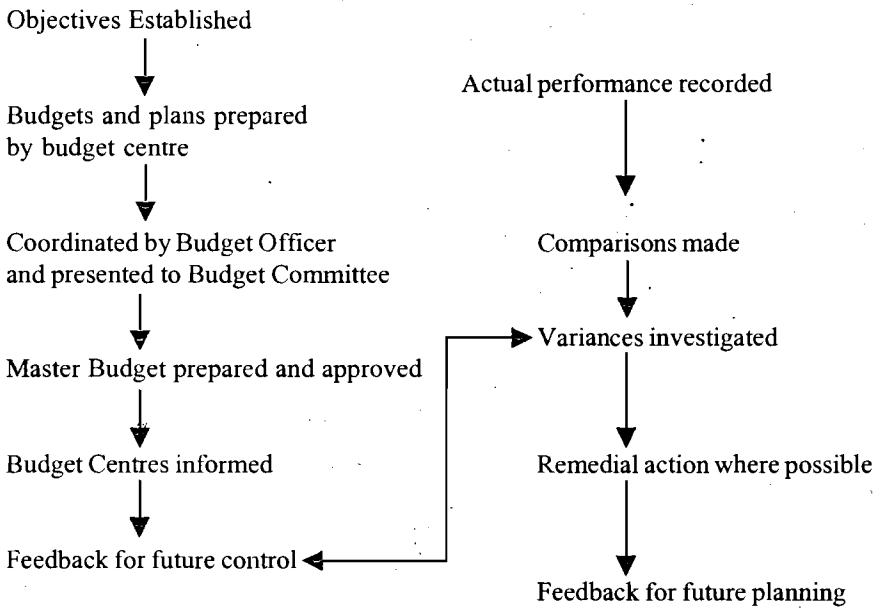
e) **Budget Period**

This means the period for which a budget is prepared and employed. Generally the budget period is taken to be a financial year, beginning on April 1st and ending on 31st March. The budget period can however be longer as well as shorter.

3.4.3 Budget Procedure

- The budget manual lays down the guidelines as well as standard procedures and formats based upon which the departmental heads or budget centre heads prepare the departmental budgets keeping in view the departmental objectives which should be a part of or contribute towards the overall financial and the service objectives of the health care organisation or the hospital.

Exhibit – Budget Procedure



- The budget officer guides the departmental heads in budget preparation and acts as overall coordinator in the exercise.
- The budget committee receives, reviews and consolidates the departmental budgets into a total master budget, which also incorporates and is supported by important functional budgets viz. purchases, engineering etc.
- After approval of the Master Budget and on the availability of the funds the budget is allocated and appropriated to various departments.
- The performance is then compared with the budgeted allotment and wherever required a midyear review is undertaken and if there are major changes in basic parameters, suitable alterations are made and budgets are revised for the second half of the year.
- The deviations from the budget allocation are analysed and then these variations are kept in mind as a feedback for the future budget planning and control.
- A brief outline of the budget procedure explained above is given in the exhibit :

3.4.4 Benefits of Budget Procedure

The benefits that accrue from using the budget as a management tool are :

a) **Orderliness in Planning Process**

The main budget is supported by departmental/functional budgets expressed in monetary/ quantitative terms based upon use of resources, income and costs. The plans are reduced to specifics to be achieved with provisions for continue review of performance. In the process a kind of orderliness is introduced. It guards against unplanned expenditure and undue optimism.

b) **Decentralisation of Accountability**

Since departmental heads/head of budget centres have been delegated the authority for preparing their budgets, buck passing is avoided.

c) **Performance Appraisal**

The budget provides a yardstick or norms for evaluation of performance.

d) **Coordination**

The key personnel are informed about the health care organisation goals, policies and procedures as well as about the environmental and organisational changes within which the budget is framed and what is expected from the individual manager. This budget exercise serves an important instrument for interpersonal and organisational communication as well.

e) **Creation of a Database**

The exercise results in ready availability of substantial data at one point. For example it could identify departments which need investments or the data provided in the budget detail sheets could be utilised to establish trends for future growths.

After becoming aware of budget administration and budget procedures to be followed we must now determine what are the prevailing techniques or approaches that are being practised or used for budgeting.

Activity 1

Study the hospital/health care organisation that you are involved with respect to the budgeting process on the basis of your study report or

a) What are the types of budgets that are prepared in the organisation?

b) How are budgets administered?

c) Are there any parts of activity which are not covered by the budgeting process? Identify.

3.5 APPROACHES TO BUDGETING

Various organisations use different approaches to budgeting. A few of the approaches being utilised and briefly discussed and described in the subsequent paragraphs.

3.5.1 Incremental Approach

This approach is a commonly used approach by majority of the health care organisations especially by governmental and public health care systems. In this approach the previous years spending level is extrapolated to the next year and incremental estimates for salary and cost of material are made. This level is further incremented to new projects and programmes expected to be undertaken in the following year to arrive at the final requirement.

In the incremental approach only the incremental portion of the previous years allocation are justified, the assumptions made are that all old activities are essential to achieve objectives, that these must be continued as they are more important than the new programme, that these are being performed in the most cost effective manner and would continue to be in future.

The drawbacks of the incremental budgeting approach are as under :

a) It analyses only the financial aspects.

b) Expenditures are not related to the intended or planned outputs (achievements).

c) It is basically accounting oriented, does not link inputs and outputs and hence there is no information about the activities and their contribution to the objectives of the health care organisations.

d) In the event of resource crunch, the acts are arbitrary.

e) It assumes that the cost efficiency of past activities would continue to remain the same in future years.

The incremental budget is thus equated to "an elephant with muscles of a mouse and brains of an amoeba". Consequently the surgeon does not know where to apply the scalpel to cut out the fat. Administrators feel frustrated as there is no relationship between expenditure and result and it does not provide adequate control over the inputs and outputs. Such a system of budgeting cannot be expected to promote operational efficiency. It may, on the other hand, create several problems for the management. Some of these are :

- Programmes and activities involving wasteful expenditure are not identified, resulting in avoidable financial and other costs.
- Inefficiencies of prior years are carried forward in determining subsequent years level of performance.
- Managers are not encouraged to identify and evaluate alternative means of achieving the same objectives.
- Decision making is rendered irrational.
- Key problems and priorities are not established.
- Managers/Administrators tend to inflate their budget requests resulting in more demand for funds than their availability.

In order to correct the shortcomings of traditional or incremental approach to budgeting, performance budgeting was designed by emphasising and incorporating both financial and physical aspects.

3.5.2 Performance Budgeting Approach

The technique was developed and recommended in 1949 and implemented by the US government.

The performance budget lays more stress on accomplishments and generates adequate information on costs and work accomplishments for decision making at appropriate levels.

Definition : Performance budgeting may be defined as the process of analysing, identifying, simplifying and crystallizing specific performance objectives of a job to be achieved over a period in the framework of the organisational objectives.

Main Objectives of Performance Budget

- To coordinate the physical and financial aspects of organisational performance.
- To improve the budget formulation, review and decision making at all levels of management.
- To facilitate better management and review by controlling authorities (Legislative, board of trustees, management boards etc.).
- To make more effective performance audit possible.
- To measure performance in relation to long-term objectives.

Essentials of Performance Budgets

- Formulating objectives which should be clearly defined and financially possible.
- Programme/activity classification which should be meaningful and bring out the main purpose. It is required to accomplish and should be in line with the objectives sought to be achieved through the expenditure of budgeted funds.
- Norms and standards setting is essential for establishing corelation between the

physical and financial aspects of a programme of activity. The setting of physical targets for accomplishment in respect of each programme activity is mandatory to enable working out of corresponding financial estimate for incorporation in the budget. Appropriate norms and standards supported by adequate data reduce subjective element and increase objectivity in framing and scrutiny of budget estimates.

- Preparation of periodic performance report comparing budget and actual data and showing variance in order to take corrective measure to avoid future deviation from the budget.

Format for Performance Budget

a) Introductory : It includes brief narration of the objectives and goals of the organisation in both qualitative and quantitative terms wherever possible.

b) Financial Requirements :
   - Work programme /activity classification
   - Objective-wise classification of expenditures like salaries, materials etc.
   - Source of financing indicating demand for grants etc.

c) Explanation of Financial Requirement : It attempts to corelate financial and physical aspects. It is to be prepared activity-wise and it should give to the extent possible workload factors, norms, standards and targets besides indicating the previous years performance and target requirements for input and detailed work plan and schedule. These aspects can be formatted as under :
   i) Name of activity Actual (last year) Revised Estimate (current year) Budget estimate (next year)
   ii) Name and purpose of activity
   iii) Physical works, input and outputs
      - Workload factors, norms, standards and yardsticks.
      - Progress during last and current year (Actual Vs Targets)
      - Explanation of variations
      - Targets for next year
      - Requirements for inputs including staff, training, materials and equipment
      - Detailed workplan and schedules.

3.5.3 Zero Based Budgeting Approach

The Zero based budgeting approach emerged as a consequence of the following :

a) A keen desire to ensure that scarce resources are optimally utilised.

b) Frustrations of the management as there was no relationship with expenditure and results obtained

c) Adequate control over input was not forthcoming or available.

Definition of Zero Based Budgeting

It is a planning and budgeting process which requires each manager to justify the entire budget request in detail from scratch (hence zero base) and shifts the burden of proof to each manager to justify why he should spend any money at all.

In zero based budgeting all activities must be evaluated to see which of them should be eliminated, funded at reduced level or funded at similar or increased level.

Objectives of Zero Based Budgeting

a) To evaluate claims on scarce resources in the light of hospital objectives.

b) To make tradeoffs amongst current operations, developmental needs, profits and availability of resources.

Process of Zero Based Budgeting

The Zero based budget has four basic steps as under :

a) **Identification of the decision content :** In the first step we have to identify the entities

of the health care organisation where the managers would be responsible to take decision on the expenditure and would prepare decision package.

A decision unit should not be at too low a level as it would increase the paper work nor it should be at too high a lev .l as this will prevent easy access and meaningful review or dialogue. Generally it may be a unit or a department of the hospital or it may be a project or a programme or a special assignment.

Once the decision unit is identified the zero based system requires an explicit statement of the objective of the decision unit in terms of future mission and long-term goal.

b) **Formulation of decision package :** Decision package is a document that identifies a specific activity in such a manner that management can evaluate it and rank it against other activities competing for the same or similar limited resources and decide whether to approve or disapprove it . There are two types of decision packages :

i) *Mutually exclusive decision package:* These identify the alternative ways of performing the same function. The best alternative is chosen and other discarded. The next step is to develop incremental packages.

ii) *Incremental decision packages :* This analyses, identifies alternative levels of effort or spending that may be expended on performance of an activity or function. It would identify the minimum level of activity or cost levels of efforts as separate decision packages.

An example would clarify the concept better. Let us take the case of a community hospital where the following activity is identified.

"Provision of ultrasonography facility in the Radiology department for the clientele".
The mutually exclusive package or the alternative ways of achieving the same function could be:

Package I : Ultrasonography facility provided by a nearby diagnostic centre which will charge the hospital on the basis of services rendered or on retainer basis.

Package II : The hospital management provides an ultrasonography machine within the Radiodiagnosis department of the hospital itself.

Let us assume that management has done a cost-benefit analysis on the two packages and has opted for the second decision package.

The mutually exclusive decision package would require to be complemented by incremental decision package in terms of personnel, equipment and maintenance facilities. Therefore, different levels of efforts or operational efficiency would also have to be identified in terms of whether additional qualified manpower will be required or not and whether maintenance is to be done by operating staff or on the basis of an annual maintenance contract. The financial implications, the result of financing and the consequences of non-financing at each level of effort will have to be worked out and included in the incremental decision package.

The decision package will generally contain the following items :

i) General Information : Title or name, level of effort, department, location, manager's name and to whom reporting.

ii) Description of the function or the activity

- Objective or function of the activity
- Tangible or intangible benefits to be derived from funding
- Consequences to result from non-funding
- Projected revenues and cost of decision packages
- Alternative approaches or packages.

Following subjects could be beneficially analysed and can be good issues for decision packages viz. cost or profit centres, people or programmes, services rendered or provided, capital expenditures, cost reduction or revenue enhancement.

c) **Ranking the Decision Packages :** This is achieved by :

- Listing all packages identified in order of decreasing benefit to the hospital or the health care organisation.
- Identifying benefit at each level of expenditure.
- Study consequences of not approving the decision package.
- Ranking of more than one decision package on the basis of perceived importance of priority for attaining the objectives.

The ranking is done at all the levels of decision units and continues till the top level, where decision package for the entire organisation are ranked in order of importance and a single consolidated list is produced.

d) **Allocation of Resources**

Once the final single consolidated ranking is done, the packages to be funded are separated from these not to be funded. The activities which are not amenable to zero base budgeting are added and the final budget prepared by allocating forecasted resources. Any increase in funding level can be done easily from the packages available which were discarded due to non-availability of funds. Reduction can be made by removing the low priority packages out of the packages in the event of resource scarcity.

Adequate feedback is also provided to the managers on the reasons for their decision packages being accepted or rejected.

Limitation of Zero Based Budgeting

- It is less applicable to those cost which have no direct cost benefit relationship.
- Greater amount of time and effort will be required in the initial stages.
- Identification and development of decision packages in case of non-quantifiable or intangible benefits would require a high degree of management expertise.
- There may be greater amount of paper work in zero based budget.

Advantages of Zero Based Budget

a) Financial
   i) Better allocation of resources
   ii) Improves productivity and cost effectiveness
   iii) Helps in reducing costs

b) Development of human skill and interpersonal relationship :
   i) Better communication between various heads and personnels of decision units.
   ii) Higher level of commitment to approved activities since subordinates are involved in preparing decision packages.
   iii) Improves interpersonnel relationships and espirit de corps.
   iv) Helps in sharpening of planning and control activities.
   v) Assists in evaluating the results of activities.

Note: Flexible /fixed approach to budgeting has already been discussed in section 3.3.

Activity 2

With respect to your own hospital/health care organisation, critically evaluate whether zero base budgeting can be effectively applied. For your hospital

- Identify the decision content
- Formulate the decision package
- Rank the decision package, and

suggest how the resources ought to be allocated, keeping in view the overall organisational objectives.

On reflecting on the foregoing it would seem reasonable to conclude that the budgetary process should be the centre piece of a hospital's or health care organisation's management system. Unfortunately this is often not the case. In one form or the other, most hospitals

and health care organisations typically have some type of budgetary process. Often, however, the budgetary process, due to insensitive designs or clumsy implementation acts only to burden or intimidate the staff. The net result in such circumstances is that budgeting often becomes little more than a paper exercise. More important the management focus shifts from using budgeting as a means for achieving the hospitals or health care organisation's goal to subverting the process, so as to blunt its influence on operating decisions.

For the value of budgetary process to be realised, its management power as well as its psychological, operational and interpersonal relationship subtleties must be recognised. In broad terms this means that the design and implementation of the budgetary process must be guided by common sense and an operational understanding that all processes have a set of biases to which the managers or departmental heads will respond.

Common sense is a phenomenon that is so simple and obvious in its conclusion, and so elegant in its presentation that until it directly confronts one, it is often difficult to see. To facilitate this confrontation, the above text has been conceived and written for it to be read, understand and applied.

3.6 LET US SUM UP

A budget is a quantitative statement of plan usually in financial terms covering a specific period of time. It is an important tool for financial planning and focuses on the future. It helps in uncovering inefficiencies in operations, in minimising wasteful expenditure and serves as a basis for education and evaluation of the managers.

The budget can be classified into different categories on the basis of time, or flexibility. The time based budget may be long-term, short-term or rolling budget. The based budget may be planned or unplanned budgets, cash budgets, revenue or expenditure budgets and master or final budget. The flexibility based budget may be fixed or flexible.

Certain pre-requisites are mandatory for process of budgeting. These are a well designed organisational structure, clear identification of financial and service goals, accurate accounting system, participation of staff members in budgetary formulation and commitment of top management.

The budgetary manual, which is tailored to fit the needs of each health care organisation or hospital, lays down the guidelines for budget preparation giving details of powers, duties, responsibilities and areas of operation of each executive or departmental heads in the organisation.

The departmental heads prepare the departmental budgets based upon the guidelines given in the budget manual and are assisted and guided by the budget officer. The budget committee receives, reviews and consolidates the departmental budget into a total master budget which is supported by important functional budgets viz. purchases, personnel, engineering etc.

The budget is prepared and employed for a particular period called the budget period and the budget calendar indicates the specific dates for the preparation and approval of individual parts of the budget. The actual performance against the budgetary outlays are recorded and variances are investigated to serve as future feedback devices for planning of subsequent budget. The budget procedure helps to bring about an orderliness in planning process, decentralises accountability and assists in fostering communication, coordination, creation of a database as well as in performance appraisal.

There are various techniques available for budgeting. The incremental approach which takes the current level of operations as the basis of estimating the future level of operation suffers from several drawbacks and is gradually being replaced by more modern approach that are more focused on accomplishments or achievements made i.e., performance budgeting. Zero base budgeting is yet another technique that suggests that an organisation should not only make decisions about the proposed new programme but should also form from time to time review the appropriateness of the existing programme. Each programme whether new or existing has to be justified in its entirety each time a new

budget is formulated. Zero base budget has the limitation of involving more time, effort and paperwork in the initial stages but its financial and managerial advantages far outweigh its limitations.

3.7 KEY WORDS

Budget : A statement in financial terms, prepared prior to a defined period of time sharing the strategy to be pursued during that period for the purpose of attaining a given objective.

Budget committee : It receives, reviews and coordinates departmental budgets into a total master budget and lays down the procedure for preparing and monitoring budget.

Budget calendar : It lays down the specific dates for preparation, discussion and approval of departmental budget with a view to complete the entire budget exercise within the desired or previously laid down period of time.

Budgeting : Process of making a budget

Budget manual : A document which incorporates the statement of the general objectives and budget procedures and sets out the responsibilities of the persons engaged in the routine of and the form and records required for the budget control.

Budget officer : An officer who coordinates the preparation of the budget, monitors its progress, analyses the variation by responsibility and cost centres and organises follow up action.

Budget period : The duration for which budget is prepared and employed.

Capital budget : It is the budget that is directed towards utilisation of funds for the acquisition of fixed or long lived assets or new projects from which a stream of benefits is expected to be received during future years.

Cash budget : It is a summary of cash inflows and outflows over a period of time.

Decision package : A document that identifies a specific activity in such a manner that management can evaluate it and rate it against other activities competing for the same or similar limited resources and decide whether to approve or disapprove it.

Decision unit : A significant programme individual department or unit or level of an organisation that can be analyed from the standpoint of describing and funding.

Fixed budget : A budget designed to remain unchanged irrespective of the level of activity.

Flexible budget : A budget designed to change in accordance with the level of activity actually attained.

Incremental budget : It is a traditional and commonly used approach of budgeting wherein the previous years expending level is extrapolated for the next year and the incremental for processes, material and inflation is added.

Master budget : Summary budget incorporating all components of financial budget which is finally approved, adopted and employed.

Non-planned or operational budget : It is the budget that is directed towards utilisation of funds for achieving the short-term operational goals.

Performance budget : A budget which specifies the outputs or results to be achieved along with the inputs or expenditures to be incurred during the budget period.

Zero base budgeting : An operational planning and budgeting process which requires each manager to justify his entire budget in detail from scratch.

3.8 SELF ASSESSMENT QUESTIONS

1) What do you understand by the term budgeting? Mention the types of budget that the management of a 750 bedded tertiary care hospital should normally prepare?
2) What are the prerequisites for budgeting?
3) State various steps essential for budget administration.
4) What is budget committee and what are its responsibilities?
5) Briefly outline the budget procedure. Enumerate the benefits of a budget procedure.
6) "The budgets never work out as planned. Conditions always change, so why bother to make them?" Enumerate the points that you would make, briefly when confronted with the arguments expressed in the above quotation.
7) Name the various approaches to budgeting.
8) Briefly describe the approach to budgeting being followed in your hospital and/or your health care set-up. State your role in the budgeting exercise, if any. Discuss the positive and negative aspects of the approach being followed. How would you improve it if you had your way?
9) Write a lucid note on flexible budgets.
10) What is a budget manual? List briefly its contents.
11) What are the advantages of incremental approach?
12) What are the objectives of Performance budgeting ? Briefly explain the performance budgeting approach. How it is better than incremental approach ?
13) What is Zero Base Budgeting? Briefly describe the process of zero base budgeting and list its advantages.

6) Match the following :

A	B
a) Capital budget	Summary of cash inflows and outflows
b) Operational budget	Justifies entire budget requests from scratch
c) Zero base budget	Planned budget
d) Cash budget	Programme and activity classification is a must
e) Performance budget	Non-planned budget

UNIT 4 FINANCIAL CONTROL

Structure

4.0 OBJECTIVES

After reading this unit, the student will be able to understand:

- the various tools of financial control;
- auditing procedures and audit objections; and
- do's and don'ts in financial management.

4.1 INTRODUCTION

Management control is the process by which the managers ensure that the resources are obtained and used economically to accomplish the organisation's objectives. It includes administrative and accounting controls. Administrative controls refer to the plan of the organisation, procedures and records that form part of decision making process and management's authorisation of specific transactions. Accounting controls ensure that the administrative controls are in their place.

Essential features of a financial control system are: (i) proper accounting system; (ii) existence of standards of performance; and (iii) regular review of actuals with what was planned. Its objectives are (i) income is properly accounted in the hospital accounting records; (ii) expenditure is genuinely incurred for hospitals activities; (iii) its resources are economically used; and (iv) the assets belonging to the hospital are in their physical custody.

For Accounting to be useful and reliable, the following are a must:

1) Adoption of mercantile system of accounting (recording of income and expenditure when they occur) instead of cash basis (recognising income and expenditure when actual cash receipts and disbursements take place).
2) Recognising depreciation as an item of cost.
3) Preparation of Income and Expenditure Statement and Balance Sheet at more frequent intervals, say monthly, soon after the accounting period is over.
4) Greater analysis of individual items of income and expenditure in Accounting books.

Hospital costs are rising in an unprecedented manner and there is a gradual realisation to make the services more cost efficient. Good financial management covers financial information, financial advice, cost analysis and cost control. The basic concepts in accounting, types of accounts and their application, account books and their maintenance, cost accounting, elements of costs, financial planning and financing and budgets have already been dealt in the previous chapters. This unit basically deals with the tools of financial controls and auditing.

4.2 TOOLS OF FINANCIAL CONTROL

Some of the relevant tools and strategies for financial controls in hospitals are:

1) budget,
2) financial analysis and control,
3) cost analysis and control,
4) financial reports and information system,
5) statistical analysis and cost control, and
6) cost containment.

4.2.1 Budget

The previous chapter has discussed at length about the definition, types, procedures for preparation, implementation and control of budgets. In spite of the various criticisms and deficiencies cited by various authorities, the financial budget continues to be a potent tool of management and financial control. As such, it acts as both an indirect and direct aid in controlling the operations within the hospital system. It provides the basis for management control by establishing the standard (the expectations) to which actual performance must be compared in order to identify out of control operational processes. It must be recognised that operational control cannot be effective, unless there is a standard – the budget, against which actual performance can be measured and evaluated. In short the budget control can be achieved through:

i) keeping a constant watch over the budget in action,
ii) continuously reviewing of actuals with the budget,
iii) analysing deviations in actual performance,
iv) taking remedial action where indicated,
v) revising the budget if conditions warrant.

4.2.2 Financial Statement Analysis and Control

This makes extensive use of financial statements such as, income and expenditure, balance sheet and financial ratios such as return on investment, earning per share etc., from the statements and ratios, the financial information, and evaluates the data with respect to liquidity, profitability and potential or actual problem areas and plan the various actions accordingly.

The income and expenditure statement for hospitals, the use of balance sheet and some of the important financial ratios are given below:

a) **Income and Expenditure Statement**

Income and expenditure statement reflects the results of the hospital's operations for a

stated period. Only broad classification of accounts is done. Details can be furnished in separate schedules. At times, functional indicators like income and expenditure per inpatient day, income per outpatient, etc. are given, and important statistics like admissions, discharges, fresh outpatients, repeat outpatients, patient days, etc., can also be given.

Usually, outpatient and inpatient income and expenditure are separately accounted. The income and expenditure of various departments are worked out department-wise. This is essential for the purpose of evaluating financial performance of each department, and in determination of costs of providing each service.

Income accrues from various routine medical services, support facilities, donations, grants, bank interest, investment returns, etc.

Record of expenditure for any free of cost or concessional care should be maintained separately. This is necessary to satisfy government authorities or organisations which give grants or subsidy. Cost of free and concessional care is shown as a deduction from the operating income.

Expenditures are incurred for salaries, supplies and materials, electricity, water, telephones, maintenance and contingencies, etc.

From the income and expenditure statements furnished at regular intervals, various rates and ratios can be calculated to ensure department-wise, facility-wise and operation-wise performance. A continuing decrease in incomes under certain heads calls for review of the management strategies of that department and accordingly plan the remedial measures. A continuing increase (disproportionate) in expenditure under different heads calls for evolving cost containment strategies.

There is a growing realisation amongst hospital administrators of the fact that if income and expenditures are continuously monitored, it provides the necessary information at a glance wherein the management controls are to be exercised and corrective measures required to be taken.

b) **Balance Sheet**

A balance sheet represents financial position as on a specific date. It is a statement of assets and liabilities. It reflects what the hospital owns and what it owes to others. Only total figures are given against each of the main accounts. Detailed schedules can be annexed if required.

A hospital's assets and liabilities consist of, though, not limited to the following:

Assets

1) Fixed assets: These are physical assets for long-term intended use.
   - Buildings
   - Land and grounds
   - Plant, machines and equipment
   - Furniture
   - Vehicles
   - Constructions in progress
2) Current assets : They consist of the following:
   - Cash in hand and bank
   - Short-term deposits and investments
   - Accounts receivable
   - Other receivables
   - Inventory of supplies and materials in stock.

Liabilities

1) Current liabilities

- Bills/Accounts payable
- Provisions for expenses

2) Long- term liabilities
   - Mortgages
   - Long-term loans
3) Special funds
   - Emergency fund
   - Endowment fund
   - Training fund

The balance sheet is a cumulative record of the assets, liabilities and owners' equity of an organisation. Whereas the income statement reports on the revenues and expenses of the organisation for a period of time such as a month or a year, the balance sheet reports on the organisation's assets, liabilities and owner's equity at a point in time, namely, the end of business of the last day of the accounting period. Thus, the balance sheet provides a snapshot of the organisation at a single instant, whereas the income statement provides a summary of the revenues and expenses accumulated during the period being reported. This is usually the time since the last financial statements were issued.

The format of the balance sheet follows the fundamental accounting equation:

Assets = liabilities + owner's equity.

Collectively, the current assets are called the working capital of the organisation. Working capital is used by an organisation for day-to-day operations to turn its capacity, as represented by its non-current assets, into products/services. Working capital management aims at safeguarding and controlling the hospitals' current assets and planning for sufficient liquidity to pay current bills. Excessive idle cash is identified and invested to earn a return while care is taken to avoid the risk of inadequate cash to pay bills on time.

The major use of the balance sheet as a financial tool is as a statement of an organisation's financial positions at a given point of time. It shows balances in permanent accounts and the effect of all accounting transactions since the first day of operation. When used in conjunction with income statement various financial ratios can be developed to gain an insight into the liquidity and management aspects of the organisation.

c) **The Statement of Cash flows**

In addition to the income statement and the balance sheet, there is a third major financial statement that must be prepared by investor-owned health care provider that is the statement of cash flow. The statement of cash flow summarises cash flows resulting from the three major management activitiesn such as operations, investments, and financing.

A statement of cash flows for an organisation may be given as:

Cash flows from operating activities

Cash received from patients	Rs. 6,000	
Cash paid to suppliers	(Rs. 5,000)	
Cash paid for operating expenses	(Rs. 2,000)	
Cash paid for rent in advance	(Rs. 3,000)	
Net cash provided by operating activities		(Rs.4,000)

Cash flows from investing activities

Payment on note related to equipment purchase	(Rs. 25,000)	
Net cash used in investing activities		(Rs. 25,000)

Cash flows from financing

Owners' initial investment	Rs. 1,00,000	
Proceeds from long-term debt	Rs. 50,000	

Net cash provided by financing activities	Rs. 150,000
Net increase in cash and cash equivalents	Rs. 1,21,000
Cash and cash equivalents at beginning of year	0
Cash and cash equivalents at end of year	Rs. 121,000

In addition to the actual statement itself, preparers are required to provide two related schedules: (1) Reconciliation of net income to net cash provided by operating activities, and (2) Supplemental schedule of non cash investing and financing activities. In addition, the organisation must present a disclosure of their accounting policies regarding the determination of cash equivalents.

d) **Funds Flow Analysis**

The funds flow statement indicates the sources from which funds have been obtained and the application thereof during a given period. It is important to finance the various assets by acquiring funds form appropriate sources. Adequate availability of appropriate types of funds is essential because finance is the life of an organisation. Projected funds flow statements are one of the important tools of financial analysis and planning.

It may be noted that 'funds refers to total resources' and working capital and not just to cash.

e) **Financial Analysis**

Financial analysis refers to the process of determining the significant operating and financial characteristics of the accounting data. Financial ratios help in financial analysis and are used to locate the symptoms of problems. Once the symptoms have been located, one has to determine the cause of the problem so that remedial measures are planned to correct the situation.

Financial ratios are useful in comparing the performance of different hospitals, different departments within the same hospital, and also in comparing the performance over different periods of time.

From all the financial accounts on the balance sheet, income statement, it is possible to formulate countless ratios. To be successful in financial analysis, the analyst must select only those ratios that provide significant information about the hospital situation.

A ratio expresses the relationship between two numbers, such as net revenues and net expenses. But it is difficult to evaluate a single ratio unless some standard or normative values are available for comparative analysis. The ratios can be useful when a combination of ratios are used to evaluate management performance.

Liquidity ratios and capitalisation ratios focus primarily on the balance sheet, whereas the performance ratios generally use data from the statement of revenue and expenses or income statement. Turnover ratios tend to use data from both balance sheet and income statement. Collectively, the ratios enable management to evaluate the financial condition of the organisation.

Liquidity Ratios

Current ratio is the most frequently used liquidity ratio. It relates current assets to current liabilities and is useful in identifying possible short-term liquidity problem. A ratio greater than one is considered to be a sign of prudent liquidity management, for this allows a margin of safety in an organisation's ability to meet its current obligations.

Current ratio = current assets/current liabilities

A high ratio may indicate an excessive amount of current assets and may indicate a failure to properly utilise the resources. Whereas a low ratio is an indicator of the fact that the hospital may not be able to pay its future payments in time.

The quick ratio or acid test is a more precise measure of liquidity than the current ratio because inventories, which are the least liquid of current assets, are excluded from the ratio.

Quick ratio (Acid test ratio) = Current Assets – Inventories/ Current liabilities

A higher ratio than one indicates that there is excess cash or receivables, both signs of lax management. A low ratio is usually an indication of possible difficulties in prompt payment of future bills.

Solvency Ratios

Long-term Debt to Fixed Assets = Long-term Debt ÷ Net Fixed Assets

Ratio of the proportion of fixed assets financed through long-term debt. The higher the ratio the less relative security perceived by a lender and the more difficult it will be for the hospital to secure future loans.

Long -term Debt to Equity =Long-term Debt ÷ Equity

Ratio of the two long-term sources of the hospital's financing. As this ratio increases the hospital becomes more highly "leveraged," and its ability to acquire future debt financing is reduced.

Debt Service =Net Income + Depreciation÷Debt Principal Payment + Interest

Ratio that measures the ability of the hospital to pay its debt, both principal and interest. The higher this ratio the more secure the lender and the greater the hospital's future debt capacity. This ratio identifies the relationship of debt capacity to earning and cash flow. Commonly used variations of this ratio are:

Net Income + Depreciation÷Interest &
Net Income + Depreciation÷Total Liabilities

The first is the measure of the hospital's ability to pay interest expenses and the second is an indicator of the cash available to meet all obligations.

Activity Ratio

Total Asset Turnover = Total Revenue ÷ Total Assets

Ratio that is used to indicate the relative efficiency of the use of assets. Typically, high values for this measure are viewed as indicating higher levels of performance. The denominator of this ratio should be net of depreciation. Variations of this ratio include fixed asset turnover and current asset turnover. While these activity ratios can be used as surrogate measures of efficiency, other indexes and factors must also be considered, e.g., occupancy rates, plant age and design, payer mix.

Inventory Turnover =Total Operating Revenue ÷ Inventory

Ratio that measures the hospital's investment in inventories. Low values typically imply overstocking, an excess investment and an inappropriate use of assets.

Operating Margin

Operating Margin = Total Revenue — Total Expenses÷Total Revenue

Ratio of net income to total revenue. It is measure of profitability. Operating margin can be calculated in aggregate as well as for patient care services and non-patient care services (non-operating revenues). In this measure the revenue figures should reflect net revenue, that is, revenue less contractual adjustments.

Return on Assets = Income + Interest Expense ÷ Total Assets

Ratio of net income to total investment in the hospital. It is measure of the relationship of operating margin (total revenue – total expense) to the assets, that is, the investment, in the hospital. Interest expense is added back to eliminate bias due to the method of financing the assets. The ratio can also be calculated net of interest expense.

Non-operating Income Contribution = Non-operating Net Income ÷ Net Income

Ratio of non-patient care services (non-operating) net income to total net income. It [illegible] importance of non-operating revenues to the hospital's overall

purpose of operating margin ratio is to provide an indication of how effectively the hospital is making resource deployment decisions. Operating margin ratio also related to liquidity and the hospital's ability to attract and service debt (capital structure), in that as profitability increase so can liquidity and debt capacity. Conversely, as profitability erodes so do liquidity and resulting debt service capacity.

4.2.3 Cost Analysis and Control

The aim of cost accounting is to ascertain unit costs with a view to achieve the following objectives:

1) Reducing the costs of providing high quality medical services.
2) Infusing a sense of accountability amongst the various managerial personnel.
3) Providing guidance for the preparation of budgets.
4) Assisting management in taking future policy decisions.

One of the significant characteristics of a hospital is that it has a number of specialised departments rendering medical services to the patients, with the support of several ancillary departments. In view of this feature, costs are determined department-wise. Thus, while the financial accounts arrive at the total expenditure of the hospital as a whole, classified under various heads of account, the cost accounts record the transactions in greater detail with a view to arriving at the total expenditure as well as the unit cost in respect of each ward, department and activity.

The commonly adopted methods for distribution of cost department-wise have already been discussed in the previous units.

4.2.4 Financial Reports and Information System

The hospital administrator must be conversant with the financial status on a week to week and month to month basis and in the long perspective. It is the duty of the finance officer to provide reports on financial performance and explain the situation on regular basis to the administrator.

The assessment of end results cannot be possible without accurate data provided on timely basis. Information about the actual outcomes should be available through the management information system in standardised format. Purposeful statistical data collection and reporting are essential for effective financial managerial control. Data processing services generate reports allowing monitoring of revenue and expenses, manpower control and services utilisation.

Daily Reports

1) Inpatient census, admissions, discharges
2) Outpatient visits – new and repeat
3) Tests carried out in laboratory, x-ray etc.
4) Daily bank and cash position.

Monthly Reports

1) Monthly statement of income and expenditure with department-wise break-up.
2) Budget versus actual cash position – detailed comparison of actual to budget sources and the application of cash.
3) Free and concessional care.
4) Operating indicators – this includes number of admission, discharge, patient days, outpatient visits, investigations, operation theatre utilisation, etc.

Quarterly Reports

Budget performance of all departments.

Yearly Reports

1) Balance sheet

2) Income and expenditure statement
3) Departmental income and expenditure statement
4) Cost analysis – cost of services, unit costs.

Points of Control

It is impossible for one person to check each and everything. But the following points shall need attention.

1) Cash receipt and payments
2) Purchases, consumption and inventory of consumables
3) Patient billing
4) Assets accounting
5) Accounts payable
6) Accounts receivable
7) Accounting of scrap
8) Accounting of packing material
9) Vehicles
10) Utilisation of plant, machinery and equipment
11) Payroll
12) Missing charges and un-collectable patient accounts

Activity 1

Enumerate the important financial information reports generated in hospitals. How does the hospital administrator make use of these reports?

4.2.5 Analysis of Hospital Statistics and Cost Control

The aim of analysis of hospital statistics and control is to achieve improvements in the utilisation of the following resources:

1) Manpower
2) Bed capacity
3) Plant and equipment
4) Stores and supplies

The key statistics in a hospital is the 'patient day' which may be defined as the number of patients to whom lodging and other services have been provided in the hospital between two successive census taking hours. The 'patient day' is a key statistic as it is used for computing the cost per patient day, which facilitates the evaluation of the performance of the hospital.

The cost per patient-day is the key financial statistic used for the evaluation of hospital performance as a whole, as well as the performance of individual departments. The cost per patient-day or bed-day for the hospital as a whole is ascertained by employing the following formula:

Total expense in rupees ÷ Total number of patient-days

For ascertaining the cost per patient day or daily bed cost for an individual department, the following formula may be used:

Total departmental cost ÷ Number of patient-days of the department

If the data pertaining to patient-days are compiled class-wise, it would be possible to arrive at the class-wise per bed/per day expenses.

The Hospital census: The total number of in-patient occupying beds in the hospital at the census-taking hour denotes the hospital in-patient census.

The average daily census is derived by using the following formula:

Number of patient-days during the period ÷ Number of calendar days during the period

Percentage of occupancy: This is calculated by using the following formula:

Patient Days ÷ Bed Days × 100

The percentage of occupancy is useful from the following points of view:
Deciding about future expansion, which would be further facilitated if a record is maintained of the number of admission refused.

Measuring the utilisation pattern of hospital capacity

The endeavour of the hospital should be to maintain a uniform level of occupancy over a period of time, since a low level of occupancy would raise the daily operating cost as a substantial part of its expenses, in the form of payroll expenses, would be fixed.

Average length of stay: This is calculated by using the following formula:

Total number of patient-days during a period ÷ Total number of discharges and deaths during the period.

A comparison of the average length of stay per patient over a period of time or with other hospitals is very useful as it may reveal, for example, that patients are spending more time in the hospital than required thereby causing an insufficiency of bed capacity. The concept of average length of say is obviously very important in a country like India, where the demand for hospital services is always much greater than the availability of the same.

Other statistical performance indicators:

1) Number of patients treated per available bed.
2) Staff per in-patient case (divided into principal categories of staff).
3) Theatre sessions per bed.
4) Energy (power) used per air-conditioned volume.

The various statistics mentioned in the foregoing paragraphs may be studied by means of trend analysis. The trend analysis usually commences with an analysis of the 'Cost per patient-day'. After ascertaining the trend in the cost per patient-day, trend in the secondary ratios may be studied in order to ascertain the causes that influenced the trend in the primary ratio (that is, the cost per patient-day). Such a trend analysis may be carried out by graphing the ratios over a period of time.

Activity 2

1) What is the role of bed occupancy and average length of stay in exercising financial controls of hospitals? Answer with reference to your own hospital.
2) How are periodical calculations of cost per patient per day useful to the hospital administrators?

4.2.6 Cost Containment

With the changing technology and clientele attitudes towards better and modernised services, the nineties have witnessed an unprecedented rise in various costs in health institutions. As on day, every type of hospital and health care institution is concerned over the rising cost of patient care.

The key to success in cost containment lies in cost awareness, cost monitoring and cost management.

No cost control programme can be implemented in absence of adequate data on costs incurred. A good integrated hospital information system, personnel data and quality control is a basic requirement for effective cost control activities.

It is generally expected that hospital costs could be contained with the following

approaches, which may directly or indirectly influence the costs and efficiency in hospital functioning. These are:

1) Creation of cost consciousness amongst functionaries of the hospital.
2) Rationalisation of staffing patterns of the hospitals.
3) Instituting a department-wise quarterly budget variance report to review actual to budget comparison and pinpoint problem areas.
4) Computerisation of patient accounting and administrative records.
5) Proper forecasting of materials, group purchases, inventory control, standardisation and value analysis in a scientific materials management.
6) Preventive maintenance of buildings and equipment.
7) Shutting down electricity, air conditioners, etc. when not required.
8) Eliminating wastage and pilferage.
9) Cost effective planning of facilities and services
10) Information booklets should be supplied to all functionaries giving details about the costing of services.
11) Introduction of multipurpose workers to take up various semi-skilled/ unskilled jobs.
12) Contractual services for security, housekeeping, laundry, CSSD, ambulances etc.
13) Approaches like day care surgery, camp approach and quality management be practised.
14) Proper training of staff in professional management for cost effective services.
15) Management information system in hospital should aim at cost effectiveness.
16) Norms and standards of staffing and equipment should be formulated based on work-studies.
17) Physicians are the key persons to reduce costs through;
    - cutting down length of stay .
    - cutting down unnecessary investigations
    - cutting down unnecessary drugs and therapies
    - economise the use of hospital supplies, facilities and manpower.
18) Periodic evaluation of different activities of the hospital along with medical audit will help in cost containment and efficiency in services.
19) Privatisation of certain hospital services specially those which are underutilised.

4.3 AUDITING

Audit is by and large a post verification based on records. The transactions appearing in accounts are judged against predetermined rules, regulations, norms, and standards.

4.3.1 Definitions

1) **Montgomery:** Auditing is a systematic examination of the books and records of a business or other organisation, in order to ascertain or verify and to report upon the facts regarding its financial operation and the result thereof.
2) **Lawrence R. Dicksee:** An audit is an examination of accounting records undertaken with a view to establishing whether they correctly and completely reflect the transactions to which they relate. In some instances, it may be necessary to ascertain whether the transactions themselves are supported by the authority.
3) **M.L. Shandilya:** Auditing may be defined as inspecting, comparing, checking, reviewing, vouching, ascertaining, examining and verifying the books of accounts of a business concern with a view to have a correct and true idea of its financial state of affairs.

4.3.2 Scope of Audit

1) To check the arithmetical accuracy of the accounts.
2) To check the books of accounts with the help of all the relevant vouchers, invoices, correspondences, minute books, etc.

3) To verify the assets and liabilities shown in the balance sheet.

4) To report to the client on the basis of his findings.

4.3.3 Objectives of Audit

1) Ensuring the correctness and completeness of accounts.

2) Ensuring regulations of expenditure by examination of accounts.

3) Looking into the honesty of financial transactions to detect errors and frauds.

4) Ensuring that the funds expended by institution have produced the desired results.

4.3.4 Limitations of Audit

Auditor has nothing more to do than merely checking, ticking, totaling and vouching the books of accounts. The ultimate object is to detect clerical errors pertaining to the accounts.

Since the audits are based on available documents and are post facto appraisals, the circumstances of the transactions and the market conditions cannot be verified by the auditor. An auditor is to act as a watchdog on verification of statements and transactions.

Until and unless the auditor is familiar with modern changes and the technical nature of hospital job, he cannot perform his functions with ability and prudence. To perform effective audit work, coordination between hospital functionaries and auditors is very essential.

4.3.5 Types of Audit

The audits may be of two main categories, i.e.,

1) according to the organisational structure of the undertaking.

2) from practical point of view.

1) **According to Organisational Structure of the Undertaking**

i) ***Statutory Audit***

It is made compulsory as per statute. Joint Stock Companies, Trusts and other corporate bodies such as Insurance Companies, Banks, Reserve Bank of India, Industrial Finance Corporation, Cooperative Societies, etc. fall under the category.

ii) ***Private Audit***

The audit of the accounts of sole traders, partnership firms, individual institutions, which are private in character get their accounts verified by some qualified auditors. Such an audit is not required by statute.

iii) ***Government Audit***

The government maintains a separate department in the name of Accounts and Audit Department, which performs the audit of its different departments and offices. This department is headed by The Comptroller and Auditor-General of India who is assisted by different officials at various levels.

The duties and liabilities of such auditors are not defined by statute. They are not public auditors and hence, cannot be appointed auditors for public concerns. They are meant for government departments and as such, they work according to the departmental rules and instructions.

They check the sanction and expenditures, bookings, stocktakings, etc. as rules and regulations laid down by the government.

iv) ***Internal Audit***

The Institute of Internal Auditors has defined internal audit as given below:

"Internal auditing is the independent appraisal activity within the organisation for the review of the accounting, financial and other operations as a basis for protective and constructive service to the management. It is a type of control, which functions by measuring and evaluating the effectiveness of other types of controls. It deals primarily with matters of an operating nature."

Internal audit is the examination of books of accounts, which is conducted by the salaried officials of a business concern known as internal auditors throughout the year. The scope of internal audit is a bit different. It is more closely related to managerial functions than to accounting duties. When an outside auditor would ensure after scrutiny of accounts that such records are correct and are being maintained in conformity with the relevant law, an internal auditor, besides doing so, would see that the work of the business is going on smoothly, efficiently and economically. Internal audit is, thus, an independent appraisal of activity within an organisation for reviewing the accounting, financial and other operations. It renders a productive and constructive service to management.

2) **From Practical Point of View**

i) ***Continuous Audit***

A continuous audit is an audit that involves the conducting of audit of accounts throughout the year at regular intervals, fixed or otherwise, say, one month or more months. The accounts in such a case are subjected to audit as and when they are prepared. An auditor in continuous audit pays visits at regular or irregular intervals all the year round and examines the accounts. Such an audit is necessary only for big business houses and not for small ones where accounts can be audited at the close of the financial year when they are ready.

ii) ***Annual or Periodical or Final Audit***

Annual or periodical audit is done at the close of the financial or trading period when final accounts are prepared. In such a case, the auditor visits his client only once a year and checks the accounts in one visit till he is not in a position to cover the accounts pertaining to the whole of the period.

iii) ***Cash Audit***

In cash audit, the auditor is concerned with the checking of cash transactions. He has to audit entries pertaining to cash receipts and payments with the help of relevant vouchers. Since his work is done under such restrictions and limitations, he submits his report accordingly. He can mention the fact in his report.

iv) ***Cost Audit***

Cost audit is performed in some special circumstances but the purpose behind such an audit is to verify the cost accounts so as to ensure how far cost accounting plans have been adhered to.

v) ***Complete Audit***

When an auditor is appointed to check each and every transaction, total, balance, book of accounts with the help of the relevant vouchers, documents, correspondence, etc., it is said to be complete audit. Under complete audit, nothing is to be left from checking by an auditor. But complete audit is neither practicable nor feasible.

vi) ***Partial Audit***

In the case of complete audit, all the records and books of accounts are subjected to audit by the auditor but when audit is conducted on some of the records and books of a part or whole of the period, it is called partial audit. Partial audit may relate to some part of the work for some or whole of the trading period. Partial audit is not practicable again.

vii) ***Management Audit***

It is an audit conducted to examine all aspects of management of the organisation. Improvement in efficiency and maximum utilisation of resources of the organisation are the tools for its success. The management auditor has to evaluate the overall performance which include account books too and he has to submit a report stating whether the predetermined targets and objectives have been achieved or not. It is related to the process of management. Thus this type of audit is connected with every aspect and helps in improving performance.

viii) ***Propriety Audit***

During a propriety audit the auditors try to bring cases of improper or avoidable expenditure even though the expenditure may have been incurred in conformity with existing rules and regulations. Though a transaction may satisfy all the requirements of regulatory audit but as far as formalities regarding rules and regulations are concerned it may still be highly wasteful.

ix) ***Performance Audit***

The focus of performance audit is to ensure whether the results achieved have been commensurate with the expenditure of resources. It is also called efficiency audit or operational audit. The basic aim being determination of efficient use of resources.

Activity 3

Enumerate the various types of audit that has been conducted in your hospital. Explain the process.

4.4 VOUCHING

We all know that the accountant does not enter any transaction in the books of original entry for which he has not got proper documentary evidence. If he does, it is an irregularity in the strict sense of the term and such a step of the accountant would be an example of fraud leading to some manipulation of accounts or misappropriation of cash or goods. Hence, there should be no entry in the books without a voucher and no voucher without its entry. Every voucher must also, therefore, be recorded in the books.

Thus, when an auditor verifies the authority and authenticity of transactions as recorded in the books of accounts and submits his report accordingly to the effect that the accountants are correct, complete and free from errors and fraud, he has to see that the entries passed in the books of prime entry are properly made, are supported by proper documentary evidence and are also in order. This is known as vouching.

4.4.1 Definition

"Vouching does not mean merely inspection of receipts with the cash books, but includes the examination of receipts with the transactions of a business, together with documentary and other evidence of sufficient validity to satisfy an auditor that such transactions are in order, have been properly authorized and are correctly recorded in the books." – De Paula

4.4.2 Objectives

In vouching an auditor verifies the authority and authenticity of transactions as recorded in the financial books so that he can satisfy himself that:

i) all transactions connected with the business have been recorded in the books of accounts and nothing pertaining to the business has been left as unrecorded;

ii) no transaction which is not connected with the business has been recorded, i.e., no extra item having no concern with the business has been entered in the books; and

iii) all entries for transactions, which are authorized, are genuine and supported by documentary evidences, which are available in the business.

The basic purpose of checking entries by reference to appropriate documentary evidence is to ensure that the transactions relating to a particular period have been recorded and there is no voucher left unrecorded in the financial books. Only after verifying the vouchers, the auditor can be sure of the genuineness of various financial statements. That is why vouching is said to be the backbone of auditing.

4.4.3 Vouchers

Vouchers are the documentary or other evidence in support of transactions entered in the books of accounts. They may be of two types:

1) **Primary:** A written evidence in original is said to be the primary voucher, e.g., invoice for a purchase.

2) **Collateral:** When the original voucher is not available, copies thereof are produced in support or subsidiary evidence is made available so as to remove suspicious and to satisfy the auditor. Such a voucher is usually known as a collateral voucher.

The correspondence, contracts, documents, receipts, invoices, bills, minute books for recording resolutions or any other similar document are vouchers, which are quoted wherever necessary.

While examining vouchers the following points should be noted by the auditor:

1) **General**

   i) All vouchers are serially numbered.

   ii) The vouchers that have been examined/verified by auditors are cancelled.

   iii) The entry of vouchers relates to particular record and that relevant entry is checked by auditor in respective books of accounts.

   iv) As far as possible, the work relating to particular period should be finished in continuous sitting.

   v) The auditor should see that each and every voucher has been certified as correct by a responsible officer and his signature put on it.

   vi) For missing vouchers, duplicates are verified by exercising due care.

   vii) While examining vouchers, the auditor should see that they are properly entered in the proper financial books. Sometimes, proper allocation of items is not made between capital and revenue. This should invariably be done to maintain correct record and ensure faultless final accounts.

   viii) Test checking should be resorted to only in special circumstances when the auditor is satisfied with the internal check system in operation, otherwise detailed checking should be done. After all, absolute responsibility is his.

2) **Particular (i.e., relating to the voucher itself)**

   i) The date, amount and name of the client should be carefully examined.

   ii) The relevance of voucher to the business itself, i.e., goods purchased and expenses incurred during that particular period.

   iii) The vouchers should be on printed forms of the payee and amount should be written in words and figures.

   iv) If the voucher relates to cash payment above Rs. 500/-, it must have a revenue stamp of Rs.1/-.

   v) Every voucher should be signed by some responsible officer on behalf of the payee.

   vi) The contents of a voucher should be examined with references to the particulars of the relevant entry so as to ensure that they tally as regards to the amount, date, etc.

   vii) It has to be remembered that if some alteration is made in the voucher, it is properly initiated by the invoice clerk.

Thus, it will be seen that while comparing vouchers with the entries made in the books of account, the auditor should be able to verify the following:

1) The authority of the voucher;

2) The authenticity of a transaction;

3) The proper classification of the account; and

4) The accuracy of the amount and correctness of the details connected with an entry.

To carry on the function of vouching the auditor has to be familiar with various functions and forms of the different organisations. Since the amount of transactions in the organisations is on increase, mechanised accounting machines are used to facilitate and provide mechanism to apply controls and checks. The mechanised system has its advantage and disadvantages and the auditor has to keep himself fully conversant about the issues involved.

Activity 5

1) Discuss the various types of vouchers in day to day hospital expenditures with reference to your hospital.

2) How will you vouch the following items in accounts of a hospital:

   a) local purchase of medicines

   b) remuneration paid to contractual workers

   c) contingent expenses

4.5 SPECIAL POINTS IN THE AUDIT OF HOSPITALS

The activities of a hospital are fundamentally different from those of any other organisation. It is, therefore, necessary to follow a specially tailored audit programme.

The auditor should examine the documents relating to the constitution of the hospital and ensure that the provisions relating to accounts and audit, incorporated therein, have been duly complied with. He should also ensure that the acquisition and disposal of fixed assets and investments, the engagement of personnel and other matters which affect substantially the finances of the hospital are properly authorized by the governing body and appropriately recorded in the Minutes Book. He should also examine the contracts and agreements affecting finance and accounting substantially.

In view of the uniqueness of the activities of a hospital, comparison of the financial figures of two periods may not necessarily be valid. Thus, the auditor cannot too much reliance on the comparative figures of two years for detecting internal irregularities, though such a comparison can certainly guide the auditor in identifying the areas where should spend more time on verifying the figures.

A hospital does not sell a commodity, but renders a service by allowing the use of beds and other specialised facilities. The control of the occupancy of such beds and the use of the special services is not easy, but is nevertheless very important. The auditor must satisfy himself that all services rendered are billed and that all bills have been recorded in the accounts correctly. For this the auditor must refer to the Bed Occupancy Summary, the Daily Admissions and Discharges Summary, the Housekeeper's Report, the Daily Summaries of Special Services Charges and the Patients' Fee Journal. If the figures appearing in the foregoing reports/records do not tally, the differences should be investigated. The auditor should make use of the statistical information compiled by the hospital for performing overall tests of revenue.

The auditor must ensure that the system of recording transactions is prompt. This is necessary because a patient may be discharged at any time and if the billing is not prompt, charges for some of the services rendered may remain uncovered. The auditor should, therefore, carefully examine the system of raising bills and test check the bills raised by referring to the Admissions and Discharges Register, the Departmental bills for Special Services and the hospital's schedule of rates. In the case of patients to whom free medical care has been provided, the auditor should ensure that this has been done in accordance with the relevant rules and regulations.

If discounts are allowed to patients, the same should be recorded separately and the revenue should be recorded at the gross figure. The auditor should examine the internal controls in respect of such allowances, which may be in the nature of charity allowances, policy discounts to employees and others, and contractual adjustments with, for example, insurance companies. The authority to allow discounts should be vested in persons who are not connected with the cash and billing functions.

The auditor should see that items 'paid-out' on account of patients are properly charged up to them and have been duly collected.

The procedures for the receipt and acknowledgement of gifts and donations should be examined.

The amounts received by way of grants should be verified by the auditor with reference to the relevant correspondence with the government/local authority and also the statutory rules relating to such grant-in-aid.

The auditor must ensure that adequate control procedures are in effect in respect of free drugs, food and other items received by the hospital.

As regards investments, the auditor should make inquiries in respect of the following matters:

1) Whether the investments are made in accordance with the relevant gift deeds.
2) Whether there has been any permanent fall in value of investments.
3) Whether a proper procedure exists for recording investments received as gifts.

Most medicines have an 'expiry date'. The physical issue of stock should, therefore, be on a 'First-in, First-out' basis.

Cash transactions constitute a large proportion of a hospital's activities and, therefore, the auditor must pay considerable attention to the same. He must ensure that all receipts are accounted for and that all payments are properly authorized. Surprise cash counts should be conducted and bank reconciliation statements should be checked thoroughly. Internal controls in respect of all the cash collection points should be reviewed.

In respect of fund balances, the description, classification and utilization of such balances should be reviewed by the auditors in the light of the available documentary evidence. The transfers of amounts between funds should be in accordance with donor's instructions and should be appropriately authorized by the governing body of the hospital. The incomes from the related investments should be appropriately accounted for.

Activity 5

1) What steps would you take before commencing actual work of audit in a hospital?
2) You have been asked to audit the first annual accounts of a newly established hospital. What information you would ask for before commencing the audit?

4.6 AUDIT OBJECTIONS

In the performance of various audits, certain lapses or irregularities are likely to be noticed by the auditors. A detailed parawise report is furnished to the management to explain the lapses or to fix up responsibility on erring officials (if it is so), so that corrective measures are taken and procedures streamlined for future. The common audit objections relate to:

1) The cash in hand may not tally with entries in cash book and other supportive documents.
2) The expenditure incurred on any activity may not have the sanction of competent authority.
3) The entries in various account books and payments made may not be supported by vouchers.
4) Entries in the stock book may not tally with inspection note of goods received.
5) The principle of separation i.e. separate authorities as prescribed for handling cash and stores, etc. may not be followed.
6) Records of distribution of drugs and other goods may not tally.
7) Proper accounting procedures and entries may not have been observed indicating certain misappropriations or frauds.
8) The expenditure is not done as per allocation under different budgetary heads and as per delegation of powers.
9) Normal purchase procedures are avoided by making repeated local purchases/split purchases.
10) The various documents like vouchers, account books, stock books, etc. are not serially numbered.
11) Payment of third party is not made as per prescribed procedures of cash is paid instead of cheque, wherever so prescribed.
12) Vouchers are missing and there are no collateral documents to support expenditures.
13) There may be unsigned vouchers or alterations in vouchers that have not been initiated/altered.
14) The prescribed procedure for purchase of articles (as per general financial rule/ prescribed rule) has been violated.
15) On physical verification of stocks shortage/surplus stocks are found.
16) The medicines have expired or expired medicines are issued.
17) Tender conditions with regard to submission of earnest money, samples or certificates as required are flouted.
18) Items are not been issued against a proper indent from an authorized authority.

19) The prescribed procedures for placement of supply orders, the risk purchases penalty to be imposed if any have not been followed.

20) Condemnation of articles has not been approved by the competent authority.

In short wherever the auditors observe that the procedure followed does not confirm to the laid down procedures, rules and regulations, an audit objection shall be raised for submitting explanation/reply/fixation of responsibility, as the case may be.

4.7 IMPORTANT ISSUES FOR FINANCIAL CONTROL IN HOSPITALS (DO'S AND DON'TS)

1) It is necessary to ensure that all cash receivable is in fact received and properly banked. Cash payments should also be made in right amounts and under proper authority.

2) Assets such as drugs, medical and surgical supplies and food must be adequately protected and appropriately preserved from pilferage, spoilage, wastage, destruction, etc. Suitable measures have to be adopted for the preservation of assets such as linen, sheets and blankets, cutlery and crockery, etc.

3) Management information should indicate the economy and efficiency with which operations have been carried out and scarce resources utilized, so that optimum utilization of such resources can be achieved. It should provide adequate financial, statistical and costing information to facilitate proper analysis so that steps can be taken to improve performance, increase productivity and control costs.

4) The clerical accounting functions relating to the recording of invoices, purchase bills, expense bills, cash and bank transactions, ledgers and inventory movements should be taken over by the computer.

5) No formal accounting entries are required to be passed in respect of Stores Requisitions. Entries will, however, be made in the Stores Ledger.

6) No formal accounting entries are required to be passed in respect of Stores Returned Notes.

7) The purchase of inventories and receipt of the same should be under the charge of different employees, whose duties should not overlap.

8) Similarly, the duties of receiving the inventories and the subsequent custody (storekeeping) of the same should be assigned to different persons.

9) Physical stock-taking should be carried out at regular intervals by employees who are not in charge of the inventory.

10) Inventories should be physically controlled by using appropriate locks, keys and guards and issues should be made only against proper authorization.

11) All documents should be pre-numbered in order to ensure their physical control.

12) The physically taken inventory should be compared with the inventory as per the records and an 'excess/shortage' statement should be prepared and reviewed critically.

13) Review procedures should be laid down to ensure that transactions are recorded in the proper period.

14) The values of materials received, as appearing in the stores records, should be periodically cross verified and reconciled with the corresponding purchase accounts appearing in the financial records.

15) Invoices should be reviewed as to services received, prices, extensions and castings by personnel who are independent of the purchasing function. Personnel holding responsible positions in the Accounts Department should grant final approval of invoices. Such approval should be granted only after it has been ensured that the required clerical work of checking and comparison has been properly performed.

16) Bills for Special Services should be cross checked with Special Services Requisition Forms in order to ensure that the special services departments have in fact prepared bills for all the services rendered by them.

17) As regards cash receipts, the following safe-guards are recommended:

    i) The cashier who receives cash physically should not be involved, in any way,

with the records relating to such cash transactions. The preparation of bank deposit slips, the banking of cash and the writing of the cash book and ledgers should be done by persons other than the receiving cashier.

ii) The cashier who receives cash should not be authorized to make any disbursements other than the refund of patients' deposits. The cash received should be deposited intact into the bank on the following day.

iii) All cash received should be first entered in a remittance book as soon as such cash is received.

iv) Inward mail should be opened by a person other than the receiving cashier or the person(s) responsible for writing up the ledger.

18) As regards cash disbursements, the following safeguards are recommended:

i) All cheques should have proper supporting documents duly authorized.

ii) When the cheque is prepared, the supporting documents should be stamped 'PAID', so that payment is not made more than once.

iii) All cheques should be signed by at least two responsible officers, who should also initial the cheque counterfoils.

iv) Cancelled cheques should be retained for the inspection by the auditors.

v) Cheques should be mailed directly to the payees in order to ensure that the payees and only the payees receive the disbursement.

vi) Only petty cash disbursements should be made in cash. All other disbursements should be made by cheque.

19) The office procedures should be so arranged that it should not be possible to defalcate cash without the collusion of two or more employees.

20) The record forms such as cash receipts, bank deposit slips, cheques and petty cash vouchers should be pre-numbered.

21) Bank statements, which serve as external evidence, should be reconciled every month with the Bank Book. Such reconciliation should be done by a person other than the cashier or the person responsible for writing the cash records.

22) In the cash receipts and payment journals, the totals of the vertical columns should be cross checked horizontally.

23) The balance appearing in the Patients' Account in the general ledger should be tallied with the total of the individual balances appearing in the accounts receivable ledger. Likewise, the balance appearing in the accounts, payable control account appearing in the general ledger should be tallied with the total of the individual balances appearing in the corresponding subsidiary ledger.

24) To exercise internal control for capital expenditures in hospitals, following safeguards are recommended:

i) Capital expenditure budgets should be prepared annually.

ii) Written authorization should be required for incurring capital expenditure. Such authority should be restricted to specified officials, whose authority limits should be clearly defined.

iii) Supplementary authorization should be required if the actual expenditure exceeds the sanctioned limits.

iv) The purchase and receipts of capital items should be subjected to the same procedure as are applicable in case of supplies.

v) Procedures should be established for the recording of movement of capital items from one location to another.

vi) The authority for the selling/scrapping of capital items should be restricted to specified officials, whose authority limits should be clearly defined.

vii) Detailed memorandum records in respect of fixed assets should be maintained.

viii) All fixed assets should be verified periodically. A written procedure should be laid down for this purpose.

ix) Care should be taken to ensure that all fixed assets are adequately insured.

x) Capital work undertaken by the hospital itself should be monitored by preparing "A Capital Expenditure Status Report".

25) The investment ledger should be reviewed periodically and a statement should be prepared to ensure that all investment income has been received on the due dates.

26) To properly manage the budget,

a) The hospitals' performance should be progressively monitored during the course of the budget year.

b) Continuous surveillance would enable management to

i) ensure that the actual expenditure is in accordance with the approved budget allocation.

ii) ensure that the actual expenditure is within the budget limits.

iii) take appropriate corrective action, if possible.

iv) use the residual budgeted funds with due economy.

4.8 LET US SUM UP

Rising costs are posing a constant challenge to hospital administrators. Hospitals being a service industry, the element of public accountability demands that the limited resources are utilized in the best possible way. Inspite of the fact that the value of human life cannot be measured in financial terms, the various operations of the hospitals cannot be planned in manner to maximize the use of available resources. To maximize the use of financial and other resources, requires creation of cost-consciousness, cost monitoring and cost management by the functionaries at all levels.

The chapter has focussed attention of the upcoming administrators to the basic tool of financial control that should be exercised during various operations in hospital management. The importance of certain important techniques like budget, financial statements, cost analysis, information system in finance and use of statistical reports and analysis to improve day to day performance have been discussed. A number of steps have been suggested to contain cost without sacrificing the quality of services. The integration of various tools and techniques is required to achieve the desired objectives as the emphasis on isolated activities is unlikely to yield any results.

Auditing as a tool of retrospective analysis of various financial transactions and procedures is essential to provide clues for future management of hospital activities. The basic philosophy of auditing rests with correcting the procedural errors and learn from our mistakes to ensure better forecasting, budgeting and performance of financial activities. The common audit objections raised in hospital functioning have been discussed to familiarize the students with the common types of errors in various financial operations and so as to take necessary corrective measures.

The issues related to financial transactions, proper use of assets, optimization of the use of available resources, inventory management, documentation of various activities, office procedures, internal controls for capital expenditures in hospitals, proper management of budget, etc. have dealt as do's and don'ts in financial control in hospitals.

4.9 KEY WORDS

Allocate : Used for accumulating information regarding a single asset, liability, owner's equity item, revenue and expense.

Accounting : An information system conveying financial information about a specific entity. or the process of identifying, measuring and communicating information to permit informed judgements and decisions by users of information.

Acid test ratio : Sum of cash, marketable securities, and receivables divided by current liabilities. Some non-liquid receivables may be excluded from the numerator. Sometimes it is called quick ratio.

Allocate : To spread a cost from one account to several accounts, products, activities, or to several periods.

Appropriation : In governmental accounting, an expenditure authorized for a specific amount, purpose and time.

Audit : Systematic inspection of accounting records involving analyses, tests and confirmations, accomplished in accordance with auditing standards.

Balance sheet : Statement of financial position which shows the assets, liabilities and owner's equity of an organisation.

Budget : A financial plan that is used to estimate the results of future operations. It is frequently used to help control future operations.

Budgetary control : The management of governmental or non-governmental unit in accordance with an official (approved) budget in order to keep total expenditures within authorized (planned) limits.

Cash budget : A schedule of expected cash receipts and disbursements.

Current ratio : Sum of current assets divided by a sum of current liabilities. Used as an indicator of solvency.

Endowment funds : Funds in which a donor has stipulated, as a condition of his gift, that the principal of the fund is to be maintained inviolate and in perpetuity and that only income from investments of the fund may be expended.

Equity ratio : Stockholder's equity divided by total assets.

Expense account : An account to accumulate expenses that is closed at the end of the accounting period.

Funds statement : An informal name often used for the statement of changes in financial position.

Internal audit : An audit conducted by employees to ascertain whether or not internal control procedures are working as opposed to an external audit conducted by specified authority.

Internal control : The procedures used by a business in attempting to ensure that operations are carried out or recorded as planned.

Inventory turnover : Number of times the average inventory has been sold during a period. Cost of goods sold for a period divided by average inventory for the period. Used to determine the effectiveness of inventory management.

Liquidity : A firm's cash position and its ability to meet obligations as they mature.

Operating expenses : Expenses incurred in accomplishing the ordinary activities of an organisation.

Playback period : Amount of time that must elapse before the cash inflows from a project equal the cash outflows.

Real accounts : Balance sheet account as opposed to nominal or income account.

Revolving fund : A fund whose amounts are continually expended and then replenished; for example, a petty cash fund.

Self-balancing : A set of records with equal debits and credits such as the balance sheet, and a fund in non-profit accounting.

Trial balance : A listing of account balances. All accounts with debit balances are totalled separately from accounts with credit balances. The two totals

Voucher : A document that recognises a liability and authorise the disbursement of cash.

Working capital : Current assets. It can also mean net working capital which is current assets minus current liabilities.

4.10 SELF ASSESSMENT QUESTIONS

1) Why is the controlling function important to the management of hospital functions?
2) What are the essential features of an accounting control function?
3) Enumerate the important tool of financial control.
4) How is budget a potent tool of financial control?
5) How does the balance sheet show the sources of resources of a firm?
6) What are the limitations of the use of balance sheet?
7) How are the financial ratios classified?
8) What is the difference between current ratio and acid test?
9) How do operating and cash budget differs?
10) How the departmental unit costing helps the management?
11) 'The key to the success in cost containment lies in cost awareness.' Discuss.
12) What steps will you take as a hospital administrator to reduce cost of various operations?
13) Define Audit. What are the advantages of audit?
14) Why should a hospital be subjected to audit?
15) What are the principle objectives of audit?
16) What are the limitations of audit?
17) What are the common audit objections raised in hospital operations?
18) Give instances of irregularities that are likely to occur in absence of proper internal checks in various transactions of hospitals.
19) What instructions would you like to issue as a hospital administrator to safeguard and maximize the use of various hospital assets?

4.11 FURTHER READINGS

Neumann, Suver and Zelman: *Financial Management, Concepts and Applications for Health Care Providers;* Kendall/Hunt Publishing Company, Iowa, U.S.A.

Berman, Howard J; Weeks, Lewis E and Kukla, Steven F: *The Financial Management of Hospitals, Health Administration Press;* Ann Arbor, Michigan, U.S.A.

Hampton, John J: *Financial Decision-Making: Concepts, Problems and Cases;* Prentice-Hall of India, Private Limited, New Delhi.

Rowland, Howard L and Rowland, Beatrice, L: *Hospital Administration Hand Book;* Aspen System Corporation, Rockvilla.

ESI Manual of Audits and Accounts, Director General, ESIC, New Delhi.

UNIT 1 MARKETING OF HEALTH CARE SERVICES

Structure

1.0 OBJECTIVES

After studying this unit you should be able to:

- explain the term marketing and its scope;
- discuss the unique characteristics of services and their marketing implications;
- explain the concept of service quality and its application for health care services marketers; and
- understand the role of marketing communication for health care services.

1.1 INTRODUCTION

You might have some idea of what marketing is since as a consumer of different products you are definitely exposed to marketing in one way or another. So, what does the term 'marketing' mean to you? Is it selling or is it advertising? In fact, marketing is much more than just selling and advertising and covers a wide range of critical business activities that bring the products to the customers; the products they want, at the time they want them, at place they want them, at prices they can afford and also providing all the information the customers need to make informed and satisfying choices. You must be thinking "why should I study marketing?" or "what does study of marketing offer to me?" Well, as you would have noticed above, marketing includes activities which are vital to any organisation, including health care organisations. Most of you may not be working in the marketing department, but you must be in direct touch with the consumers (patients) at some point of time and thereby have an impact on the way the consumers judge the quality of services being received. This way you act as part time marketers. Therefore, regardless of specialisation or different responsibility areas a basic understanding of marketing is important for all of you. Even an HRD manager would be required to do some sort of marketing to attract best talent to the organisation.

In this unit we will first have a basic understanding of the 'marketing' function and its scope. Since services are different from goods, we will look into distinct characteristics of services which differentiate them from goods and their resulting marketing implications. The concept of service quality with specific reference to health care services will be discussed next. This is one area which is receiving widespread attention of

academicians as well as practitioners worldwide. Word of mouth communication is very important for health care services and thus we will also take up some issues related to it.

1.2 MARKETING : MEANING AND SCOPE

There is no single universally accepted definition of marketing. We are giving below a few widely accepted definitions of marketing which highlight the essence of the broad subject.

Marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individual and or organisational goals. (America Marketing Association)

Marketing is the management process responsible for identifying, anticipating and satisfying customer's requirement profitably. (U.K. Chartered Institute of Marketing)

Marketing is a social and managerial process by which individuals and groups obtain what they need and want through creating offerings and exchanging products of value with others. (Philip Kotler)

Some of the common points emerging out of these definitions of marketing are:

- Marketing is a management process.
- Marketing is about giving customers what they want and includes identifying and anticipating customer requirements.
- Marketing offers and exchanges ideas, goods and services.
- Marketing involves pricing, promotion and distribution of ideas, goods and services.

Marketing activities include environmental scanning (demographic, technological, political, legal as well as socio-cultural environment), competitive analysis, finding customer needs and wants, and also deciding exactly which wants and whose wants the organisation is going to satisfy (segmentation and target market strategy), developing a marketing mix (the four P's–product, price, place and promotion) to satisfy the needs and wants of the selected target market, periodically evaluating the marketing efforts so as to bring about effective changes, if required. We will now take up some of these activities in details.

The Marketing Mix

Marketing is performed within a certain environment which itself is always changing. The marketing activities have, therefore, to change in consonance with environment to be continuously effective. In order to appreciate this process it is easier to divide the marketing activities into four basic elements which are together referred to as the marketing mix. The four basic elements are:

i) Product

ii) Price

iii) Promotion

iv) Place

As all these four start with letter 'P' they are, at times, referred to as the four Ps of the marketing mix or the 4Ps in marketing.

The word product stands for goods or services offered by the organisation. Once the needs are identified, it is necessary to plan the product and after that keep on analysing whether the product still satisfies the needs which were originally planned for, and if not, to determine the necessary changes.

Price refers to the money value that the customer has to pay. The product has to be adequately priced. This involves considerations to the profit margin, the cost, the possibility of sales at different prices and the concept of the right price. Pricing for

services require separate treatment than pricing for goods. We will take up the issue in details in the next unit.

Promotion is the aspect of selling and advertising, or communicating the benefits of the product or service, to the target customers or the market segment involved in order to persuade them to purchase such products or services.

It includes selling through advertising as well as the sales force. Besides, a certain amount of promotion is done through special seasonal discounts, competitions, special price reductions, etc., collectively called sales promotion.

Finally, place or distribution refers to the aspect of the channels of distribution through which the product has to move before it reaches the consumer. It also includes the logistics aspects of distribution such as warehousing, transportation, etc., needed for geographical distribution of the products.

It is also concerned with the selection of distribution channels. The organisation must decide whether it should sell through wholesaler (who buy in large quantities and sell to retailers) and then to retailers (i.e., the shopkeepers, who ultimately sell to the consumers), or whether directly to the consumers. There are many ways in which a product can be moved from the producer to the customer. The optimum method has to be determined in terms of both consumer satisfaction and profitability to the organisation, or optimum use of the organisation's resources.

Market Segmentation

Market segmentation refers to the process of dividing a market into meaningful, relatively similar and identifiable segments or groups. This helps in a better understanding of needs and wants of the customers and thereby fulfilling them in an effective way. Now-a-days, market segmentation plays a key role in marketing strategy of almost all successful organisations. The ideal segmentation strategy maximizes differences between segments and minimizes differences within each segment, in terms of criteria of interest. The most common segmentation techniques use demographic, geographic, psychographic, behavioural/utilization and benefit criteria. According to Engelberg and Neubrand (1997), "segmentation techniques are integral to an organisation's entire marketing process, from initial marketing research through marketing communication. Segmentation is a powerful way for marketers to understand who they are trying to reach, what is unique about each group, and how to design, distribute price, and promote offerings accordingly. It helps marketers make wise, cost effective choices. Health care marketers should understand and perform segmentation techniques particularly when financial resources are limited, competition is increasing and a health care organisation's clear direction is essential to ensure its profitability".

Activity 1

Identify possible bases for market segmentation of cardiac care services market.

1.3 DISTINCTIVE NATURE OF SERVICES MARKETING

The term service is rather general in concept and it includes a wide variety of services. They are widely used by people in practically all aspects of life. From education to entertainment, finance to fast food, market research to medical services, travel to telephone, advertising to amusement parks, retailing to recreation and so on, services now-a-days are increasingly being used by corporate as well as household sector. Before we discuss the distinctive nature of services let us first look at a couple of definitions of a 'service'. Kotler and Bloom defined service as "any activity or benefit that one party can offer to another that is essentially intangible and doesn't result in the ownership of anything. Its production may or may not be tied to a physical product". According to Gronroos "A service is an activity or series of activities of more or less intangible nature that normally, not necessarily, take place in interaction between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solution to customer problems".

Characteristics of Services

The above definitions highlight some of the special characteristics of services which are different from physical goods. For majority of services, four basic characteristics can be identified:

i) Intangibility

ii) Heterogeneity

iii) Inseparability of production and consumption

iv) Perishability

i) Intangibility

The most basic difference between goods and services cited universally is intangibility. Since services are performances and not objects, they cannot be seen, felt, tasted or touched in the same manner as we can do with physical goods. Consider for example a dental check-up, this cannot be actually seen or touched and can actually be experienced only. This is in contrast with, say, an automobile – a physical good – which can be seen, touched and physically checked. Intangibility of services is considered to be the critical distinction between goods and services. However, it must be noted that it is difficult to find a pure good or a pure service. Practically all physical goods have some element of service built into them and similarly all services have some tangible components. It is basically the relative dominance of intangibility in services as compared to dominance of tangibility in goods as shown in Fig. 1.1.

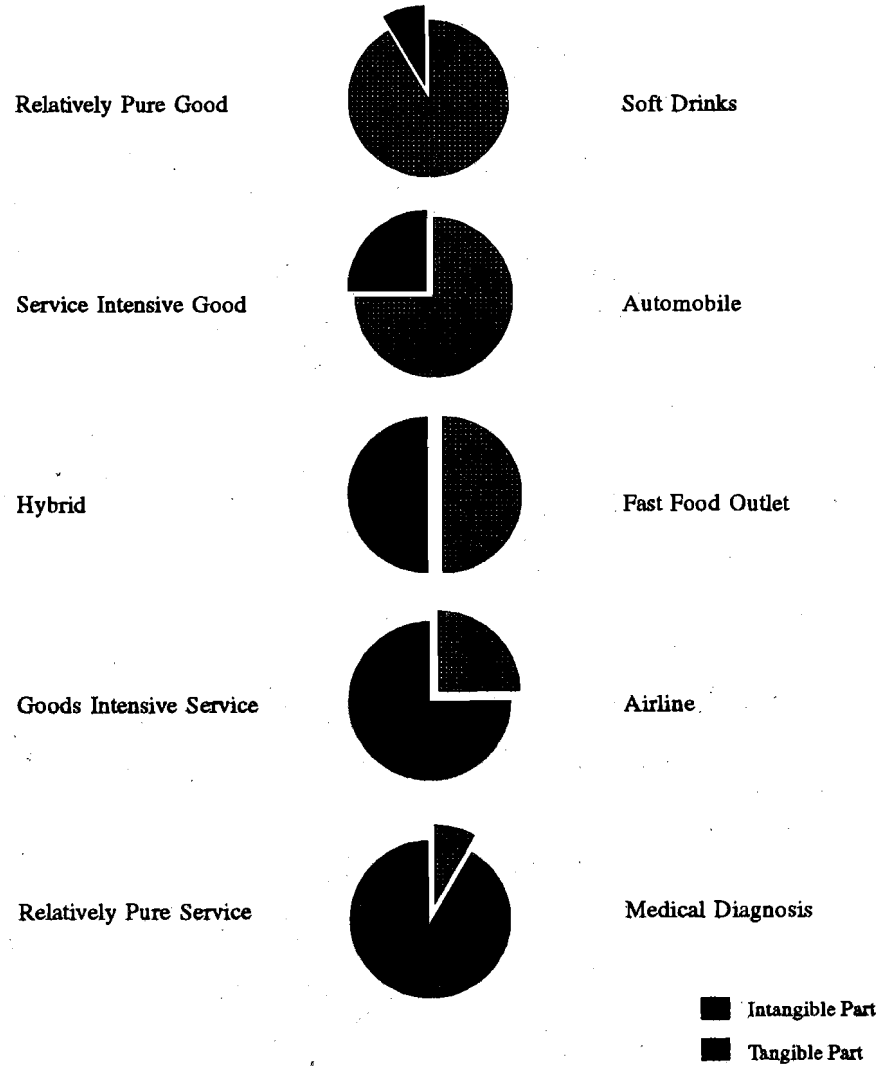


Fig. 1.1: Relative Tangibility Spectrum

As you would notice health care services are relatively intangible in nature.

The intangibility of services poses a number of marketing challenges:

- Services can't be stored and, therefore, it may become difficult to manage fluctuations in demand. For example, while demand for air coolers is more in summers, still it is possible to manufacture them in winter and keep them in store for selling later in summers. However demand for health care services which again is more in summers/ monsoons can't be managed that way.
- Since services can't be touched, felt, tasted or smelt, they can't be readily displayed or communicated to customers. Therefore, it becomes difficult for customers to evaluate a service prior to purchase. This makes the process of judgement of quality by consumer difficult, which in turn make the advertising and promotion strategies difficult to frame for the service provider.
- Prices are comparatively difficult to set for services because of its intangible nature. The actual costs of a unit of services are hard to find out and the relationship between price and quality is complex.

ii) **Heterogeneity**

Since services are performances produced mostly by humans, there is a strong possibility for high variation in these performances. The service delivered may vary from day to day, from producer to producer and from customer to customer. For example, a doctor may talk differently to different customers on a given day or differently to the same customer on separate days. Essentially, since number of factors affect human performances and that no two customers are the same gives rise to the heterogeneity factor.

Since the service delivered may vary from customer to customer, provider to provider and day-to-day, it becomes difficult to ensure consistent service quality. Further, the quality of services provided depends on many factors which cannot be fully controlled by the supplier, like the level of demand, ability of consumer to tell his requirements etc. Because of these factors service providers can't be sure that the services being delivered will match with what was planned and promoted. In a nutshell, heterogeneity makes standardization and quality control difficult to achieve.

iii) **Inseparability of Production and Consumption**

In case of services the production and consumption process overlap. While goods are first produced, then sold and consumed, most of the services are sold first and then produced and consumed simultaneously. The interaction between production and consumption may be broad or quickly passing. It may involve interaction between customer and service employee, or between customer and machine. The interaction is considered to be the essence of services marketing since generally it is during the interaction that customer makes a judgement on the level of service being received by him e.g. interaction between patient and doctor or patient and nursing staff.

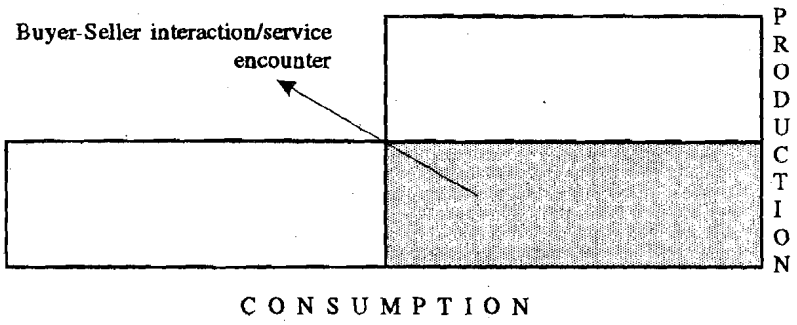


Fig. 1.2: Inseparability of Production and Consumption in Services

Because services are generally produced and consumed at the same time, it is not possible to have mass production. So it is not possible to have significant economies of scale. Because of simultaneous production and consumption, the customer is generally present in the 'service factory' and is involved in the production process. This may affect the outcome of the service process or transaction. Further a customer is not alone while receiving the service. This presence of other customers could have an impact on the type of service perceived to be received by a customer. Benoy (1996) highlights the

importance of this characteristic for health care managers, "They should define their services, not in broad, sweeping images of high-tech medicine and glossy newsletters, but in terms of dozens – perhaps, hundreds of specific encounters or events (e.g. admission, food quality, telephone enquiries, staff responsiveness, discharge etc.). Employees shape these moments of truth not only by the tasks they perform, but also by the way they look, act, talk and interact with the customers with other customers, and with fellow workers. Employee behaviour must, therefore, be carefully orchestrated and managed".

iv) **Perishability**

Perishability means that services cannot be stored, resold or returned. A hospital bed not occupied on a particular day cannot be used or resold at a later time. That opportunity is gone forever. This is in contrast to goods which can be stored or even returned.

The perishability of services poses a number of challenges:

- The major implication of this aspect is that services can't be stored. Therefore, aspects like demand forecasting, capacity utilization planning become important and difficult decision areas.
- Since services can't be returned or resold there is a greater need to have strong recovery strategies if the service goes wrong.

Table 1.1 gives a summary of the above mentioned marketing problems.

Table 1.1: Unique Service Features and Resulting Marketing Problems

Unique Service Features	Resulting Marketing Problems
Intangibility	• Services cannot be stored • Cannot protect services through patents • Cannot readily display or communicate services • Prices are difficult to set
Inseparability	• Consumer involved in production process • Other consumers involved in production • Centralized mass production of services difficult
Heterogeneity	• Standardization and quality control difficult to achieve
Perishability	• Services cannot be stored

Source: Zeithaml, Parasuraman and Berry, *"Problems and Strategies in Services Marketi* ", Journal of Marketing, Spring 85, p. 35.

A number of strategies to overcome these problems resulting from unique service characteristics have been developed and suggested over a period of time by a number of researchers. Table 1.2 gives a summary of these strategies.

Table 1.2: Marketing Strategies

Unique Services Features	Marketing Strategies
Intangibility	i) Increase service tangibility ii) Stress tangible cues iii) Simulate or stimulate word-of-mouth communication iv) Create strong organisational image v) Promote brand names

Unique Services Features	Marketing Strategies	
	vi)	Use cost accounting to set prices
	vii)	Engage in post purchase communications
	viii)	Manipulate the atmospherics
Inseparability	i)	Emphasise selection and training of public contact personnel
	ii)	Learning to work with larger groups
	iii)	Manage customers
	iv)	Train additional service providers
	v)	Use multi site locations
Heterogeneity	i)	Proper person selection and training
	ii)	Have systems for monitoring customer satisfaction
	iii)	Industrialize service through use of technology
	iv)	Customize service
Perishability	i)	Use strategies to cope with fluctuating demand like: • Differential pricing • Reservations systems • Consumer participation • Part time employees etc.
	ii)	Make simultaneous adjustments in demand and capacity to achieve a closer match between the two

Source: Zeithaml, Parasuraman and Berry, *"Problems and Strategies in Services Marketing"*, Journal of Marketing, Spring 1985, p. 37.

Activity 2

Take any particular health care service and find out how it differs from packaged goods marketing.

1.4 THE SERVICES MARKETING MIX

The unique characteristic of services make the traditional 4P marketing mix (discussed earlier in this unit) seem inadequate. Careful management of these 4Ps – Product, Price, Place and Promotion though essential, is not sufficient for successful marketing of services. Further, the strategies for the four Ps require some modifications while applying to services.

Since services are produced and consumed simultaneously, the contact personnel or the service delivery personnel become extremely important. It is during these encounters of service providers and customers i.e. the process on which a lot depends with regards to the final outcome as well as the overall perception of the service by the customer. The actual physical surroundings during these encounters have also a substantial bearing on the service delivery. All these facts lead to the development of an expanded marketing mix with three new P's added to the traditional mix. These are:

- People — All human actors who play a part in service delivery and thus influence the buyer's perceptions; namely, the firm's personnel, the customer, and other customers in the service environment.
- Physical Evidence — The environment in which the service is delivered and where the firm and customer interact, and any tangible components that facilitate performance or communication of the service.

- Process — The actual procedures, mechanisms and flow of activities by which the service is delivered – the service delivery and operating system.

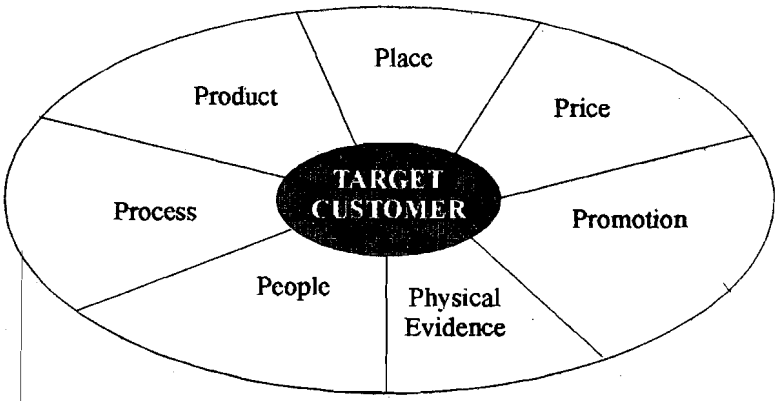


Fig. 1.3: Marketing Mix for Services

Because of the simultaneous production/delivery and consumption of services, the nature of marketing departments and marketing functions become quite different as compared to goods. The marketing function — all activities which influence the preferences of the consumers towards the offerings — is mainly handled by marketing departments in case of goods. Here as far as consumers are concerned, marketing departments (the organisational entity which is responsible for some, but not necessarily all marketing activities performed by the firm) can plan and implement most of the marketing activities i.e. the marketing department is able to control almost the total marketing function. In the service sector the situation is entirely different as indicated in Fig. 1.4.

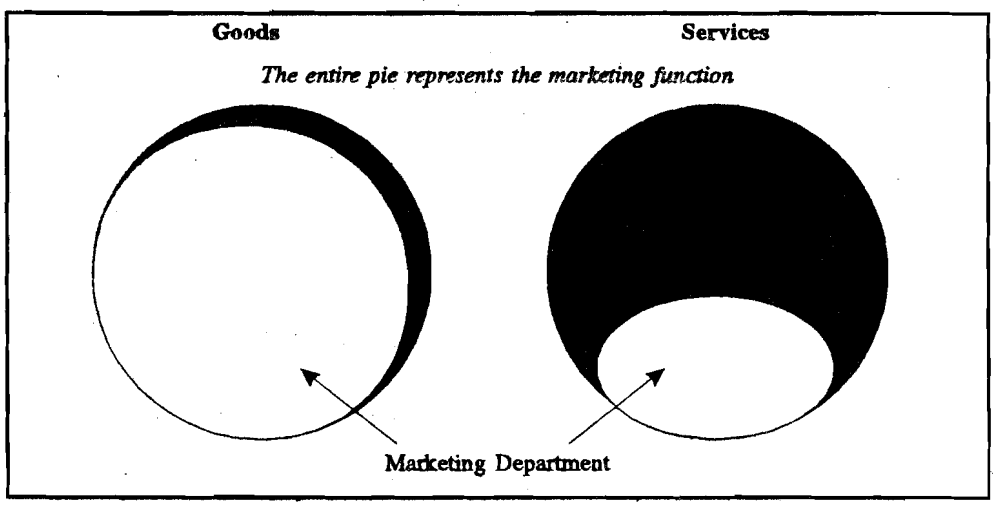


Fig. 1.4 : Relationship between Marketing Function and Marketing Department

Source: Chiristian Gronroos *"Designing a long range marketing strategy for services"* in Malcolm Donald (Ed.) *"Marketing Strategies : New Approaches, New Technologies"*, Pergamon, 1995, p-161.

A traditional marketing department in services can only control a minor part of the marketing function. Usually, it doesn't have the necessary authority to manage the buyer/seller interaction. The marketing department, therefore, cannot plan and implement activities pertaining to interactive marketing function.

Therefore, the marketing function, which is a key function in service sector require a special treatment. The total marketing in services include three different types of marketing as shown in Fig. 1.5.

As can be seen from the triangle, the traditional marketing mix and marketing department basically address to 'External Marketing' only. However, all three sides are critical to successful services marketing and the triangle can't be supported in the absence of any one of the sides.

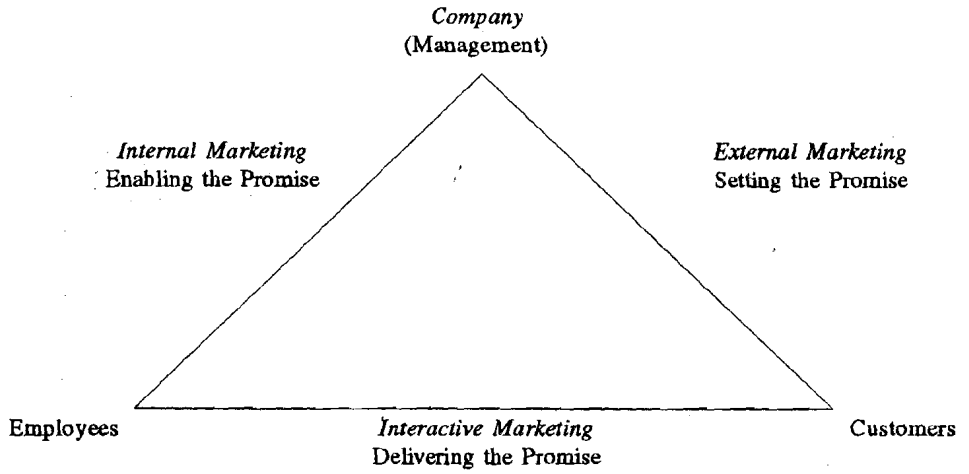


Fig. 1.5: The Services Marketing Triangle

1.5 SERVICE QUALITY

Quality came to the service literature only at the beginning of 1980's, which is quite in contrast to manufacturing sector wherein quality management has a long and rich history. However in 1990's quality has become an essential part of service marketing. The term 'Service Quality' has been defined in different ways by researchers, some of which are given below:

- Service quality is the delivery of excellent or superior service relative to customer expectations. (Zeithaml and Bitner, 1996)
- Quality of a service, as perceived by the customer is the result of a comparison between the expectation of the customer and his real-life experiences. (Gronroos, 1982)
- Service quality as perceived by customers, can be defined as the extent of discrepancy between customers', expectations or desires and their perceptions. (Zeithaml, Parasuraman, Berry, 1990)

As you will notice, all these definitions revolve around the fact that service quality is essentially what customers perceive. Only customers judge quality and all other judgements are irrelevant. However, 'Service Quality' as contrasted to goods quality requires a different approach because of some basic differences between goods and services with regards to how they are produced, consumed and evaluated.

- As you have studied earlier in this unit, services are predominantly intangible in nature. Since services are performances, acts and experiences, it is difficult to have exact specification for them unlike physical objects like television sets, automobiles etc. Further, services can't be tested prior to sale to determine its quality. That means services are low in 'search qualities' – attributes that a consumer can determine before purchasing a product, and stronger in 'experience qualities' – attributes that can only be assessed during consumption. Also there are certain services which consumer find difficult to evaluate even after purchase and consumption i.e. 'credence qualities'. Example of services high in credence quality would include medical diagnosis or an operation. Very few consumers would have sufficient medical knowledge or skills to evaluate whether such services are necessary and/or performed in a proper manner even after they have been prescribed and produced by the provider. Therefore, the criteria customers use to evaluate services is more complex thereby, increasingly the difficulties of marketers.
- Another very important aspect requiring separate treatment of services quality is the 'inseparability' aspect of services. As you have noticed earlier, inseparability of production and consumption in services reflect the more active part required from service providers as well as the consumer. It is in this interaction where usually the quality is judged is the consumer (refer to services marketing triangle – Fig. 1.5 – wherein one of the sides is interactive marketing). For example, even if the worker

on the shop floor who is producing a T.V. set may not be in a good mood but you as a consumer would never come to know about it. However, if a doctor is not in a good mood it may have a direct impact on the quality perception of the consumer of his services.

- Since services are 'heterogeneous' in nature, ensuring consistent service quality is a big challenge to service marketers.

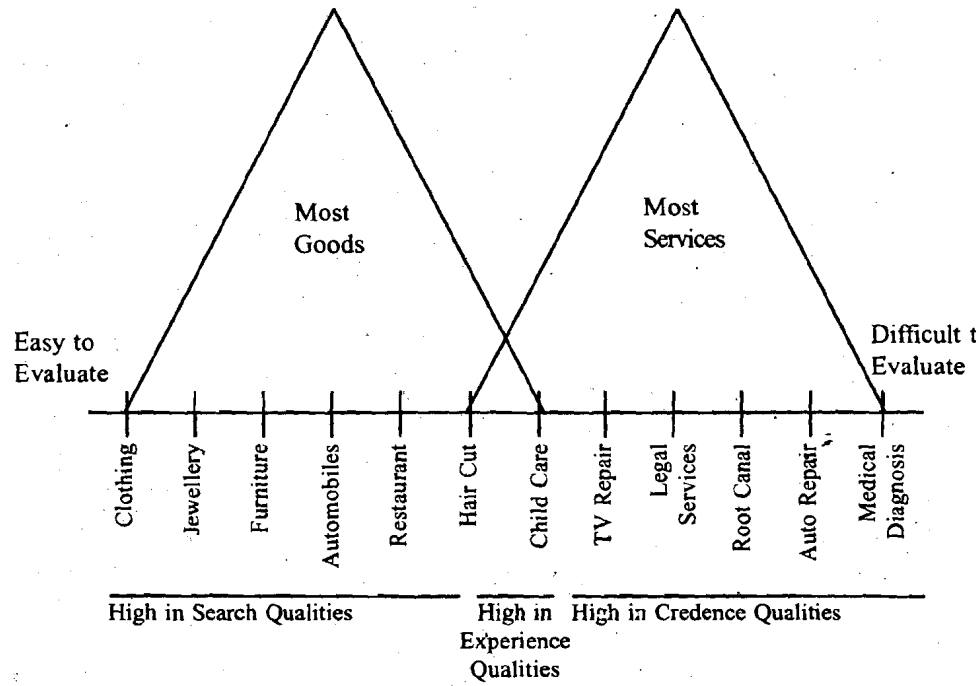


Fig. 1.6: Continuum of Evaluation for different Types of Products

(*Source*: Zeithaml, V.A., and Bitner, M.J. (1996) *"Service Marketing"*, McGraw Hill, p. 58)

Service Quality Dimensions

Gronroos (1990) suggests that the quality of service as it is perceived by consumer has two dimensions – a technical or outcome dimension and a functional or process related dimension. That means, the consumer judges the quality not only on the basis of what is being delivered but also how that outcome is delivered. For example for consumer of health care services the primary expectation is related to the response to the illness – 'cure'. The process of achieving this end is characterized by the delivery of service experience – 'care'. As we have discussed earlier that health care services are rich in credence qualities and, therefore, the technical outcome is difficult to evaluate, consumer would tend to make the assessment of the technically complex cure dimensions on the basis of the more familiar 'care' experience. Gabbott and Hogg (1996) suggest that evaluation of the clinical aspect of the service is particularly complex for individual patients but the impact of it upon overall satisfaction is unquestionable i.e. if the patient considers the medical response to have been inadequate, aspects of care can't compensate sufficiently to result in overall satisfaction. However, given the difficulties in adequately evaluating "cure" and the investment that a patient has in believing in the doctor's ability to treat illness, it is suggested that patients take this aspect of the service for granted and evaluate their service provision on the other aspects of service delivery.

Zeithaml, Parasuraman and Berry (1990) have done extensive work in the area of service quality and based on their research work have identified that customers consider five dimensions in their assessment of service quality.

Reliability : Ability to perform the promised service dependably and accurately (example – doctor keeps the appointment on schedule, diagnosis prove to be accurate).

Responsiveness : Willingness to help customers and provide prompt service (example – no waiting, doctor's willingness to listen).

Assurance : Employees' knowledge and courtesy and their ability to inspire trust and confidence (Example – reputation, credentials and skills).

Empathy : Caring individualized attention given to customers (Example – acknowledging patient as a person, remembers previous problems, patience).

Tangibles : Appearance of physical facilities, equipment, personnel and written materials (Example – waiting room, examination room, equipment, report cards).

Zeithami and Bitner (1996) suggest that since health care services involve some amount of uncertainty/high risk, assurance dimension would be of great importance to the consumers. In the early stages of relationship, the consumer may use tangible evidence to assess the assurance dimensions. Visible evidence of degree, honours and awards and special certifications may give new customer confidence in a professional service provider.

Poor service quality can be caused by a number of factors. These include organisation's lack of understanding of customers expectations; not selecting the right service design and standards; inability or unwillingness to meet the standards i.e. not delivering as per the service standards; not matching performance to promises. To provide quality services, an organisation should first learn about consumer expectations through market research. Even in the developed countries, in the not-too distant past, health care organisations had little first hand familiarity with marketing research. (Marketing Research is the objective and systematic process of gathering, analyzing and interpreting data relevant to a specific situation or problem facing an institution.) However, as hospitals increasingly have adopted a marketing orientation, they are choosing to use marketing research to help them understand marketing problems and opportunities. Loubean and Jantzen (1998) conducted a survey of 230 hospital executives in USA to assess the kind of marketing research activities being conducted by hospitals. Hospital's administrators reported that satisfaction surveys of both inpatients and outpatients are the most widely used research applications with more than 80% of the respondents reported usage of these two methods within the last year. Of the surveyed respondents 48% performed a competitive analysis of other institution within the last year and 78% performed this analysis within the last three years. The researchers go on to suggest that 'hospitals seeking effective marketing strategies need to recognize that a broad array of marketing research information is available to them. Research is not inexpensive, but it can be one of the hospital's best values because, if done properly, it leads to better decision making. Hospitals should develop and fund annual research activities'.

Activity 3

Talk to different consumers of health care services and determine the relative importance of the five service quality dimensions (discussed in the section) as perceived by them.

Internal Marketing and Service Quality

As you would have noticed earlier in the services marketing triangle that internal marketing plays a critical role in services marketing. It enables the employees to keep the promises that have been made to customers. Internal marketing can be viewed as the building of customer orientation among employees by training and motivating both customer-contact and support staff to work as a team. The role of employees in a service organisation is very dramatically highlighted by Hal Rosenbluth (1992), owner of a chain of successful travel agencies, in his book titled "The Customer Comes Second" wherein he argues that a company's first focus should be on its employees. "Only when people know what it feels like to be first in someone else's eyes can they sincerely share that feeling with them" (p. 25). Similarly Benoy (1996) mentions that for service business such as health care that are labour-intensive and demand high levels of personal contact between the service provider and the customer, no marketing plan can be considered complete unless it includes strategies for reaching and winning over its internal customers. He further goes on to define internal marketing as "the application of marketing, human resources management and allied theories, techniques and principles to motivate, mobilize, co-opt and manage employees at all levels of the organisation to continuously improve the way they serve external customers and each other. Effective internal marketing responds to employee needs as it advances the organisation's missions and goals". The activities involved in internal marketing include competing for the talent, training employees, empowerment, knowing employee needs, good internal

communication, measuring and rewarding quality. You will study more about some of these aspects in the section on Human Resources Management.

> Knowledge is empowering. When customers and visitors ask, the employees know what is going on and why. They feel they are the hospital, rather than answering. "They tell me nothing!" If you don't tell them, if they don't know, then distorted rumours start circulating. Worse yet, they fell excluded and not a true part of the hospital. Employees, in general, are well motivated and want to do well. Further more, no one knows the job better than individual employees themselves. Therefore, if you create an environment in which they feel comfortable enough, knowledgeable enough, about the business to feel that they own the business in a sense, they will contribute – providing, of course, that their capacity to contribute is enhanced by a responsive upper structure of the organisation. (Rabkin and Avakian, 1991)

1.6 MARKETING COMMUNICATION FOR HEALTH CARE SERVICES

As we have discussed in the beginning of this unit, communication is an essential part of marketing. In fact it is one of the elements of marketing mix i.e., promotion. Few goods or services, despite being well developed, priced and distributed can sustain the market place without effective promotion. Promotion can broadly be understood as "communication by marketers that informs, persuades and reminds potential buyers of a product to influence an opinion or elicit a response". The various elements of promotional mix are advertising, sales promotion, public relations and personal selling.

However, in this section we are going to focus on word of mouth communication, since in case of services, especially services which involve some amount of uncertainty or risk (like health services), consumers tend to rely more on information from personal sources (e.g. friends) than from non-personal sources (e.g. mass media). Therefore, word of mouth (w.o.m.) communication becomes a critical part of health care marketing. Before moving further let us study a definition of w.o.m. communication. It may be defined as "Oral, person-to-person communication between a receiver and communicator whom the receiver perceives as non commercial regarding a brand, a product or a service". Though not under the direct control of marketer, they can still influence it. A health care marketer might ask how favourable word of mouth can be prompted, unfavourable word of mouth reduced – and since either effort will likely require marketing expenditures, what results can be expected. Besty and Madeline (1995) have highlighted a number of issues regarding w.o.m. communication in health care marketing:

i) Word of mouth is more effective than advertising. And in the health care field, the difference is even more striking than in other purchase categories.

ii) The effectiveness of word of mouth applies across the board in terms of the kinds of responses marketers traditionally seek. Word of mouth communication not only increases awareness and knowledge, but it also persuades and lead to action, such as actually choosing the provider one has heard about.

iii) Favourable w.o.m. communication can't overcome personal negative experience.

iv) Health care organisations should encourage its employees, their spouses to become involved in community and neighborhood groups and to educate them on what to say when they get there, in the hope that a source of word of mouth communication is listening.

v) Word of mouth increases as the level of satisfaction increases. An emotionally positive experience with a health care provider increases w.o.m. and satisfaction which in turn, raises the odds that w.o.m. will be positive. A marketer, therefore, has an opportunity to enhance experience that leads to positive w.o.m. So, health care marketers should seek a mandate to provide emotional highs to the patients and prevent strong emotional negatives, even if these goals involve serious trade-off.

vi) Consumers of medical care are more likely to engage in negative w.o.m. than they are to complain to their health care provider. Health care providers, therefore, must

make a greater effort than marketers in other industries to make complaining easy and acceptable.

Activity 4

Find out the information acquisition activities undertaken by consumers for selecting a health care provider.

Advertising

Though advertising is not being used substantially by hospitals in India, it can be a significant means of communication to the customer. Clow (1995) suggests that by incorporating the five dimensions of service quality (discussed earlier in this unit) – assurance, reliability, empathy, responsiveness and tangibles into their advertising, health care providers can increase the level of perceived quality and thereby reducing the perceived risk. To be effective, health care advertisements must contain one or more of these dimensions in the form of headlines, copy or captions. Pictures and drawings can also be used. To prevent clutter and confusion, an advertisement should focus on only one or two clues; more can be used by cycling several advertisements.

1.7 LET US SUM UP

Marketing, broadly can be viewed as business activity that brings the products to the customers – the products they want, at the time they want them, at place they want them, at price they can afford and also providing all the information customer needs to make informed and satisfying choices. Regardless of specialization or different responsibilities all health care services providers need a basic understanding of marketing. The term service includes a wide range of services including health care services. Services marketing require a different treatment as compared to goods marketing because of the distinctive characteristics of services. These include, intangibility, heterogeneity, inseparability of production and consumption and perishability. Because of these characteristics, the traditional 4 P marketing mix is inadequate and services marketing entails an extended 7 P marketing mix which includes Product, Price, Place, Promotion, People, Process and Physical evidence. The aim of service marketers should be to present a unique blend of these seven marketing mix elements in order to deliver excellent or superior service relative to customer expectation. For health care marketers, this could include not just taking care of the 'cure' (outcome aspect) but also the 'care' aspect (process). For achieving this, internal marketing is of crucial importance. Further for health care services, which involve some amount of uncertainty or risk from customers' point of view, word of mouth communication plays an important role.

1.8 KEY WORDS

Internal marketing : Application of marketing, human resource management and allied theories, techniques, and principles to motivate, mobilize, co-opt and manage employees at all levels of the organisation to continuously improve the way they service external customers and each other.

Marketing : The process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individual and or organisation goals.

Market segmentation : Process of dividing a market into meaningful, relatively similar and identifiable segments or groups.

Service : An activity or series of activities of more or less intangible nature that normally, not necessarily, take place in interaction between the customer and service employees and/or physical resources

or goods and/or systems of the service provider, which are provided as solutions to customer problems.

Service quality : Service quality is the delivery of excellent or superior service relative to customer expectations.

Word of mouth communication : Oral, person-to-person communication between a receiver and a communicator whom the receiver perceives as non-commercial regarding a brand, a product or a service.

1.9 SELF ASSESSMENT QUESTIONS

1) What do you understand by the term marketing? How is marketing relevant to health care organisations?

2) Identify the four main distinguishing characteristics of services. What are their implications for marketers?

3) What are the components of service quality? How would you apply these to health care services?

4) Discuss the importance of word of mouth communication for health care services?

1.10 FURTHER READINGS

Benoy, J.W. (1996) *"Internal Marketing Builds Service Quality"*, Marketing Health Services, Chicago, Vol. 16, Issue 1, p. 54.

Besty, G. and Madeline, J. (1995) *"Word of Mouth Communication: Causes and Consequences"*, Marketing Health Services, Chicago, Vol. 15, Issue 3.

Clow, K.E. (1995) *"Advertising Health Care Services"*, Marketing Health Services, Chicago, Vol. 15, Issue 2.

Engelberg, M. and Neubrand, S. (1997) *"Building Sensible Segmentation Strategies in Managed Care Setting"*, Marketing Health Services, Chicago, Vol. 17, Issue 2, p. 50-55.

Gabbott, M. and Hogg, G. (1996) *"The Glory of Stories : Using Critical Incidents to Understand Service Evaluation in the Primary Health Care Context"*, Journal of Marketing Management, 12, p. 490-503.

Glynn, W.J. and Barnes, J.G. (1995) (Ed.) *"Understanding Service Management"*, John Wiley & Sons.

Gronroos, C. (1990) *"Service Management and Marketing"*, Lexington Books p. 37-39.

Loubean, P.R. and Jantzen, R. (1998) *"Marketing Research Activities in Hospitals"*, Marketing Health Services, Chicago, Vol. 18, Issue 1, p. 12-17.

Rabkin, M.T. and Avakian, L. (1992) *"Participatory Management at Boston's Beth Israel Hospital"*, Academic Medicine, Vol. 67, May, p. 289-294.

Rust, R.T., Zohorik, A.J. and Keiningham, T.L. (1996) *"Services Marketing"*, Harper Collins College Publishing.

Zeithaml, V.A., and Bitner, M.J. (1996), *"Services Marketing"*, McGraw Hill International, p. 117-122.

Zeithaml, V.A., Parasuraman A. and Berry, L.L. (1998) *"Delivering Quality Service : Balancing Customers Perceptions and Expectations"*, Free Press, NY.

Zeithaml, V.A., Parasuraman A. and Berry, L.L. (1985) *"Problems and Strategies in Services Marketing"*, Journal of Marketing, Spring, p. 33-46.

UNIT 2 PRICING OF HEALTH SERVICES

Structure

2.0 OBJECTIVES

After going through this unit you should be able to:

- discuss the concepts underlying price setting;
- explain the relationship between costs and prices;
- define the various objectives that may be sought while deciding the prices of your service;

- explain the various methods of pricing;
- select a price appropriate for your own health services; and
- apply the understanding of consumer perception of prices to your pricing decisions.

2.1 INTRODUCTION

Pricing is one of the most important decisions that you as a provider of health services will have to take. The sheer variety of available price levels for similar services among different providers of medical and health services is indicative of the differential practices that are being used to arrive at the ultimate price for various services. We in this unit shall discuss the conceptual basis of price setting, the different objectives that may be sought in price setting and the various bases that different establishments apply to arrive at the final price. The discussion also includes some of the operational issues that need to be considered in relation to administering your pricing policy. This unit presumes that you have already gone through and understood the break even analysis explaining costing of health services, as we will use the concept of costs in terms of their relationship to prices. This unit also briefly discusses why pricing for services like medical services is different from pricing of tangible products. One of the key determinates in any pricing decision is the consumers perception of the value he gets as a result of availing a particular treatment. As consumers evaluate prices in a different way for services that they do for products, it creates both opportunities and problems for providers of health services. These issues are discussed at length in this unit.

2.2 PRICING — THE BASIC FOUNDATIONS

All medical service establishments, except the public ones, are dependent on revenues from patients as a significant and sometimes the only source of their incomes. These incomes are a function of the prices they charge for their services and the number of customers who avail these services. Interestingly however, for routine and standardised medical services like a health checkup or vaccination or a tooth extraction, the price charges would often determine how many customers would avail the service in a given establishment. In order to understand price determination fully, you must be aware of the basic fundamentals of price setting, specially in the context of hospitals as providers of medical services.

The pricing strategy for any given service, medical services included, depends on three basic fundamentals. These are ***costs, value*** and ***competition***. The costs represent the monetary value of everything that the organisation has to utilize in order to create and offer the service for the patients. In the short run or the long run, all costs must be recovered if the organisation is to earn profits. Costs thus represent the lowest limit below which in the long run, prices cannot be set. On the other hand, you cannot set the price, beyond the value that your customers assign to the service, simply because at that price level, exchanges (or purchase of service) will not take place. Consumer's perception of value of a given service would thus set the upper limit beyond which prices cannot be set. Between these two limits service organisations may have the freedom to charge whatever prices they determine, but for the presence of a third variable, the competition. You are not the only provider of health services in the market. There may be several other providers with similar or better services. The prices that your competitors charge for a similar service will limit your freedom of setting prices between the two limits provided by the costs and the consumer's concepts of value. The prices being charged by the competition would thus determine the actual level at which prices for a given treatment or service may finally be set in between these two limits. To recapitulate the three basic variables that are fundamental to any pricing decision are:

- how does my consumer define value for a given service.
- what are my costs in providing that service.
- how does my competitor price the same service.

We shall in the next paragraphs try to understand why the pricing of health services has to be dealt differently as compared to pricing of products.

Activity 1

Identify any basic hospital service like an X-ray analysis, a complete health check examination or a medical consultation for suspected typhoid in three medical establishments in your city. Do you find any price variations? What in your view are the reasons for these variations?

2.3 WHY IS PRICING FOR MEDICAL/HOSPITAL SERVICES DIFFERENT FROM PRICING FOR GOODS

In order to realistically set your prices, you should be able to have an appreciation of what role does price play in the customers' decisions to avail a given medical service or health plan. Health providers must, therefore, have a clear idea about how their prospective client population perceive prices and price changes of various medical services offered by them. The three basic ways, in which pricing for hospital/clinical/medical services differ from pricing for goods are the issue of customer's knowledge of prices, the role of prices in indicating quality of services and the issue of non-monetary costs.

2.3.1 Prices of Hospital Services and Customer Knowledge

How important is price to the customer when he/she tries to select a particular hospital/ practitioner for a particular treatment? Do customers have any idea at all about the costs associated with such services? Do customers really have clear awareness about the exact prices they would be required to pay for a given treatment before they decide to avail of a given treatment? Let us briefly look at these issues and their implication for pricing of health services. To take a simple exercise, ask adult people around you a few questions about health services and their prices. For example, what is the price for a medical checkup in your city? What is the price for a service like a root canal operation, or a simple tooth extraction? What is the price one is likely to pay for a bone setting process after a fracture and so on. You will find that few people will be able to answer accurately on the basis of their memory alone, because clear ideas about such prices are not available. The price point in our memory for a product or service is called the 'reference price' for that product or service. Very few prospective patients have a clear reference price for the range of health services provided by hospitals and clinics. Let us examine some of the reasons for this phenomenon.

Health services are intangible, and can be offered in a variety of configurations with variation in accompanying services. Hospitals, therefore, are able to create a number of permutations and combination of a given treatment package, resulting in complex pricing structures. If a prospective customer wanted to have comparative assessments of prices for a Ceaserian section, she/he would find that the type of package varies (length of stay, associated services provided), patient particulars may vary and necessitate price variation (complexities, age, medical condition), the level of services may vary (single vs. double room, patient to nurse ratio etc.) Few hospitals would offer exactly the same features or package of services. Prices are, therefore, not strictly comparable.

The problem becomes compounded on account of the fact that in quite a few cases medical providers may be unable to give an accurate price figure in advance as they may not, at the very outset know what a given treatment would ultimately involve. In case of health services, customer's individuals needs also result in different prices being charged. Previous history, general medical condition, age, related health complications etc. may often determine the course of action that would need to be taken for a given patient, final prices, therefore, may also be a function of individual needs of different patients.

It is also comparatively difficult to gather accurate pricing information of all comparable hospitals, because unlike retail outlets displaying prices on their merchandise, prices of health services are not really displayed except for routine services and consultation charges.

It must now be clear to you that prospective customers often possess inaccurate information about prices of health services. The implication of the fact for your pricing

by finding some ways of communicating prices at least for all routine services; creating of price visibility is an issue that many hospitals consider seriously.

The second implication is that while the customer may not 'know' the final price until after he has been in the service transaction for some time for his initial treatment, prices become an important criterion for repurchase of the service as the customers' knowledge of the service costs has now become more accurate.

2.3.2 Prices and Quality of Health Services

One of the interesting things about service prices is that because other cues to quality of service are seldom available, customers tend to use prices as indicators of service quality. In case of goods, the tangible nature of the product and the possibility of physical examination by touching smelling feeling enables a customer to have an assessment of the quality of the product before he buys it. In case of services which are intangible, such pre-purchase assessment is difficult. Research shows that in case of most service, because other tangible indications to assess quality are not available consumers use physical evidence and price as surrogate indicators of service quality. Wherever pre-purchase assessment of quality is not easily assessable high prices in the consumer mind get associated with high perceived quality. Medical services are among the services which are high on credence qualities, where evaluation of service quality even after experiencing a given service (for example a by pass surgery) is difficult to make. In such situation consumers depend on prices as a cue to quality. Prices for medical services, therefore, must be determined keeping in mind the fact that price and quality for such services are positively associated. In addition to cost coverage and/or meeting the competition, prices must be set to convey an appropriate and desired quality image.

2.3.3 Costs other than the Monetary Cost

There is an increasing realisation on part of service providers that apart from the monetary cost, customers have to bear several non monetary costs also while availing a given service. Sometimes these costs affect consumer valuation and affect his choice of alternative service offers. These costs include time costs, search costs and psychic costs.

Health services require direct participation of the patient and thus require him to spend both waiting time and interaction time with the hospital subsystems — registration, specific tests and of course the doctors. For any given appointment his time spent may comprise both waiting time and time with the doctor. Time spent in availing a given service represents a specific cost to the customer. Some health services, specially the costlier ones like a by pass surgery require the customers to go through a lot of information search to identify the best possible alternative offers are comparable, one variable may include apart from the prices, the expertise of the doctors, facilities offered, location etc., such costs are sometimes considerable and also have to be borne by the customer. Sensor costs are the other class of costs that may make a difference. Unpleasant sounds, noise, crowds are some of the sensations that most people are uncomfortable with. In hospitals that are located in crowded or squalid neighbourhoods, or are overcrowded customers may have to bear these costs. If there are alternatives which are compenable on other variables mentioned earlier, customer may like to avoid the sensory costs, even if they have to pay a little higher.

For health services, one of the most potent costs are the psychic costs – not understanding the service feat of uncertainty, feat of undesirable consequences like pain, disability or loss of control are very important in the customer's decision to avail or postpone a given medical transition. Providers of health services, therefore, must be aware of not only the monetary costs like cost of time, cost of search, sensory and psyche costs because there costs offset consumer valuation significantly and should this be an input in pricing consideration.

Activity 2

hospital they chose. From the former, try to find out, why in spite of high price, was their choice made in favour of this hospital. How does their answer reflect the concepts studied above?

2.4 ROLE OF PRICES AND CONSUMER VALUE

Exchanges of goods and services take place when the buyer of a given service feels that the goods or services being bought by him are at least as valuable to him as the money he is spending in buying those goods and services. The case of health and medical services is however slightly different. As there are many instances under which the customer's need for a given treatment or check up is a non postponable or emergency purchase and often a necessity, the exchange will take place even if prices are not suitable to the customer. He will however, if competitive offers are available, try to find the best possible return for his money. The return again is dependent upon how a given customer defines value that he gets in a given transaction.

Different consumers may perceive value differently. To some value may meet low price, others may perceive value in terms of associated service, comfort, speedy disposal, and privacy.

The implication of the concept of net value for pricing decision is that, while evaluating whether a given price is right for a given medical service, the customer may look at all the perceived benefits that he would receive as a result of the service transaction. He would also analyse the costs that he has to bear in order to avail the service. The higher the difference between the sum total of perceived costs and the sum total of perceived benefits greater will be the net value of the service in the eyes of the customer. You can imagine a balancing act being carried out in the customer's mind while he tries to offset the perceived benefits of the service against the perceived total cost. If the perceived costs are found to be higher than the total perceived benefits, the transaction will be looked upon as having net negative value and, therefore, not desirable at that particular price. Of interest to marketers is the fact that the evaluation of net value can be changed either by increasing the perceived benefits to the consumer or minimising perceived costs or managing both. The net benefits apart from the core benefit of health added could include value to the health service in terms of personalised care, individual attention, higher quality of medical personnel, high success rates, ensured privacy, exclusivity of service, corporate health plans enabling speedier medical reimbursement, installment payment plans, accepting payment through credit cards or cheques etc. Perception of net value can be increased by giving some of these additional benefits. Reducing the costs side may not necessarily mean cutting only the monetary costs. Perceived costs of availing the service by the customer could also be reduced by:

- reducing waiting time, reducing the time taken in giving test reports, ensuring all appointments are meticulously managed and kept.
- reducing the information search costs by providing required information readily and easily.
- facilitating access to services like facilities, accounts and amenities.
- reducing unnecessary physical effort that customers may be required to make to avail the facilities and services.
- reducing levels of stress associated with a given treatment through information sharing, consultation and counselling.
- minimising sensory costs like noise, unwelcome sights and smells, offensive behaviour of support staff and so on through creation of attractive, pleasant visual atmosphere, noise reduction and training of personnel.

Reduction in these costs, will enable the customer to perceive higher 'net value' in the service. It can also enable the provider to enhance the monetary price charged or have greater pricing freedom because he is now able to manage a higher net perceive value in the consumer's mind.

Perception of value are important in marketing of health services because buying decisions do not get made on reality but on perception of reality. The fact that prices are perceived to be high or reasonable by the customers is thus dependent upon whether they perceive the price as being commensurate with the value that they receive.

The providers of services in health care must also be sensitive to the fact that customer's evaluation of 'net value' may vary sharply pre and post utilisation of the service. As health care is a service where repeat use by the same customer or members of his family is a frequent possibility, post purchase evaluation may have important implications for repurchase of services when customers find that costs of a given stay in the hospital in terms of monetary or some of the costs described above, were higher than what they anticipated at the time of making the buying decision or that the anticipated benefits were not received fully, their evaluation of net value may go down sharply and may result in absence of repurchase as well as loud word of month publicity for the hospital. Prices, therefore, have to be reflective on the perceived net value in terms of giving the consumer a positive figure on the balance of net perceived benefits and net perceived costs.

Activity 3

You have just studied about some relevant costs other than the monetary costs. Take a survey of at least five medical establishments and report how efforts have been made to reduce some of these costs. What additional recommendations would you made to these providers for minimising the cost side (monetary costs not included) of their price and price cost value equation.

Clinic/Hospital	Efforts at non Monetary Cost Reduction	Further suggestions by you
1.		
2.		
3.		
4.		
5.		

2.5 PRICE SETTING IN PRACTICE AND PRICING OBJECTIVES

Under this section let us look at the various pricing objectives that health service establishments may seek when they determined their prices and then identify the various bases that are applied by them to arrive at a final price.

2.5.1 Pricing Objectives

Fundamental to any decision on pricing is your understanding of your pricing objectives or simply put answering the questions "what do I want my prices to do for me/my organisation". In the basic objective maximising your profit, or maximizing patronage or sheer survival at a given point of time? Understanding pricing objectives will help you appreciate the outcomes that you want your prices to achieve and this would direct your price setting efforts. Pricing objectives may be revenue oriented, operations oriented and patronage oriented. The approaches that can be used to arrive at the final price are costs based pricing, competition based pricing and demand based pricing. Let us discuss these in the following paragraphs.

2.5.2 Revenue Oriented Pricing Objectives

Revenues represent the surplus of income over your costs. Health establishment in the private domain, if they are established as profit seeking organisation, will seek to keep their prices at levels that will enable them to earn the greatest possible surplus on their costs. Even in the public domain, health establishment cannot afford to overlook the revenues or at least consider carefully that prices are set at levels that enable the revenues

to at least cover the costs if not generate profits. The various revenue oriented objectives that may be sought by health services provider may include:

- maximising the surplus or revenues.
- achieving a certain target rate of return on your investments.
- cover all costs.
- cover cost of providing one particular services.
- cover incremental costs of offering a given service.

Apart from these revenue oriented objectives you may sometimes come across two other classes of objectives which are usually applied in cases of new or innovative services. These objectives are:

2.5.3 Market Skimming Objectives

When a new or innovative health service is introduced in the market, for example, a new diagnostic test (ultrasound test, MRI Scans, are good example of this technique of pricing) the providers on account of the fact that there are only few providers who can offer the services try to charge an initial high price so that the initial return can be very high. This enables them to encash their near monopoly position at the initial stages of the service being introduced in the market. Market skimming as an objective is generally followed when the expectation is that competition for this new service will soon emerge in the form of other providers. Starting to offer the same service when competition starts emerging prices are brought down to a more reasonable level, allowing the organisation to still earn profits but not at the introductory levels.

2.5.4 Market Penetration Objectives

Alternatively when an innovative service with a high market potential is introduced in the market, but customers resistance to the service on account of its novelty is also high, a low initial price is sought to be charged, to enable the potential customers to try the services and be convinced of its value. This is called the market penetration objectives as it enables the organisation to gain entry in a market and then develop its market overtime. As larger number of customers, realising the value of the service start demanding the service, the prices are gradually raised to enable the earning of a targeted rate of return.

2.5.5 Operations Oriented Pricing Objectives

This objective is usually applied in case of service organisation where there are large differences in volume of demand at different times, so that the situation of under utilisation of capacity and overfull demand may alternatively be confronted by the organisation depending upon the seasonality of demand. The prices, therefore, are sought to be set in a way that allows price variation over time so that demand matches available supply at any given point of time. Special weekend packages in developed contracts pricing are an example where low prices on weekends are used to off set the low hospitals bed occupancy weekend. Hospitals in our country on the other hand are severely supply constrained organisations where demand for hospital services far outships the available supply. Operations oriented objectives are thus rarely applied except in cases where specific full equipment utilisation is sought to be achieved through such practices.

2.5.6 Patronage Oriented Pricing Objectives

Hospitals like all customer based organisations are dependent for their growth on the number of customers who choose to patronise them. Health providers may, therefore, sometimes, deliberately seek to set prices at levels which are directed at enhancing patronage rather than being based purely on costs or revenues. These objectives may be:

- subject to a certain level of revenue, try to maximise patronage if capacity is not a barrier.

- identify that different segments in your market have different paying capacities and create pricing structures that will enable patronage from different segments.
- identify that alternative strategies like paying through credit cards or organisational billing may actually enhance customers willingness to patronise your establishment.

This description of the various pricing objectives that may be sought by hospitals health service providers is not exhaustive. Other objectives that may be sought to be achieved through pricing can include survival market development, maximisation of current revenue, maximisation of market skimming overcoming customer resistance to trial of a given service achieving a quality leadership etc. The organisation should however have a clear focus on what objectives are sought to be pursued through the pricing decision to enable a clear definition of what bases would be used to arrive at a pricing figure. We shall now discuss the pricing methods using the various bases i.e. cost, competition and demand.

Activity 4

Identify, from among the practices followed in your city or in your knowledge, examples of the following:

a) Market Skimming Objectives

b) Market Penetration Objectives

2.6 BASES USED IN PRICING

2.6.1 Cost Based Pricing

Generally used as a pricing basis for revenue oriented pricing objectives cost based pricing methods are among the most prevalent methods of pricing in a large number of organisation. The reasons are simple. You often feel that there is less uncertainty about costs than about factors like demand or consumer evaluation of value, costs are internal data and may be more controllable. In the cost based pricing approach, hospitals will be required to determine expenses accruing on account of raw material, labour, human resources and machinery; add amounts or percentage for overheads and then add the margin for profit thereby arriving at the price. Price would thus be a sum of direct costs plus overhead costs plus the profit margin desired to be earned on investment. This however looks much easier than it is. Let us look at the various costs that you would need to estimate before you arrive at the inputs for this pricing equation. (You have already been exposed to the basic costs concepts in Unit 1, Block of this Course).

Fixed costs are those that do not vary with the volume of operation, and continue to be incurred if the health services are not being offered. These include costs like rent of the building, insurance, taxes, depreciation, administrative salaries, salaries of the full time medical and nursing staff, utilities like water and electricity, security, cost of capital invested, maintenance costs etc.

Variable costs are those that vary with the level of output (or operation in this case) and are thus dependent upon the number of patients served by the hospital. This would include costs involved in calling in consultants for a specific patient, costs of test conducts, wages and salaries incurred in paying overtime for additional manpower required costs of medical supplies etc. Conceptually, the organisation must be able to calculate its total cost per service transaction by adding up the variable costs component per service and the proportion of unit fixed costs allocated to that services and add to this total unit cost, the margin that is desired to be earned to arrive at the price figure for that service. In the long run every organisation must operate at a price level which allowed it to earn a certain margin after covering both fixed and variable costs.

You have already learnt in the unit on break even analysis and how break even point can enable identification of both the level of operation and the safety level at which the organisation should operate. The difference between the final price and the variable costs, called the contribution margin is indicative of the amount that is available with the organisation to cover its fixed costs and if possible to earn a margin of profit. Since

information about costs is the basic input in arriving at a pricing decision, this approach is referred to as cost based pricing.

There are however several problems associated with purely cost based pricing approaches, specially in case of hospitals where multiple services are being provided. The main difficulty arises in allocation of costs. It is for example very difficult to decide what proportion of costs of land and building should be allocated to outpatient services or the surgical services? What should be the basis of allocation — should it be the proportion of space occupied or should the cost be equally allocated to all services. How should the salary of administrative staff be charged to per unit service transaction? These are difficult issues and required either a simple overall overhead calculation which is their equally allocated to all services (which would be arbitrary) or detained costing exercises which may prove to be extremely time consuming. The second major problem is that a large proportion of cost is composed of cost of people (both doctors and administrative personnel) which is, very difficult to allocate on a per unit basis. There are also interesting variations in the type of work that gets created in a hospital which has implication for costing and pricing. While an X-ray charge may be based on fixed and variable costs related to the X-ray machine and the machine operator, how does one really costs the time or the expertise of the professionals who has to interpret the film and prepare a diagnosis? How does the costing really get done if the diagnosis is a team effort or consultative process? These issues sometimes render cost based pricing a non realistic exercise and estimation instead of actual figures start getting applied. Yet on the basis of historical data and analysis of costs incurred in the past period, health providers use cost based pricing extensively. Two variations of the cost based pricing technique are generally used. The first is based on deciding about a markup on costs of offering the service and then charging a final price based on total cost + markups. Hospitals also tend to vary markups within the same establishment. Markups may vary inversely with the volume of services sold, the higher volume the service the lower the markup, for example paediatric vaccination. The lower the frequency of service the higher may be the markup. Others may vary the markup on the basis of industry practice; still others may follow a practice of fixed markup like 20-30 % across the services.

The second cost based pricing technique is based on earning a targeted rate of return on investments wherein the organisation bases its pricing decision on identifying a certain percentage rate of return that is desired to be earned on the total investment made. The total revenue that must be earned on the investment is thus calculated and the proportionate allocation is then done across services to enable the actual total revenues as per the desired rate of return.

2.6.2 Competition Based Pricing

The approach here is to base the pricing decision on the prices charged by other comparable providers. As noted earlier, service providers in the health sector may not be strictly comparable. Yet for routinely bought services like periodic health check, dental cleaning, tooth extraction, X-rays, diagnostic tests etc. consumer knowledge of competitive prices is higher and the possibility of varying prices very much from the going rate is not very high. The higher the degree of standardisation in certain medical/ health services (i.e. blood test) the higher is the tendency for prices to cluster around the going rate prices. There are however locational variations in the level of the prevalent prices with the going rate higher in large town or metros. This does make economic sense also as cost of offering medical services in metropolitan towns versus a small town may be much higher.

2.6.3 Demand Based Pricing

The third approach to pricing, demand based pricing is based on the consumer ability to pay or willingness to buy at a given price. Provider of health services typically base their pricing decision on consumers' perception of value of the service offered. Consumers' perception of value in case of health services, which are highly intangible in character and whose quality is extremely difficult to judge prior to the purchase of the service are dependent upon a number of variable. Among them are service cures like exclusively of the service, the brand name, the perceived non-monetary costs (discussed earlier) and other assessments like physical infrastructure and word of mouth publicity from friends, relatives and other users. Central to the concept of demand based pricing is the

understanding that different segments of consumers will have different perception of the value they perceive in differently priced services, that different segments will have different capacities to pay and also that apart from the core benefit of freedom from disease or discomfort, some segments may look for other augmented benefits in the service package and may be willing to pay for them. Let us look at how different pricing strategies, under demand based pricing may be followed when consumer's definition of perceived value differs.

2.6.4 Pricing When Value to the Customer is Low Price

There are segments of the market where actual price to be paid may be the most important criterion of choice to the consumer. To go further, sometimes a reluctance to avail a given medical service may actually be sought to be offset by keeping the price very low. The technique that are followed in such conditions where the customer is acutely price conscious or defines value as being 'low prices' include the following.

2.6.5 Price Discounting

Hospitals may carry discounted prices for vaccination for certain fixed periods, when such services are targeted to low income segments of the society, to overcome the apathy or enable purchase by large sections of consumers. Discounts usually are offered on basic routine services. It must however be borne in mine that no amount of discounts would promote purchase unless the consumer has a felt need for the service. Health checks like regular mammography; pap smear tests etc. have a less than actual demand because a large section of population is not alive to the need for such tests or postpone them for psychological reasons.

2.6.6 Odd Pricing

This is the pricing technique used to create a lower perception of the price and entails in pricing the service just below the rounded rupee figure so that consumer feels he is paying a lower price. Off pricing is an example of psychological pricing and works very well in competitive markets specially for basic or routine services, where specialised skills may not be called for, but where the perceived lower figure becomes a determinant of repeat purchases.

2.6.7 Place Differentiates

Locations partly because they define market segments indirectly also sometimes determine the prices that will get charged. When doctors operate more than one clinic they may charge different prices in different locations depending upon the clientele's differential ability to pay.

2.6.8 Quality Differentiates

Bulk discounts such as corporate and organisations purchases are increasingly becoming common in health services as on the one hand organisations are making attractive medical reimbursements an integral part of their HR policies while on the other hand hospitals are becoming conscious to the necessity of having an assured and steady customer bases, the demand of which does not fluctuate widely.

2.6.9 Penetration Pricing

Discussed earlier under the market penetration objectives in pricing thus pricing strategy is followed to introduce new services at low prices so that trial may be encouraged. The strategy is specially useful where the threat of potential competition is very high. Care must however be taken that the initial prices should not be kept so low that they result in customer resistance when regular pricing is done, once the service becomes competitive.

2.6.10 Pricing Strategies when Consumers Value Perception includes Augmented Services and Prestige

Under such conditions when customers are willing to pay higher to get the desired package of additional conveniences or exclusively or personalised attention, monetary prices do not remain the main consideration in selection of a given service provider. As

high prices may actually be seen as being indicative of high quality or esteem attached with the provider and, therefore, the purchase high prices may actually be preferred prices. The strategies that may be followed are price skimming and prestige pricing. Price skimming is confined to introducing new services at price premium, accompanied by high promotional expenditure (discussed earlier under market skimming objective). Prestige pricing on the other hand is a demand based pricing where markets, looking at the kind of demand or clientele they have, offer high quality service at very high prices. Examples could be exclusive plastic surgeons, physiotherapists, psychiatrists who have a limited but high margin clientele and part of the status is generated by the exclusivity of the service. Services are consciously priced very high in keeping with the high level of service quality that embodied the service. Value additions may also take the form of privacy, comfort, personalised care, high doctors to patient ratio etc.

2.6.11 Pricing Strategies when Consumers' Perception of Value is Value for Money

When customers insist upon getting due value for money prices, service providers resort to value for money price, the two strategies that are generally followed here are:

2.6.12 Value Pricing

This strategy, based on the understanding of evaluation that the consumer will make on getting his money's worth, this pricing technique frequently used in the hospitality sector, entails in 'giving more for less'. It generally involves building together some related services that are needed by a large number of people and pricing the package lower than the services would have cost individually. Examples in the health sector can be found where camps for specific medical package like an eye camp, or vaccination camp are organised with two or three organisations coming forward to provide various services. The bundle has a large user base, and the price of the complete package, registration, medical transaction, brief stay and post transaction care is lower than the services would have cost individually. This is possible because of collaboration service assembly by two or three organisations.

2.6.13 Complementary Pricing

Sometimes called loss leader pricing – this pricing technique identifies complementarily between some of its services. While the basic service is priced low, the peripheral services can be priced to absorb some of the cost of the basic services and priced high. Examples could be a doctor charging low initial consultation but the prices for various treatments could be priced to take care of margins for both services. A dental clinic may have low consultation or registration charges but may price the follow up services like a root canal operation or a ceramic bridge assembly at a higher price. Hospitals may use low registration and room charges, but the consultant doctor's fees or the treatment like the charges for the operation can be kept high. The low prices of some services are thus allowed to complement the higher prices of the other services in the total package.

2.6.14 Price Bundling

A careful look at services provided by hospitals would show that patients utilize multiple services which go on to form a package. Not all patients would want to or need to utilize all associated services within a given package. Price bundling is a strategy which enables a hospital to identify differential packages of associated services and price the 'bundles' of services differentially, on the basis of how many associated services form a given bundle. A given patient having had an operation, may want to have round the clock nursing support and follow up nursing support at home when discharged, frequent checkups and weekly visits to one of the consulting doctors. Another patient having had a similar operation may be willing to use family support for his post operative general care, and may like to use the nursing help only for administering medication and needed paramedical support. It should be possible for the hospital to identify that these two cases actually make up two different service packages and thus price them differentially.

Price bundling is based on the understanding that it is possible to look at the service provided by the hospital as consisting to certain core services surrounded by levels of augmenting services. There may be patients wanting to avail all the facilities offered by the hospital and willing to pay for them. Others may want just the bare bone core service

and not the associated augmented services or may want to pay for only a lower level of augmentation. Recognising this differential ability to pay, the hospital could look at different 'bundles' packages that can be created for different segments of consumers and offer multiple packages at different price levels.

Activity 5

Comment upon the newer trends in payment enabling practices being followed by hospitals in your area. Can you think of ways which would add value for the patients in terms of added convenience/facilitation.

2.6.15 Market Segmentation Pricing

While health care and medical attentions, freedom from disease and pain are basic human needs, the market for health services is not a homogenous market, in that different customers have different abilities or willingness to pay, they differ in the levels of "quality" or comfort or associated value addition they may want, they differ in their sensitivity to prices and so on. Recognising this, health service providers segment their markets and charge different price to different group of customers. Public hospitals for examples have different price structures for non income tax payers, and sometimes for senior citizens above a certain age. A large number of private hospitals have a certain proportion of beds which are categorized as 'free' beds where the patient may have to pay only minimum charges for same services.

Another form that market segmentation takes place is where the hospitals have different categories of rooms like a general ward, single, double, deluxe or super deluxe categories and price them differentially. Here the prices are supposed to be rationalised on what is perceived to be different quality level of associated services, even though the costs of providing these services at the different levels may not be translated proportionately in the price differentials. A doctor giving post operative examination to a patient in the general ward and to another patient in deluxe room may spend the same time, let us say 15 minutes each in both situations, yet the overall price charged in the two categories will be different for instead of cost based pricing, demand based pricing has been applied to ensure demand from all segments and maximise total returns.

Activity 6

Looking at the practices followed in your town, identify the segmentation strategies used by hospitals. Are these effecting?

2.7 IMPLEMENTING THE PRICING POLICY : STRATEGIC CONSIDERATION

You must now be clear about the various bases that can be utilised to arrive at your pricing decision. In addition to variables like costs, demand and competition and the considerations of your own objectives in arriving at a pricing figure, there are certain issues which demand decision before you can implement and administer a pricing strategy. Lovclock has clearly focussed on these issues in terms of key questions that must be addressed while determining the pricing strategies. The following table highlights these issues and the underlying decision that must be made in order to be able to define and implement your pricing strategy.

How Much to Charge

As noted earlier in the beginning of this unit, the issue of costs is important for the pricing decision. The health service provider, however, would need to decide upon the relevant costs that must be considered while arriving at the pricing decision. Is the hospital trying to cover only the variable costs or all the costs, whether it has decided to allocate a share of the fixed costs across all priced services and is seeking to get them also covered? Is there a way in which costs of fixed goods such as land and building can be spread over all services or over a period of few years? Should the hospital have a basic package of core services priced at a certain level and then keep on adding to the price depending upon the

combination of value added services availed along with the core service? Answers to these questions would depend upon the choices you make and will thus determine the actual figure you want to finalise as the price for a given service.

For the market/markets that you cater to, you would also need to assess the prospective customers sensitivity to prices. In the first section we had discussed consumer's perceptions of value affecting his evaluation of prices to be paid. While for a lot of health services, because of their necessity and expediency nature, customer do not display high levels of price sensitivity, yet for frequently availed routine services like medical checkups, ultrasounds, dental fillings etc. wide price differential, may make customers go to alternative providers unless they are supported by superior value through accompanying services.

Price discounts should be carefully used. All discounts affect the overall total revenue to the organisations and reduce the contribution margin from each transaction. While offering specific price discounts to attract a given segment may create marketing opportunities in new segments, heavy discounting may actually interfere with the valuation of the service in the eyes of the high paying customers. Discounting over time, however is prevalent in the health sector, where understanding the customer reluctances to stay in a hospital over weekends some hospitals offset the dip in weekend utilisation of operating and post-operating services by offering substantial discount on operations during the weekend.

Advocates of psychological pricing suggest that when prices of services are in term of an odd figure e.g. a sonography costing Rs. 490.95 as opposed to Rs. 500, it gives the consumer the feeling of paying "somewhere around 400" rather than almost 500. Since people rarely carry an absolute figure in their mind as the price for a given service this perception of the price as "somewhere around 400" is likely to give a substantial competitive pricing edge to your prices if odd pricing or psychological pricing is used. Hospital administrators on the other hand and sometimes customer as well may actually welcome the convenience of round price figures.

On What Basis should Prices be Charged

As a complete service provider, you will need to identify the basis on which prices would be charged in your hospital. You would recognise that in your case, there could be actually more than one basis on which price could be charged. For example, fee could be charged for admission (or registration) and then on a time basis (duration of stay on a per day basis in the hospital) or on the basis of resources consumed (additional nurses hired for round the clock care). Different establishments also vary in their practices as to whether they should bill each element of the treatment separately or charge a single 'package price' for the whole transaction. It is however a good practice to have a price figure for each service element, even though the policy is to quote a package price to the customer.

Where should Payment be Made

You must clearly indicate the payment procedures in terms of whether the payments should be made and receipts collected at the reception counter or at the Accounts and Billing department if you have a separate section like that. Increasingly consumers today are using their credit cards to make payments. Where customers simply give their card number and ask for their account be billed directly. Policies allowing cheque payments for government employees may allow greater willingness for patients to choose one particular hospital over another. All these are example of facilitation provided especially if the payments are large.

Where and How should the Payment be Made

The two alternative options that service organisations use are asking the customers to pay in advance or to ask for payment once the treatment is completed. Most prevalent in case of medical care is the practice of asking the customer to ask for an initial advance deposit, with the balance being billed later as the treatment progresses or is completed. This practice makes sense because specialist services or time of specialists may need to be allocated or services brought in, expensive resources may need to be appointed and

scheduled in advance of the actual treatment. In addition, very often in the beginning of the treatment, the service provider is rarely ever completely sure as to what costs the treatment will actually entail, the complication that may arise, the additional services that may need to be provided. It is, therefore, prudent to ask for an initial deposit and then identify the billing inputs as they accrue.

How should Prices be Communicated

Once the decision on how much a charge and how the payments are taken, the hospital must at a policy level decide how the prices are to be communicated to the customers. Since prices constitute an important input in the purchase of at least some of the medical services, creating information access to prices can enable customer to minimise some of the uncertainty in decision making. Not only do customers need to have some information on prices in advance, they also need to have information on how and when would they be required to pay. It is, therefore, advisable to institutionally decide, how much information on prices is to be communicated and how? Should rate lists for various services be on display or the rate cards be given to customers once they seek that information. Decision on how public should know pricing information needs to be institutionally taken and then clear unambiguous communication of prices needs to be managed.

To define the term in the most comprehensive way we can say value to the customer in the sum total of all perceived benefits minus the sum of all the perceived costs. Looking at this concept of value, it must be clear to you that the larger the gap between perceived total benefits and perceived total costs, the greater is the value that the customer would perceive in a given service. To enhance this perception of value in a given price category, therefore, as a provider of health services you may follow two alternative strategies or follow a combination of both. Value can be enhanced by increasing the benefits that you give to your customers or by rendering costs. On the side of costs, apart from the monetary costs, in services like health, other costs like cost of time (waiting in the reception, waiting for an appointment), cost of effort (in terms of access to location), cost on account of stress and sensory costs like fear are very relevant. If the provider can manage to reduce some of these costs, he can alter the customers perception of value of his own service. What you must appreciate is that while comparing alternative providers of health services, customers use this perception of 'net' value i.e. the difference between perceived benefits and perceived costs, rather than just the figure of monetary prices. You must, therefore, consider carefully the perceived benefits that are associated with your hospital services and the perceived costs that the customer has to bear, before arriving at a monetary price figure for your services.

Activity 7

Based on your knowledge of practices regarding communication of prices by clinics/ hospitals, prepare a note on what needs to be done further looking at the customers need for information on the one hand and the peculiar nature of the health service on the other hand.

2.8 LET US SUM UP

Pricing of health services poses several issues for decision makers in view of the sheer diversity of both the type of provider and the vast variety of consumer. In this unit you have studied the role prices play in consumer valuation of health services, the kind of pricing objectives of the organisation. Organisations may seek to achieve while deciding upon their pricing policy and the various factors that are utilised to arrive at the pricing decisions. Issues requiring decisions while implementing the pricing policy have also been identified. The unit has covered the inputs that go into the pricing equation as well as the consumer use of price in his buying decision for the health services.

2.9 SELF ASSESSMENT QUESTIONS

1) In a service like health, how important is price in the consumer's selection of a service provider? Justify your answer by giving reasons.

2) Why is pricing for health services unlike the pricing of a product like toothpaste or a car? What difficulties can be envisaged while pricing health service on account of the fact that health is a service and not a product.

3) What do you understand by patronage oriented pricing objectives? Are these relevant for the health service sector?

4) Compare and contrast Market Skimming and Market Penetration Policies as alternative strategies of pricing. What are the conditions under each is likely to be more successful.

5) What are the dangers that you can associate with price discounting as a policy in the health care sector? When can price discounting, according to you, be used.

6) Discuss the problems associated with cost based pricing in health services. What are the ways to overcome these problems.

UNIT 3 HEALTH ECONOMICS

Structure

3.0 OBJECTIVES

After studying this unit you should be able to:

- describe basic concepts of health economics and its application in health sector;
- discuss techniques of economic evaluation;
- explain demand, supply and price mechanism; and
- understand the various ways of resource generation and their allocation.

3.1 INTRODUCTION

In this unit you will learn about the basic concept of Health economics, demand and supply mechanism and how they operate, some ideas about the production function and briefly about how to generate resources and their allocation and utilization.

- The achievement of objective for health for all requires that resources are made available to health sector and are used efficiently. Economic recession has exacerbated the problem of financing health sector.
- The funds are not always used in ways that will have maximum impact on the health of the people.
- This unit provides introduction to health economics for health professionals and presents basic economic concepts and their potential application in health.

3.2 DEFINITION OF HEALTH ECONOMICS AND ITS APPLICATION IN HEALTH AND HOSPITAL PLANNING

3.2.1 Definition of Economics

To understand health economics and its contribution to health and hospital planning, the starting point is definition of health economics. Samuelson, the author of one of the mostly read text book of economics, defines economics as:

"The study of how people and society end up choosing, with or without use of money, to employ scarce productive resources that could have alternate uses, to produce various commodities and distribute them for consumption, now or in the future among various persons and groups in society."

It analyses costs and benefits of improving patterns of resource allocation. Economics do not restrict itself to any particular activity, it applies to all activities wherever there is scarcity and there is thus need for making choices. Therefore, it is the study of scarcity and choice.

Positive Economics : It is about describing and analyzing decisions to do with scarcity and choice. It is concerned with what is or was, or will be.

Normative Economics : It makes judgement about norms or standards to be applied. It determines what should be and not merely what is.

Health Economics : It can be defined as "application of the theories, concepts and techniques of economics to health sector."

It is concerned with:

1) allocation of resources between various health promoting activities.
2) the quantity of resources used in health delivery.
3) organizing and funding of health institutions.
4) efficiency with which resources are allocated and used for health purposes.
5) the effects of preventive, curative and rehabilitative health services on individuals and society.

Activity 1

With respect to your own state, identify the decision of the government which will fall within the scope of health economics, which of these decisions will fall under normative economics and which under positive economics.

3.2.2 Contribution of Health Economics to Health Planning

Health planning and health economics are both about choices. Health planning is choice between one future or another; choice between various ways of achieving that future. Health economics also relates to choice about how to optimize the use of resources within various activities. Economic considerations play a key role in all aspects of life such as industry, housing, agriculture, health etc. The major determinant of the country's health status is the level of economic development. Health policy of the country is strongly influenced by economic considerations. Vice versa health of the population can also influence economic progress of the country. For example to improve the social and economic welfare of people requires strategy which demands selection of those health programmes which improve health most efficiently such as health services, the provision of other health infrastructure such as water and sanitation, or action at improving nutrition etc. Health economics can help evaluate such choices. Governments are actively seeking ways of containing costs, increasing efficiency and finding additional resources. Health economics is important as it helps improve the allocation of resources, increase their efficiency, identify most cost effective technologies and evaluate alternate sources of health finance.

3.3 ECONOMIC DEVELOPMENT AND HEALTH

Economic development is a process having number of aspects. The three important aspects are economic, demographic and health.

3.3.1 Economic Development

Economic development is a broader concept than economic growth. When the economies grow in terms of national income and per capita income, certain structural changes accompany the process of growth. Conceptually the trends in income and the structural changes together constitute economic development. Income per head varies between nations and there is systematic relationship between income and other differences which include production patterns, consumption patterns, demography, health and health inputs between rich and poor countries, e.g. in poor countries agriculture is more important, smaller population lives in towns, people spend relatively more on food and little on consumer durables etc.

3.3.2 Demographic Development

Economic development results in demographic transition. In the earlier part of the century, population has grown very slowly because high birth rates have been offset by high death rates. But with economic development; richest countries are again in a situation of low population growth because lower birth and death rates.

But in transition the death and birth rate do not move in step. Death rate falls first and in combination with high birth rates produce a period of very rapid population growth. Only when birth rate falls population will stabilize. This may take decades. Therefore, the demographic transition has also its own momentum but is partly controllable. The speed at which birth rate follow the fall in death rate, is believed to depend on the fact that greater child survival causes parents to desire less children. Therefore, there is justification in making huge expenditure on population control programmes.

3.3.3 Health Development

It is a process by which population moves from low level of health to high level of health. The nature of these changes can be seen in case of infant death. At lower levels of health i.e., high infant mortality rate, most infant deaths are associated with communicable diseases e.g., diarrhoea and respiratory conditions. At intermediate levels the common infectious diseases are replaced by range of conditions which require institutional care. At high levels of health (IMR 10 or less) infant deaths are reduced to a core of congenital conditions and expensively institutionalizable diseases. For children and young adults the same basic pattern is found. However, in older age the gap between countries with low and high general level of health tends to narrow, e.g. infectious diseases are much less important relative to chronic and degenerative diseases such as

cancer, stroke, diabetes, arthritis and mental conditions which are common to all countries.

Relationship between Economic, Demographic and Health Development

What is the relation between economic, demographic and health development. Economic development provides the extra resources for better nutrition, better housing and sanitation, health services and technology. This leads to lower mortality, which triggers demographic development. But it is not always that simple, for example, unless the demographic transition is completed, many of the gains from economic growth will be absorbed by high rate of population increase. Economic development promotes better health but better health, by reducing burdens of sickness and uncertainty, facilitates economic development. The relationship between economic, demographic and health development is a complicated system of interacting variables.

3.3.4 Production and Health

Economic development is usually accompanied by changes in pattern of production which interact with health of the population. Their interaction may have unfavourable effects on health and damage to health may be direct and concrete e.g. Bhopal Gas Tragedy in 1984 and Chernobyl disaster in 1986. In some cases there is indirect effect, e.g. irrigation leads to increased agricultural output but creates a suitable environment for the spread of water borne diseases such as schistosomiasis, the use of insecticides result in the emergence of resistant strains of malaria mosquito, making control of malaria more difficult.

In some cases from the economist's point of view the development is always potentially favourable to health. Health care industry is itself a form of production.

3.3.5 Distribution and Health

The proceeds of economic development are not necessarily equally distributed between persons and groups (e.g. resources for health services, income in general etc.). Strict equality is not possible for health services in general. What is sought is equity i.e., fair shares for all obtained through the avoidance of inequalities which are not necessary or socially acceptable. Health services like many forms of production are subject to diminishing returns i.e., the more resources that are applied to given population, the less the increase in output (health) obtained from adding one more unit of output.

3.3.6 Consumption and Health

Private Consumption Pattern

Patterns of consumption tend to vary in a predictable way with income. Income-Consumption relationship can be understood through the economic concept of elasticity of demand. The income elasticity for a particular category of consumption say health, can be defined as percentage change in expenditure on that item i.e., health, associated with a 1% change in the consumer's income. Income elasticity of more than one means an item of consumption takes increasing share of total expenditure as income increases. Medical care has an income elasticity of more than one.

At national level poor country will spend 2-3% of national income on health care where as richest countries spend up to 10%.

Activity 2

From your own environment pick up examples to illustrate the following:

1) How does economic development affect demographic transition?

2) Why does the gap between the countries with high level and low level of health tend to narrow in old age?

3) How can improvement in health promote economic development?

3.4 ECONOMIES OF SCALE AND MONOPOLY

The relationship between input and output as the scale of production increases can be represented on a scale known as Economies of Scale or Scale of Economic efficiency. Economic efficiency deals with the least combination of the inputs, which will produce the desired output e.g. given the hospital fixed budget, output that can be maximized alternatively given a fixed quantity of services.

Economies of Scale has three forms:

i) Constant returns to the scale.

ii) Increasing returns to the scale (Economies of Scale).

iii) Decreasing returns to the scale (Diseconomies of scale).

3.4.1 Constant Returns to Scale

When input increased in same proportion, it is possible for the output to increase at same rate, e.g. if the inputs in the immunization programme such as vaccines, publicity, immunization centres are increased by say 10% and the number of children vaccinated also increase by 10% the programme is experiencing constant returns to the scale.

3.4.2 Increasing Returns to the Scale (Economies of Scale)

When output increases at a higher rate as compared to input i.e. for the example given above if the number of vaccinated children increase by 15% or more the programme is experiencing increasing returns to the scale. This is known as economies of scale. This phenomenon of the output rise at a rate higher than the rate of increase of input on account of larger volume of input is referred as economies of scale.

As the scale of production increases, managerial inefficiency and problems of large scale production are seen eventually leading to diseconomies of scale.

Economies of scale are important in planning of programmes, planning for hospitals, planning for facilities etc.

3.4.3 Decreasing Returns to the Scale

When output increases at a lower scale as compared to input i.e. the number of vaccinated children increase by say only 5%, the programme is experiencing decreasing returns to the scale. This is known as Diseconomies of scale.

3.4.4 Monopoly

A monopoly exists when a firm or individual produces or provides and sells the entire output of same commodity or service, e.g. if only one pharmaceutical company is the manufacturer of a particular drug and sells the same in the market. There are some instances of economies of scale and tendency to natural monopoly in health care. Examples include hospitals and pharmaceutical firms. More often, the market is characterized by a limited degree of competition between two large producers (i.e. oligopoly). Price competition may be reduced in these circumstances by collusion. Competition, instead gets limited to non price competition, for instance advertising of brand names.

Activity 3

a) From the health scenario in the country, select illustration to show how economies of scale have been positively utilised to improve the status of health in this country.

b) From your experience, cite examples where monopoly in the health sector has had:

   i) beneficial effects for consumers of health services.

   ii) negative effects for consumer of health services.

3.5 EXTERNALITIES (SPILL OVER EFFECTS)

Externalities exist when the level of consumption or production of some good or service by a consumer or firm has a direct effect on the level of welfare of another consumer or firm, as opposed to indirect effect through the price mechanism. Certain activities have spill over effects on other producers or consumers. These effects are called externalities. These effects may be desirable or undesirable. A very good example in the health field is the protection against disease provided to others when an individual is immunized. Another example is public health measures such as sewerage and drainage.

Externalities can be positive (beneficial), or negative (i.e. harmful). A particular type of externality is known as Public Good. These are commodities or services that (a) can be used, consumed or enjoyed by increasing number of people without diminishing the amount available to others, (b) are available to every one in the catchment area independent of the size or existence of payment, (c) cannot be withheld from non-payers. Health care service characterised by the problem associated with public good is malaria control through environmental management (e.g. cleaning ponds). Here it is not possible to exclude non-payers from the benefits.

Activity 4

Classify the examples of the common externalities in the health sector into positive and negative externalities.

3.6 PRODUCTION FUNCTION

Production is the process of producing goods and services, which satisfy human wants.

There are three components common to all production activities:

Input : Various resources such as manpower, equipment available for production capacity.

Process : Describes the transformation or productive technique which changes inputs into desired outputs.

Output : It is the end result of production.

In economics, the relationship between these components is described within the framework of production function. Production function is a way of representing, both qualitatively and quantitatively, the relationship that exists between inputs and outputs.

The relationship between input and output is represented by a production function of the type:

$Q = f(L,K,T)$

Q = output, L = labour, K = capital, T = the way L&K are combined.

It says that output (Q) is a function of combination of labour (L) and Capital (K), and the way in which they are combined (T).

Health care systems are not simple productive units. They produce many different types of outputs simultaneously and sometimes even unintentionally.

The way these outputs are produced is often poorly understood and it is often difficult to relate particular output to any one interaction or activity.

The Production Process

A) The production process has following components:

1) Final outputs e.g. longer life, better health related quality of life.

2) Intermediate outputs e.g. reduction in symptoms, fewer cases of a disease, changes in a disease stage.

3) Activities e.g. tests carried out, vaccinations given, surgical procedures performed.

4) Inputs e.g. doctors, nurses, health promotion staff, buildings, equipment etc.

B) The production process is concerned with turning 4 into 1.

C) Theory of production : The production theory enables us to raise issues like:

- What are the feasible ways of producing outputs?

- What are the efficient ways of producing outputs?

- What is the cheapest way of producing outputs?

The basic premise is that there are always many different ways of producing a final output, the differences may be of strategy such as:

Example 1 : Reduction in deaths of Very Low Birth weight babies using surfactant replacement therapy or by treating mothers with corticosteriods.

Example 2 : Reduction in malaria morbidity by nets, vector control or prophylaxis.

Example 3 : Reduction in TB by immunization or treatment with antibiotics.

Further within a basic strategy there may be a choice as such.

Example 4 : Substitution of junior doctors for senior, substitution of nurses for junior doctors, substitution of alarmed monitors for observation.

Example 5 : Day's case for in-patient surgery.

Example 6 : Lithotripters for "keyhole" surgery, 'keyhole' surgery for open procedures.

Interventions may be quite different, but aim is for the same intermediate output (e.g. stone free gall bladder).

D) Given the choice of ways of producing final outputs, the choice should be based on minimising the cost of achieving any given output. The best method can change if the relative cost of inputs change (e.g. a wage rise for one category of staff, cheaper equipment), or when technology changes.

E) Production can exhibit increasing, constant or decreasing returns to scale.

Increasing returns to scale are more common where it is possible to change the technology in use above a certain level, or where some necessary input is only partially used, e.g. since herd immunity becomes possible. There are also possibilities for scale economies in providing for services with large uncertainty (e.g. accident services).

Where services are very labour intensive, and the ratio of staff to patients is constant, then constant returns to scale are likely. Decreasing returns to scale are likely when access is costly, when management problems arise at larger outputs.

F) 1) Production is feasible whenever combinations of inputs can be turned into outputs.

2) Production is efficient when it is not possible to reduce the use of any one input (holding other inputs constant) without a loss of output.

3) The cheapest efficient production will depend on prices of inputs.

3.7 EQUITY AND HEALTH

Equity in health implies that ideally everyone should have a fair opportunity to attain their full health potential and, more pragmatically, that no one should be *disadvantaged* from achieving this potential, *if it can be avoided.*

Equity is, therefore, concerned with creating equal opportunities for health and with bringing health differentials down to the lowest level possible. Equity in health care is defined as:

- equal access to available care for equal need.
- equal utilization for equal need.
- equal quality of care for all.

Unequal access to health services may be due to:

- differentials in income, religion, race, sex, age or other factors not directly related to the need for care.
- high transport costs.
- inconvenient opening hours of health facilities.
- language and cultural barriers.
- resources and facilities being unevenly distributed around the country.
- resources spent on high technology medical services catering to only small segment of population.

Principles of Equity

a) Horizontal equity

— equal treatment of equals

b) Vertical equity

— unequal treatment of unequals

General Principles for Action

1) Equity policies should be concerned with improving living and working conditions such as safe housing, clean drinking water, controlling pollution etc.

2) Enable people to adopt healthier life styles.

3) Decentralize power and decision making, encouraging people to participate in decision making process.

4) Making high quality health care accessible to all.

5) Health impact assessment.

6) Research, monitoring and evaluation.

Is equity Achieved through Market

Markets do not necessarily result in equity, e.g. market exacerbates income inequalities by allocating goods or services according to the ability to pay thereby undermining the health of those who cannot afford health care. Therefore, some intervention is required to protect those who are most likely to be sick and least able to afford health care.

Activity 5

You are now witness to the era of market led competition in the health care sector. How can equity be achieved through market processes? Comment.

3.8 TECHNIQUES OF ECONOMIC EFFICIENCY

3.8.1 Economic Efficiency

In everyday use efficiency means value for money. For economists it has precise meaning. In health sector it means use of health resources in such a way that population is as healthy as possible. It deals with the least cost combination that will produce desired output and in fixed budget how output can be maximized or given fixed quantity of services in a hospital how cost can be minimized. To achieve economic efficiency two criterias must be met i.e. Effectiveness and Efficiency.

Effectiveness

It identifies the technical considerations for transforming inputs into outputs. There are many ways of achieving an output. Some of them may use inappropriate technologies or more resources than are necessary to produce a given level of output. Effectiveness is concerned with process of minimizing waste or effort when achieving an objective.

Efficiency

It takes into account the cost of resources used in production and then compares them with the cost of the output produced. In other words it relates to output per unit cost of the resources employed. Resources are being used effectively if a given output is produced at a minimum cost, or maximum output is produced at a fixed cost.

3.8.2 Operational Efficiency

Producing given output at minimum cost or maximize output for given cost.

3.8.3 Allocative Efficiency

Allocate resources between health and other objectives in relation to the value society places on health relative to other social objectives and the cost of achieving those objectives.

There are three conditions for achieving efficiency:

i) Correct mix of outputs.

ii) Technically efficient production process.

iii) Least cost combination of inputs.

Techniques of economic evaluation concerns in achieving these three conditions.

Techniques of Economic Evaluation

Definition

" The quantitative analysis of the relative desirability to the whole community of investing in alternative projects or programmes."

The desirability is assessed in terms of both costs and consequences. Consequences is used as generic term for the beneficial results of the programme.

Essential Features of Economic Evaluation

1) Desirability assessed through comparing costs and benefits (effects)

2) Comparison of alternatives

3) Concerns with costs and benefits to whole society (not just Government)

Forms of Economic Evaluation

There are many forms of economic evaluation but only those forms, which examine both costs and consequences for two or more alternatives can be described as economic evaluation studies. The various forms of economic evaluation are:

1) Cost Minimization Analysis.
2) Cost Effectiveness Analysis.
3) Cost Benefit Analysis.
4) Cost Utility Analysis.

Cost Minimization Analysis

It is based on prior epidemiological findings. The technique identifies the least cost intervention, e.g. if reduction of disability is achieved to the same degree by two interventions than which is the least cost intervention to achieve reduction of disability.

Cost Effectiveness Analysis

It does not question the objective. It finds out the best way of achieving a desired objective by comparing effects with costs. It evaluates either:

1) Which of the number of possible interventions will achieve a given health objective for least cost, or
2) Given a fixed budget, the intervention that maximizes the effectiveness of expenditure.

Results are expressed as costs per unit of output i.e. total cost of intervention divided by total health effect or as effect per monetary unit i.e. total health effect divided by total available resources.

Examples

1) Finding out cost effective methods for shistosomiasis control from amongst chemotherapy and water, chemotherapy alone, water supplies, or molluscicides.
2) To find out most cost effective test for cancer screening.

The problem of cost effectiveness analysis is that it cannot take account of multiple effects or consequences. It also cannot tell how large a programme should be.

Cost Benefit Analysis

It investigates whether the benefits of a project or programme exceeds costs. It involves identifying, measuring and valuing all relevant costs and benefits over an appropriate time period. In cost benefit analysis objectives can be questioned. It values both costs and benefits in monetary terms and is expressed by benefit / cost ratio i.e. benefits divided by costs. If the cost / benefit ratio is more than one, the project / programme is worthwhile, e.g. Cost benefit analysis for three programmes to eliminate severe vitamin A deficiency i.e. Public health intervention or monosodium glutamate fortification or mass dosage.

Cost Utility Analysis

It is a form of cost effectiveness analysis but it measures effects of the project or programme in terms of utilities. Like cost effectiveness analysis it can focus either on minimizing costs or maximizing effects. Results are expressed in terms of Quality Adjusted Life Years (QALY) or QALY's per monetary unit. It permits choice between wider range of options.

The most commonly used techniques of economic evaluation are cost benefit and cost effectiveness analysis.

Problems of Economic Evaluation

- Technical problem due to lack of information and the shortcomings of units of effect.
- "Efficient is not always sufficient" as the sole criterion for decision making.
- The economic evaluation techniques are used inappropriately to impose value judgements of specialists on the community as a whole.

Strengths of Economic Evaluation

- Methods for obtaining the best value for money from the use of available resources.
- It provides framework within which to consider the use of resources.
- They have important role to play in management issues, where the emphasis is on assessing how best to provide services rather than identification of priorities for investment, e.g. services should be provided in health facilities or homes.

Activity 6

Select any recent major buying decision taken by your hospital. On the basis of the information given in the section above undertake the economic evaluation of the decision. What is the type of information you would need to utilise to conduct the evaluation?

3.9 DEMAND, SUPPLY, ELASTICITY OF DEMAND AND SUPPLY

In order to optimize use of scarce resources, an efficient information system is required to bring together the values of the alternative uses of resources (products) with their production cost, and to co-ordinate the many decisions of consumers and producers. The price or exchange system, although imperfect, attempts this difficult task and plays a central role in economic analysis. It influences many health and health care programmes either directly or indirectly (e.g. through markets for personnel, drugs etc.). It is thus important to consider the workings of the price system, through an examination of demand and supply.

3.9.1 Demand

Demand is the desire for a good combined with the willingness and ability to get the desires fulfilled. In economics, the quantity of a particular good demanded is seen as a variable determined by a range of factors.

The *demand function* summarizes this relationship:

$Qd = f(P, RP, Y, T, ...)$

The quantity demanded (Qd) is some function of the price of the good (P); the prices of other related goods (RP); income (Y); and the organisational and institutional structure of society and preferences and tastes of individuals (T) which will depend on many socio-economic and cultural factors. The demand function can represent the demand of an individual demanding a particular good in which case it is simply the sum of individual demands.

Demand Curve

The relationship between demand and price is often portrayed as a *demand curve* (Fig. 3.1). It illustrates how much would be demanded at each price. For most goods, more is bought as the price falls and so the demand curve will slope downwards.

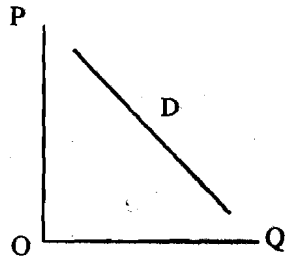


Fig. 3.1

In using a two-dimensional drawing of the demand curve it is assumed that the other factors (RP, Y, T) remain constant. As far as health care is concerned there may be some exceptions to the downward slope e.g. addiction.

3.9.2 Elasticity

The degree of responsiveness of one variable changes into another. If responsiveness is high, it is termed as elastic; if low, inelastic.

Elasticity of Demand

It is the responsiveness of demand to change in variables. It is reflected in the shape of demand curve.

Price Elasticity of Demand

Price elasticity of demand is measured by expressing the percentage change in quantity demanded (Qd) as a proportion of the percentage change in price (P).

$$\frac{\%\text{ change in Qd}}{\%\text{ change in P}} = \text{Ed}$$

If the percentage change in Qd is greater than the percentage change in price, the demand for a good is elastic, Ed > 1. If the percentage change in quantity demanded changes by less than the percentage change in price (Ed < 1) the demand is inelastic. If the percentage change in price evokes a similar change in percentage quantity demanded then the demand is unitary elastic, (Ed = 1). Elasticity will depend upon the ease with which goods can be substituted for one another.

Income Elasticity of Demand

It measures the response in quantity demanded (Qd) which arises from changes in income (Y):

$$\frac{\%\text{ change in Qd}}{\%\text{ change in Y}}$$

Cross-elasticity of Demand

It measures the response in quantity demanded of good A (Qda) which arises from changes in the prices of other goods or services (Pb):

$$\frac{\%\text{ change in Qda}}{\%\text{ change in Pb}}$$

It measures the degree of association amongst goods, i.e. whether they substitute or complement (need to be used with) each other. An example of substitute could be day care/in-patient care and example of complementary care could be diagnostic/curative services.

3.9.3 Supply

In economics, supply is used in a sense symmetrical with demand. The quantity of a good that producers offer for consumption is seen as determined by certain economic variables, of which the most important is the price at which the good can be offered.

Supply Function

It is the function relating to the quantity supplied to the variables likely to affect it.

Qs = f (P, RP, C, RC, T.....)

The quantity supplied (Qs) is some function of the price of the good (P), relative prices (RP), costs (C), relative costs (RC), and tastes (T) which will include socio-economic and cultural factors.

The supply curve (Fig. 3.2) shows the relationship between the price and the quantity supplied. It will normally slope upwards indicating that more will be supplied if prices rise. The notable exception is the supply of labour, which in some situations has a backward bending supply curve above a certain wage level.

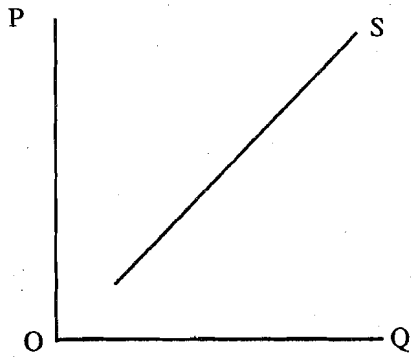


Fig. 3.2

Elasticity of Supply

The ease with which quantity supplied will respond to changes in price is measured by the elasticity of supply, and it is reflected in the shape of the supply curve.

The elasticity or responsiveness of supply is roughly measured by expressing the percentage change in quantity supplied (Qs) as a proportion of the percentage change in price (P):

$$\frac{\%\text{ change in Qs}}{\%\text{ change in P}} = \text{Es}$$

Like the elasticity of demand, supply is described as elastic where Es >1 and inelastic where Es < 1. Elasticity will depend upon the ease with which quantities of goods or services can be produced. In some cases over an appreciable time span it may be difficult to obtain any more goods, irrespective of the price offered, e.g. agricultural crops or production where the scale of activities is fixed in the short term.

Equilibrium

Equilibrium in a market is achieved when supply equals demand (Fig. 3.3). Price and quantity will adjust until the point is reached where buyers and sellers are content to exchange a given quantity (q1) at a given price (P1). The price so obtained will be the equilibrium price i.e. the value of the good of the consumer and producer is in equilibrium.

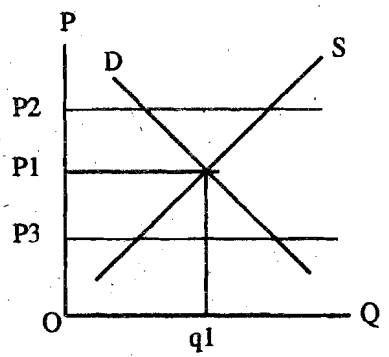


Fig. 3.3

At P2 suppliers will be willing to supply more than buyers are willing to purchase at that price. There will be *excess supply* and pressure to reduce prices. At P3 buyers will be willing to buy more than suppliers are willing to offer and there will be pressure on prices to rise – *excess demand.*

Supply, Demand and Policy

Supply and demand analysis can be used to consider policy changes such as the introduction of a *tax* on production and consumption of a good or *subsidy* on *price* or a policy of *price controls.*

Policy Instruments

Policy instruments used to intervene in the price system are:

a) Fiscal policies – taxes or subsidies

b) Control policies – limiting quantity (quotas) or price

c) Regulations – setting out conditions for exchange – whether, when, where, by whom and of what standard

d) Information/education, advertising to change values

e) Changing property rights

These instruments could be used to correct market imperfections and the demand and supply of a good or services can be controlled.

Taxation

Tax is introduced to raise revenue or change behaviour. Fig. 3.4 shows the effect of a tax. Price has risen and quantity purchased has fallen. The extent of the rise or fall will depend upon the tax change and the relative elasticities of the supply and demand curves.

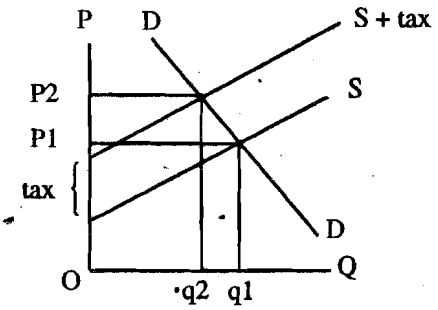


Fig. 3.4

Subsidy

Subsidy is introduced to protect the income of the producers, aid or protect an industry or to encourage use of a product by consumers who otherwise might be deterred by prices.

Fig. 3.5 shows the effect of a subsidy. Price has fallen and quantity purchased has risen. Again the extent to which changes occur depend on the responsiveness of demand and supply.

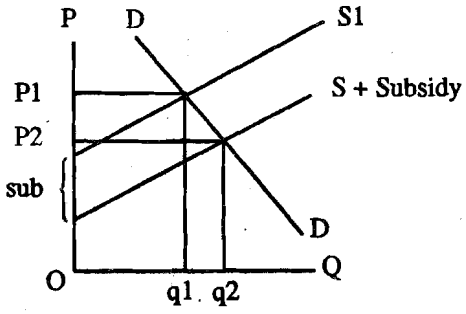


Fig. 3.5

Price Controls

Any Government can by decree fix the prices. The prices so fixed can be equal to, above or below the equilibrium price.

Fig. 3.6 shows the effects of the imposition of a price control (P2) above equilibrium price (P1). Price has risen and quantity demanded has fallen but excess supply (q1-q2) is available; unless this is managed there will be pressure on the market to bring down prices.

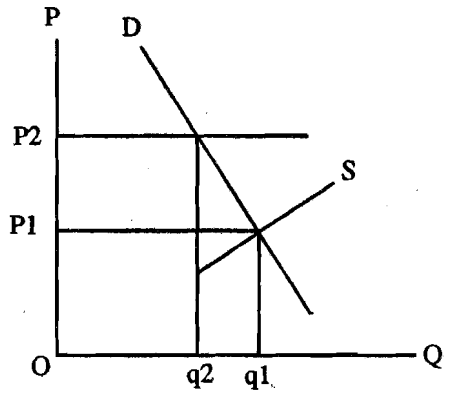


Fig. 3.6

Fig. 3.7 shows the effects of the imposition of a price control (P2) below equilibrium price (P1). Price has fallen and quantity has fallen. At this price there will be excess demand (q1-q2) and pressure to bid up the price unless some form of rationing is introduced.

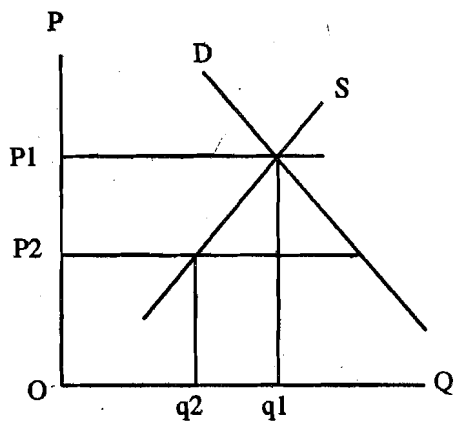


Fig. 3.7

Taxes and subsidies can be used to promote health. For example, taxes can be imposed on health-damaging substances (e.g. cigarettes) or on polluting industries, thus raising their price and reducing consumption/production. The extent of the reduction will depend on the relevant elasticities. Similarly, subsidies can be used to promote consumption or production by in effect lowering the price of health-promoting activities (e.g. zero-priced ante-natal screening or dental and eye checks).

Externalities and Demand/Supply Analysis

Values, as expressed by the amount people are willing to pay, reflect only the private assessment of values and no account is taken of society's values. If there is a difference between the individual's and society's valuation of a good or service, externalities exist, i.e. factors are important that are external to those taking part in the transaction. You have already learnt about externalities earlier.

Demand or Consumption Externalities

If there are positive, external benefits from the consumption of a good or service, society's demand curve will be to the right of the individual demand curve e.g.

immunization, preventive medicine (Fig. 3.8); if there are negative external benefits from the consumption of a good or a service, society's demand curve will be to the left of the individual demand curve e.g. smoking and consumption of fat (Fig. 3.9). In either case, without intervention, over or under-consumption would occur.

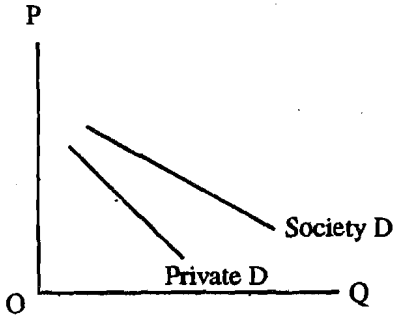


Fig. 3.8

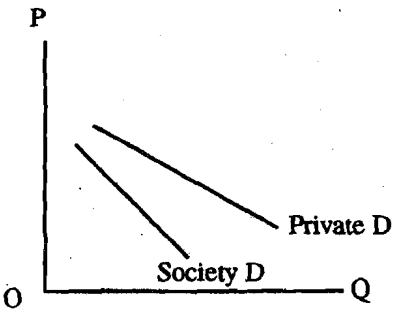


Fig. 3.9

Supply and Production Externalities

A similar situation might occur on the supply side (Fig. 3.10). The costs which underlie the supply schedule only represent the private costs borne by the supplier. There may be costs borne by others as a result of the activity undertaken when producing goods e.g. river pollution, noise pollution or the use of scarce resources.

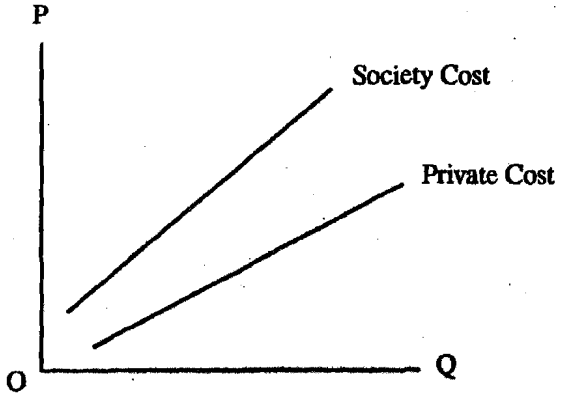


Fig. 3.10

Alternatively, the process may provide benefits in terms of amenities that can be used for other purposes and society's costs would then be below private costs.

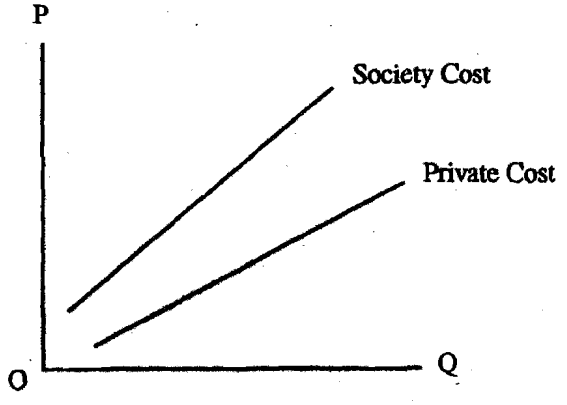


Fig. 3.11

Again, over- and under-consumption would occur if no intervention takes place. Intervention may take the form of taxes or subsidies of services, legislation to control output or price, or direct intervention in production and distribution of services.

3.10 HEALTH SECTOR FINANCING

Finance means provision of money as and when required. Health financing means raising

of resources to pay for goods and services, financing of health care does affects the provision and utilization of health services. Financing of health care is vital not only because of scarcity of resources but also sustainability of resources and resource efficiency considerations. The lack of information about health sector financing has undermined appropriate decision making. The studies of health sector finance have two main purposes, related to health sector problem: to investigate the efficiency of health sector and to provide information for financial planning. The information can be valuable for:

- Identifying who benefits from services?
- Identifying who gets what?
- Identifying current patterns of financing and encouraging discussion on alternative source of finance.
- Identifying and quantifying resource deficiency.
- Analysing resource deployment and identifying possibilities for re-deployment.

Methods of Health Care Financing

Health care financing can be through public or quasi-public sources and private sources. Some of the methods of health care financing are enumerated below.

a) Public and Quasi-public sources of finance:
   - i) General tax revenues
   - ii) Deficit financing
   - iii) Earmarked taxes
   - iv) Social insurance
   - v) Lotteries & betting

b) Private source of finance:
   - i) Private health insurance
   - ii) Employer-financed scheme
   - iii) Charity and voluntary contributions
   - iv) Community financing
   - v) Direct household expenditure

Criteria for Evaluating different Methods of Financing Health Care

1) **Efficiency**: Four aspects of overall efficiency with which financing mechanism raise and use finance are raising adequate sources, stability or reliability of financing sources, net use of the source and freedom and flexibility in the management of the funds.

2) **Equity**: To see the impact of equity of health care financing options it is important to ask 'who pays'? One way is that only those who benefit from the use health care (that is the sick or potentially sick) should pay for it – horizontal equity. The other way is that the distribution of the burden of paying for health care should reflect difference in ability to pay – vertical equity.

3) **Demand/utilisation** : Different financing methods have different effects on the level and type of service used. Some methods of payments influence consumer behaviour by the incentive to provide us to withhold or provide services.

4) **Supply/provision** : The method of financing affects the supply or provision of services. There may be bias with respect to the type of expenditure that they favour i.e., favouring curative rather than preventive services.

5) **Displacement effects** : Instead of generating additional resources new financing methods may displace funding from other sources, e.g. foreign assistance may displace Govt. funding for health care.

3.11 LET US SUM UP

In this unit you have learnt about the basic concepts of health economics and its application in the health sector. You have also learnt about the economic development and its relationship with demographic and health development. Further you have learnt about three forms of economies of scale and monopoly. You also learnt about production function which is the process of producing goods and services that satisfy human wants and have three components namely input, process and output. You have also learnt about equity in health which aims at creating equal opportunity for health and bringing health differentials down to the lowest possible level. You also learnt about the techniques of economic evaluation which include economic efficiency, operational efficiency and allocative efficiency.

You also learnt about four forms of economic evaluation namely cost minimisation analysis, cost effectiveness analysis, cost benefit analysis and cost uitlity analysis. Subsequently you have learnt the concept of demand, supply and elasticity and their application in policy instruments, taxation, subsidy and price control. Towards the end of the unit, you have learnt about health sector financing which is not vital only because of security of resources but also sustainability of resources and resource efficiency consideration. This also includes various methods of health care financing including public and private sources of financing.

3.12 SELF ASSESSMENT QUESTIONS

1) Define health economics.

2) Health economics analyzes ..... and ..... of improving patterns of resource allocation.

3) Name three applications of health economics.

4) What are the three components of production activity?

5) What do you understand by production process ?

6) Define Demand and Supply.

7) What are the different types of Elasticity ?

8) What are your expectations about the impact of tax on tobacco, alcohol, food?

NOTES

UNIT 1 LOGISTICS MANAGEMENT

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- explain principles of logistics management;

- describe functions of logistics management;
- plan and coordinate various activities of materials planning and management catering for optional stock of items;
- outline the systems of storage, distribution, classification, security and disposal of materials/equipment; and
- describe the hospital stores management.

1.1 INTRODUCTION

In this unit, we introduce you to the concept of Logistics Management with particular reference to hospitals. This has been explained by the way of understanding the objectives, principles and functions involved in the logistics management.

Logistics is a broad, far-reaching function, which has a major impact on a society's standard of living. In a health care institution, we have come to expect excellent logistics services, and tend to notice logistics only when there is a problem. Logistics has been called by many names, including the following : Materials management, Supply management, Industrial logistics, Business logistics, etc.

What these terms have in common is that they deal with the management of flow of goods or materials from point of origin to point of consumption, and in some case, even to the point of disposal.

The Logistics/Supply management in any health-care institution is that part of the entire hospital activity which deals with procurement, storage, transportation, distribution, maintenance and evaluation of drugs and equipment. Sufficient stocks of these varied types of items are to be maintained, primarily because it will be too costly to initiate action to procure an item at the time of need. Non-availability of an item when required by the user in a hospital could lead to 'Stock-Out' and adversely affect the treatment of a patient, or even create a life-threatening situation. On the other hand, over-stocking of items could lead to blockage of finance, which in turn would be a costly proportion to any hospital.

Hence, planning of logistics and supplies is a process of deciding what and how much of various items are to be kept in stock at a given time. It is also necessary to determine the lead-time involved and the appropriate quantity to be procured.

1.2 DEFINITION, GOALS AND OBJECTIVES OF LOGISTICS MANAGEMENT

1.2.1 Definition

"Logistics management can be defined as the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer (patient's) requirement."

An integral part of the logistics management process is *materials management*, which encompasses the administration of raw materials, subassemblies, manufactured parts, packing materials, and in-process inventory. Materials management is critical to the total logistics process.

Thus, "materials management is that process of management which coordinates, supervises, and executes the tasks associated with the flow of materials to, through, and out of an organisation in an integrated fashion".

1.2.2 Goals and Objectives

The primary goal is to obtain materials at the lowest possible price, which must go hand in hand with consistency in both quality and continuity of supply. The other goal is to maintain the minimum of inventory of materials so as to free the working capital for other useful purposes. Finally, all activities in this functional area of management process should be carried out at a minimum of cost.

Given the goals, let us now identify the objectives of logistics management, which can ensure the best performance, and use of materials in a hospital. These are as follows:

Primary Objectives

a) Good information system regarding the items
b) Right price of purchase
c) High turnover of the items
d) Low procurement and storage cost
e) Continuity in supply of stores
f) Consistency in quality of the product
g) Good supplier relations
h) Development of personnel carrying out materials management

Secondary Objectives

a) Forecasting requirement
b) Favourable reciprocal relationship between supplier and purchaser
c) Awareness of new materials and products.
d) "To make" or "to buy" decision.
e) Standardization of items.

1.3 PRINCIPLES IN LOGISTICS MANAGEMENT

1.3.1 Principles

Hospital managers must at all times be aware of the seven cardinal principles or elements, which may be utilized individually or in combination to achieve good results, which are enumerated below. These "righteous" elements can be achieved through various Management Techniques marked against each principle. At this juncture, it is sufficient that the students are aware that there are techniques, which can be applied. The gist of the techniques will be touched upon in other units.

Principles	Management Techniques
a) Right item/material	Value Analysis Standardization Codification
b) Right quantity	Purchasing Balancing of Inventories EOQ (how much to buy and when to buy)
c) Right price	Cost Analysis Price Value analysis
d) Right source	Market research Purchasing techniques Selection process
e) Right delivery time	Procurement technique Follow up PERT/OR
f) Right methods/systems and procedures	Work study System analysis Management information systems
g) Right people/attitude oriented towards innovative improvements	Organisational analysis Behavioural sciences Integrity

In addition, seven other supportive elements of procurement strategies include:

h) Right quality
i) Right place of delivery

j) Right transport

k) Right packaging

l) Right handling methods

m) Right materials intelligence

n) Right contract or legal aspects: This should cover all the above purchase parameters.

1.3.2 Essentials in Logistics Management

To follow the principles stated above, it is necessary that the students must understand certain essential values in logistics management of any hospital, to ensure fulfilment of the objectives, which are summarized as:

a) To develop a system of supplies whereby there will be right quantity of stock of items properly stored, easily retrievable, and distributed close to the points of usage, whenever required, at a given time. On the flip side of planning, if there is overstocking of the items, it will block part of the working financial in the hospital.

b) To ensure that the resources available are being used most effectively, and the stores are purchased at the most economical price consistent with the quantity.

c) To co-ordinate the activities amongst the various departments in the hospital, for optional and equitable utilization of the items being procured.

d) To reduce the inventory costs—both carrying costs and ordering costs, and to maintain the same.

e) To ensure that the receipt of stores is timely, and thereafter distribution time is also within a reasonable time frame.

f) To ensure that the inventory of stores is minimized by identifying items of common usage in the different departments of the hospital.

1.3.3 Procedural Planning Sequence

Having understood the essential requirements of logistics management, it is imperative that the sequential events of planning and control must be achieved, as follows:

a) To determine the categories of stock required, both in terms of quantity and quality of each item.

b) To procure the items necessary from the best, reliable and authentic source either from within or outside the country at economical prices.

c) To ensure timely supply from identified sources.

d) To ensure good storage, without loss of potency or deterioration of the item.

e) To carry out effective and judicious distribution of the stores throughout the hospital.

f) To develop an effective and realistic record-keeping system of the medical stores and equipment (manual /computerized).

g) To minimize losses through pilferage and damage, and utilization of the stores within the shelf life.

h) To carry out disposal of waste and scrap which cannot be utilized in the hospital.

i) Employing personnel conversant with logistics management of hospitals.

j) To ensure good performance of the personnel handling the system.

Check Your Progress 1

1) Enumerate the three goals of logistics management.

.....

.....

.....

2) Enumerate the cardinal elements in logistics management.

.....

.....

.....

3) Fill in the blanks:

a) The appropriate system of supplies ensures that the ..... of stock of items are available at the .....

b) Overstocking of stores will block the ..... in the hospital.

c) Inventory of the stores is minimized by .....

1.4 FUNCTIONS OF LOGISTICS MANAGEMENT

Logistics or materials management, as already defined, is that activity of management, which primarily concerns with the efficient flow of materials, to, through and out of an organisation for optimum use of materials. It, therefore, deals with several activities or functions which are vital for hospital, and covers maximum utilization, conservation, elimination of wastes, avoidance of unnecessary delays and assurance of right quality and in needed quantity of economic costs.

These multifold functions often cut across the classical functional boundaries, so that integrated functional control becomes necessary. This is important for any hospital because logistics costs are a significant part of the total product cost. Conventionally, logistics costs are buried under overheads as indirect charges under our present cost accounting system. Only direct and variable costs are highlighted which receive greater management attention.

In all hospitals, because of increased specialization, variety of items are being purchased in large quantity, resulting in consequent increase in expenditure on material inputs. As the purchasing function becomes critically important, the problem of systematic storage has increased *pari passu*. This requires highly trained professionals, to which the students are being made aware of in this unit. Now, let us identify the set of interrelated activities, which emphasize the entire flow of materials, to, through and out of a medical institution. An integrated functional approach treats each activity as a dynamic one. Each activity is characterized by high sensitivity, since each one influences and in turn is influenced by all others. An objective analysis of logistics management will reveal that it concerns itself with the **total flow of materials**, from forecasting of future demands down to final distribution at end-points. All these sub-functions are individually important, but at the same time it has to be realized that they are not isolated phenomena.

Thus the following functions or activities are listed as logical boundaries of Logistics Management:

a) Materials forecasting, budgeting, planning and procurement.

b) Scheduling, purchasing and procurement.

c) Receiving, inspection (quality and quantity) and forwarding.

d) Inventory control, storage, warehousing and distribution.

e) Materials handling, movements control and traffic, etc.

f) Despatch, shipping and disposals (including wastes, scraps and reclaimed/surplus materials).

In addition, there are also other functions which will need close attention of the logistics manager:

a) Coordination among the above major six activities,

b) Keeping liaison between the various departments of the hospital, and/or with the suppliers/market, and

c) Cost-reduction by variety reduction and value analysis.

1.5 TENDERING PROCEDURES, PROCUREMENT AND INSPECTION

1.5.1 Purchase Activities

Hospitals require supplies of materials and services from outside sources. Therefore, purchasing and procurement are common functions in almost all organisations. *Purchasing*

generally refers to the actual buying of materials and those activities associated with the buying process. *Procurement* is broader in scope and includes purchasing, traffic, warehousing/storage and all activities related to receiving inbound materials.

Purchasing activity starts with the recognition of a need. When materials requisition emanates either from the user department, stores department or materials planning, purchase department has to ensure its timely supply.

The next step is the selection of the right source of supply. Often, the purchase department has to develop alternative sources of supply and arrange for potential substitutes.

The responsibility of the purchase manager is from ascertaining the price of the item, which is a prime factor in source selection, timely delivery, quality assurance, reliability, credit availability, etc. according to the policy of the hospital.

Maintenance of records and files and good vendor-vendee relations are also important phases of purchasing activities.

The main **objectives** of purchasing may be delineated as follows:

a) To ensure uninterrupted flow of materials;
b) To buy economically in a competitive market;
c) To keep inventory investment low;
d) To develop good buyer-supplier relations;
e) To develop alternative and reliable source of supply; and,
f) To act as logistics intelligence information centre with regard to specifications, processes, price, quality, etc.

With these objectives in mind, the **functions** of the purchasing department may be summarized as follows:

a) Selection of supplies
b) Analyzing of bids
c) Price negotiations
d) Issuance of purchase orders
e) Follow-up actions
f) Cost analysis and market study
g) Maintenance of price catalogues, information library, etc.

Checklist of sources of supply

Selection of a potential supplier should be based on:

a) financial capacity,
b) manufacturing capacity,
c) total value of business,
d) service facilities,
e) business reputations and other customers, and
f) production processes and specifications to which the products are manufactured by the supplier.

In addition, a periodic rating of the supplier's performances item-wise should be carried out, regarding: quality, delivery schedule, business ethics, promptness and competitive bids.

Generally, all purchase orders must be covered by a requisition, whether for stock-replenishment or for non-repetitive items. All requisitions must be signed by authorized persons who are competent to do so. It must also have the full and detailed descriptions, specifications, drawings (wherever necessary) as well as estimated cost and expected delivery time. On having all these particulars, the buyer must float tenders or enquiry.

1.5.2 Floatation of Tenders/Enquiries

Enquiries should contain complete specifications, brand or trade names, and date on which tenders are to be received. All governmental buying and purchases in public sector undertakings resort to *Tender buying*. This ensures proper competition among the vendors.

Tenders are floated according to the system prevailing in the respective hospitals. This cannot be standardized since it depends on the size of firm, type of purchase, quantity, etc.

Tender systems may be any one of the following:

a) *Open tender*: By advertising in the requisite media of newspaper, bulletins, magazines, etc.

b) *Limited tender*: Often advertising is costly and increases the lead time, then bids are solicited only from reputed limited pre-qualified parties.

c) *Simple tender*: In case of only a single source, that firm is asked to submit his quotation in writing. Simple tender purchases should be avoided, as it leads to monopoly of proprietary item, which is against the basic objective of purchasing.

d) *Global tender*: When bulk purchase of special articles is involved, global tenders are invited through advertisements both in India and abroad.

The steps involved in Open tender system are:

a) Formulate the requirements clearly,

b) Establish bidder's list,

c) Invite competitive bids through advertisement.

d) Open the tender before the representatives on the notified date.

e) Prepare comparative statements on quality, price, and delivery schedules.

f) Evaluate the bid.

g) Award the contract for the *lowest responsible bidder* by taking a total view of the final product. Lowest implies being below the average standard. Responsible means answerable legally and morally.

h) The quotation should be low, consistent with the quality requirement.

i) The lowest bidder need not be the best bidder from the buyer's view.

j) Discounts such as cash discounts, trade discounts and quantity discount should be familiar to the buyer to ascertain the final price.

1.5.3 Types of Purchases

a) *Rate/Running contracts*: This system is prevalent in governmental buying, public sector enterprises and procurement by direct demanding officers. The rate of the item is fixed usually by the tender system. In rate contract, rate is specified but quantity not indicated. In running contract, the minimum quantity is also specified. Rate contracts reduce internal administration lead time drastically.

b) *Systems contracting*: This is a form of stockless purchasing, under which authorized employees may directly obtain requisition of material from the supplier's storeroom. Useful for low unit price, but high consumption values.

c) *Blanket order*: It is an incomplete contract with a vendor to purchase certain low value items. This becomes effective only when vendor receives a bonafide release requisition order. A typical example is an annual order for stationery items.

d) *Reciprocity*: It involves a policy of buying from one party, who in turn buys from another, so that it promotes good trade relations between the contracting parties. This decision of reciprocal buying and selling is a matter of top-management policy, rather than that of the purchase department.

e) *Bazaar purchase*: Also known as "cash purchase" or "imprest purchase" and is confined to urgently needed small items.

1.5.4 Negotiations

In the purchasing context, negotiation is essentially a discussion between a buyer and a seller with a view to reaching an agreement. The price agreement is a major factor in purchase and sale contracts, but other factors are also determined in such discussions. These parameters may be with regard to: price and payment schedules, delivery, quality and/or performance characteristics, specification variations, accessory benefits, insurance, spares, guarantee, warranty, freight, and other special features.

In any case, negotiation is considered very important in the buying process and when it is actually held, it creates a good buyer-seller relationship. Negotiation is an art, and the hospital purchaser must familiarize himself with the requisite details of the product, prior to the meeting.

1.5.5 Legal Aspects of Purchasing

All purchase orders signed by the purchaser on behalf of his hospital and commitments made therein legally binds his institution. It creates a contractual relationship as to the contract between the buyer and the seller as per the terms and conditions agreed to in the course of a deal. The purchase order or contract is, therefore, a legal document which has a direct bearing on the company as to the performance of the contract.

Law is complicated subject, and, therefore, its application and interpretation must be left to those who are competent to deal with it. As a primary rule, all purchasing personnel should consult competent counsel on doubtful or controversial points.

The students should always be familiar with the basic principles of contract and be aware of certain legal terminology, so as to minimize the area of understanding and conflict, and to avoid litigation.

Law of agency: This states that the acts of the purchaser (agent on behalf of the hospital) done within the apparent scope of his authority binds his hospital with respect to third parties (seller), in respect of any contract concluded.

Law of contract: A formal contract of purchase duly signed by an authorized hospital purchaser binds both the seller and the buyer. An offer becomes a contract only when it is accepted by the seller. A valid contract has four basic elements:

a) An agreement resulting from an offer and acceptance, understood in the same sense by both the buyer and the seller.

b) A consideration or an obligation imposed on both the parties.

c) Parties should be competent to contract.

d) The purpose of the contract should be within the existing laws of the land.

Legal Status of Buyer: The purchase officer while signing a purchase contract does so on behalf of the hospital. The buyer must, therefore, know the extent of his scope and delegated authority, either express or implied, to bind his hospital with the supplier.

1.5.6 Quality Assurance

Quality is the inherent characteristic and distinctive attribute that makes a product different from others. It ensures conformity to requirements. Products and services should be essentially free from defects, thereby becoming cost-effective.

In India, awareness of quality standards began with the establishment of Indian Standards Institution (ISI), now re-named as Bureau of Indian Standards (BSI). The bureau provides certification of quality, and at the same time keeps a check on the quality system.

The International Standards (ISO) with its headquarters at Geneva, maintains standards of manufactured goods and products within and outside the industry. The ISO 9000 series are norms aimed at documentation of procedures which define precepts, guidelines and processes to maintain discipline and quality management practices. Where design of the product is involved, ISO 9001 is required. If the design is already established, then ISO 9002 would apply, which means activity of production, installation and servicing is in conformity

with the requirements. ISO 9003 is applicable only when capability is demonstrated in the field of final inspection. These are various criteria for quality of material, depending upon the buyer's price consideration, availability of the item, their possible substitution and reliable sources of supply. In purchasing the right quality of materials, the following considerations are significant:

a) Determination of the quality

b) Defining it properly and clearly

c) Controlling it through some methods

The consideration of quality of the material has direct relationship to the technical suitability, physical availability and the economic consideration of price. The other two aspects are relative to the procedures of procurement.

Inspection

The role of inspection is to maintain standards of physical measurements and also to provide precise determination of physical constants and the properties of materials. It also provides the necessary methods and instruments of measurements required to utilize these standards. Further, through calibration services, it ensures the accuracy of various hospital equipment and instruments and working standards by comparing them with master standards.

The drugs, intravenous fluids, powders, etc. are also subjected to inspection by physical standards, chemical analysis (qualitative and quantitative) and stability of the items.

Depending on the type of the product and its nature, the amount of inspection is bound to vary. However, that does not reduce the importance of the subject, and more so, when lack of inspection may mean faulty purchases and defective store-holding.

The inspection duties are detailed as follows:

a) interpretation of specification given in the requisition or conforming to identified formulation,

b) measurement of product,

c) checking for conformance to specification,

d) disposition of product, and

e) maintenance of inspection records.

Inspection of stores are carried out in batches, with each batch being tested to thorough Sample Inspection. There are different methods adopted to the type of sampling, depending upon the product and its quantity.

Instruments and accessories have to be functionally checked before these are acceptable to stores. Sample of drugs and other hospital materials e.g. cotton, gauze have to be sent from the lots for confirmatory tests. Any defect or deficiency noted has to be reported to the vendor for corrective action. Reports of chemical analysis (if any) have to be preserved for future reference.

All rejections have to be reported to purchase department so that they know the quality performance of various vendors.

Check Your Progress 2

Fill in the blanks:

a) Purchasing pertains to ....., whilst procurement includes ....., ..., ..., ..., etc.

b) The main objective of purchase is ..... of materials.

c) Periodic check of supplier's performance is related to ....., ..., ..., ... and .....

d) Tender buying is resorted to all ..... agencies and .....

e) Running Contract caters to ..... and .....

f) Negotiation is an art involving ..... between ..... and ....., to reach .....

g) Law of Contract is a formal purchase contract between ..... and .....

h) BSI stands for ....

i) Inspection through calibration services ensures ..... of hospital equipment.

1.6 STORAGE SYSTEM, STANDARDIZATION, AND CODIFICATION AND CLASSIFICATION

1.6.1 Storage System

The process of storage system can be broadly viewed in a three-fold sub-systems i.e. the receipt system, physical upkeep and maintenance and the issue system. In a medical institution bustling with materials needs, the system design should cater not only for the current requirements of existing supplies, but also take care of the future growth potential and demands. The system should, therefore, be flexible to cope with the changing demand and supply environment.

The main objective behind the stores function is to render service to the users. The regular activities of the storage system may be enumerated as follows:

a) Receive the materials, check them for quantity, coordinate for inspection and quality checks, and prepare the stores receipt vouchers.

b) Accept the passed materials, prepare the rejection notes and complete the formalities for payment of bills.

c) Take into stock the accepted materials, store them in respective locations as pre-determined.

d) Prepare issue vouchers, make actual issues for disposal and account for the same.

e) Keep the purchasing team well informed through systematic indents and other reports.

f) Keep the storage place clean for facilitating handling and movements, and observe all safety measures and security regulations.The materials are to be arranged in such a manner so as to enable easy storage, minimized pilferage, proper identification and quick retrievals with minimum wastage of time and effort.

Stores Location and Layout

The storage system has to accommodate the inflow of materials, in-process inventories and outflow to the wards/outpatients departments. It usually takes into account the elements of space requirement, labour, equipment needs and costs to build/maintain the storage area. Any of the specific systems design planned has some advantages in sacrificing the accessibility to stock in favour of getting more stores in less space, or vice versa. It may thus not be possible to arrive at any absolute criterion for the efficiency of one storage system or another. The design, size and location of the storehouse must, therefore, be an integral part of the hospital design and management strategy. Storage of nature and type of the material is a crucial factor to be considered whilst planning the type of building or site. Bulky and slow-moving items in a hospital may be stored in a basement or ground floor level, pharmacy services may be planned on the ground floor or first floor depending on the layout of the out-patient department, dietary and laundry stores are preferable on the lower floor to accommodate the heavy equipment. However, dietary services may often be planned on a higher floor closer to the in-patient areas in a vertical-rise building. Hence, the students will appreciate the need for flexibility of ideas whilst planning the storage areas in conjunction with the hospital plans.

1.6.2 Standardization

Standardization is the orderly and systematic formulation, adoption, application and review of hospital institution standards, which leads to simplification or variety reduction. This implies reducing unnecessary varieties of items and standardizing to the most economical sizes, grades, shapes and colours or type of stores. It reduces the number of types and sizes of items to a minimum, consistent with the needs of the departments / hospital.

Benefits: Standardization has multiple advantages, some of which are:

a) The purchase manager can concentrate on large quantity of fewer items.

b) It is possible to place economic order quantity or orders of staggered deliveries with bulk discount.

c) Reduction of inventory will require lesser amount of working capital commitment of the hospital.

d) Items can be easily identified by all the stores personnel, as the bin location can also be standardized.

e) Reduces the time involved in negotiation process with the vendors, with better communication and prompt delivery schedules.

f) Procurement lead-time gets reduced, as all users know item.

g) Buyer-seller relations improved as purchase dimensions of cost, specifications, etc. are standardized, without scope for disputes.

h) Minimizes obsolescence of variety of items.

i) Possible to have rate/running contracts for standard items.

j) Assists in fewer annual maintenance contracts (AMC) of equipment.

k) Reduces inventory of spare parts of equipment to be stocked, thus giving cost-effectiveness.

l) Enables reduced inspection and quality control burden.

m) Interchangeability of parts is assured.

n) Efficiency of personnel handling stores/equipment is enhanced.

o) Reduces paperwork, improves inter-departmental coordination and ensures better communication between the stores department and end-users in the hospital.

The process of standardization should be entrusted to a task force in the hospital. They should obtain the relevant data/facts from the relevant departments and develop standards. There should be a constant reviewing, updating and monitoring committee to deliver the best benefits to the hospital. The role of standardization and variety reduction in inventory simplification has real significance in hospital logistics management field. This also assists in rationalized codification.

1.6.3 Codification and Classification

In hospitals, often the reason for stocking a large number of drugs and unnecessary items in inventory can be traced to different and misleading nomenclature, faulty numbering and use of trade or brand names used to describe the same item. It would, therefore, be useful to classify them as to their permanent basic or generic characteristics; group together all closely similar materials/items either function-wise or for its utility. This would reduce long, incomplete and ambiguous designations. Standard numerical coding should be evolved for the purpose of use in purchase, stores, issue and other purposes in order to symbolize fundamental and particular characteristics.

One of the pre-requisites of classification and codification is to know the basic nature and characteristics of all materials/drugs used in that hospital, and classify these in broad categories, and then to group and sub-group them in logical progression of types, sizes and functional usage. As for example, bio-medical equipment (department-wise), chemicals, laboratory, office (equipment and supplies), pharmacy (drugs), X-rays (films and chemicals), hospital linen, etc. can be classified, grouped and sub-grouped.

After the broad classifications as to their nature and use, a code or symbol is allotted to each of them.

Systems

There are various systems of codification in use: Alphabetical, Numerical, Decimal, Combined Alphabetical and Numerical, Brisch and Kodak systems. The system to be adopted depends upon the type of stores and organisational set-up.

Examples

a) **Alphabetical System**

Class	Group	Code
Table operating (TO)	Stainless steel (SS), Hydraulic (H)	TO-SS-H

b) **Numerical System**

Class	System	Generic Name with Strength	Family of Drug	Condition	Code
Drug	CVS	Atenolol - 50 mgm	Tablet	New	01-31-02/ 2-1-1
(01)	(31)	(02/2)	(1)	(1)	

c) **Combined Alphabetical and Numerical System**

Class	Sub-group I	Sub-group II	Code
Sulphuric Acid	SP	81	SP-81

d) **Brisch System**

A comprehensive system with usually a 7-digit numerical code assigned to each item with digital significance by virtue of their position and value.

e) **Kodak System**

Developed by Eastman Kodak Company, U.S.A., based upon numerical system and grouping done on purchase category, with 10-digits.

Class		Sub-class		Sub-class of 63		
Material	*Class Code*	*Item*	*Sub-class*	*Class*	*Sub-class*	*Kind of chair*
Furniture	61-70	Chair	63	63	2	Wooden

etc., till tenth digit stage of minor variation is reached.

Therefore, Code : 632-XXXX-XXX

Merits and Demerits of Codification

A rationalized system of codification helps in accurate identification, prevents duplication and reduces varieties. It also assists in recording, accounting, pricing and costing of materials. Locating and indexing for inspection are made simple. However, the demerits are that often codes are misunderstood, and when a mistake occurs, finding out the exact code is rendered difficult. Also when large numbers are coded in one group, this could lead to confusion.

Check Your Progress 3

Fill in the blanks:

a) The arrangement of materials should be planned to enable easy ....., ... pilferage, ... identification and ....

b) Layout of stores should be an ..... part of the hospital design.

c) Standardization ensures ..... in the varieties of items, thereby requiring lesser amount of .... commitment of the hospital.

d) Procurement lead time is ..... as a result of variety reduction.

e) Codification helps in ..... identification, ... duplication and ..... varieties.

1.7 MATERIALS ACCOUNTING AND PHYSICAL DISTRIBUTION LOGISTICS

1.7.1 Materials Accounting

The primary basis for Materials Accounting is cost. Materials are ordered on a continuous basis and there is no prescribed procedure which can be used in the determination of materials cost for accounting purposes. In order to determine the money value of materials on hand at a given point of time, the quality of the materials must be known, and a value must be assigned to those quantities based on one of the several accounting methods.

The records kept by the logistics department have two broad characteristics:

a) Only quantities are shown in the records; and

b) Regular balancing of materials is done.

For this purpose, the following records and documents are kept:

a) **Bin card:** It is a record of movement of materials against each kind of stock in respect of daily transactions, which is attached to each bin or shelf or any other form of containers. It shows daily receipts, issues and balance quantity on hand. The card also shows maximum and minimum and re-order levels.

b) **Stores ledger:** The stores ledger shows the details of the information of each item—i.e. supplier's name and address, quantity ordered, invoice number, price, expected delivery date and stock levels.

c) **Stock identification card:** These cards are kept against each bin/rack to identify the materials. It has the material code number, full description, stores ledger folio and bin-card numbers.

d) **Materials received note:** Materials after inspection are taken into stock through this document. It passes through the Inspection Department to Accounts Department for recording and accounting of materials.

e) **Materials requisition slip:** This document conveys the quantity required of the material from the issue counter. Stores department must ensure that the MR slip is signed by the authorized person, proper code number, and/or description of material is mentioned and the quantity issued must be entered and signed.

f) **Materials returned note:** When materials are not required by a department, these are returned to the stores with this note. Stock and stores records are adjusted accordingly.

g) **Materials transfer note:** Transfer of materials from one department to another is carried out on this note and stores account informed for necessary recording.

1.7.2 Flow of Goods

The flow of **goods** physically in the inventory is directly related to the financial characteristics of flow of **costs**. The flow of costs depends upon the method used, which in general use are as follows:

a) **FIFO method:** "First in, first out" method is in most common use. Materials from the oldest stock is issued, and their unit cost also represents the oldest cost on the stock ledger. However, when prices are subject to change, this method cannot match costs against revenue on a current cost basis.

b) **LIFO method:** "Last in, first out" method assumes that most current cost should be charged to the goods. This however results in unrealistic inventory valuation for the balance sheet.

c) **Average cost method:** This does not take into account which item went out of the inventory first or last, rather it determines the average cost for each item during a period of time.

d) **Specific cost method:** This provides the most realistic valuation of ending inventory as well as flow of costs. Costs flow and physical flow are identical under this method, with proper maintenance of records. It is suitable for physical verification of inventories made round the year.

1.7.3 Physical Distribution Logistics

An efficient distribution system includes:

a) Elimination or reduction of all unnecessary handling and movements.

b) Planning of stores distribution for overall economy.

c) Mechanization, wherever possible, and use of simplest equipment.

d) Standardization of handling equipment.

Distribution System

The distribution of stores may be Centralized or Decentralized according to the hospital management policy, and depending upon the storage location system, which may be as follows:

a) **Spot location system:** Whichever item fits in whichever place. It has the proper utilization of space, but has an admixture of items. Chances of pilferage are high.

b) **Sequence system:** The materials are sequentially arranged and are easy to locate. However, additional space is required for storage.

c) Popularity system: Items which are used more often and are in greater demand are readily available at convenient sites.

d) Size system: The bulky items are placed at distant locations and on lower floors, whilst the smaller items are more easily accessible at decentralized locations.

The physical **distribution system** in the hospitals is usually one of the following methods:

a) **Basket system:** Requisition note from the ward/department approved by the authorized signatory is received by the stores department, and items issued in totality on as required basis. Chances of misuse and pilferage in this system are higher. This system should usually be utilized in specialized departments.

b) **Topping up system or replenishment system:** Here the issues made by the stores are against the number of identified/accountable items utilized in case of disposable, or are exchanged on one-to-one basis in case of non-expendable items. Chances of pilferage are reduced, but there is no buffer/reserve stocks available with the ward/departments.

c) **Unit dose system:** In case of certain operations/procedures, certain identified items are issued as a "unit dose" or single item requirement by the stores.

The hospital management should bring out a "materials handling guidelines" for easy handling and distribution of stores. Some of the recommendations are as follows:

a) Materials should be kept generally at a level at which distribution is most convenient.

b) Materials should be placed on pallets, trays or platforms.

c) Distances for distribution should be as short as possible.

d) When distances are long, attempt should be made to handle as large a quantity as possible on each trip/issue, to cut down frequency of handling.

e) Straight flow layout is ideal.

f) Gravitational use must be encouraged.

g) Belt and roller conveyors should be utilized where load factor is high. Fork lifts/trucks help in facilitating movement of bins/containers/wire baskets.

h) Incoming materials should be received in a covered area, and in-process handling should preferably be in pallets or in suitable container, wherever direct transfer to the respective department is not possible.

Check Your Progress 4

Fill in the blanks:

a) Bin Card is a record of ..... against each kind of stock, on ..... transactions.

b) Stores ledger shows ..... of each item.

c) Materials requisition slip indicates ..... of material demanded.

d) FIFO is ....., ...

e) Large number of pick-up and delivery points affects ..... and ..... requirements adversely.

f) Basket distribution system is based on ..... basis.

1.8 TRANSPORTATION SYSTEM

1.8.1 Transport and Traffic Importance

Transportation and traffic often means the same thing to many people. Transportation is the management of the movement of goods and materials through space and time from their original source to the ultimate destination. Traffic considers only the techniques.

With the necessity of large scale supply of stores to the hospitals, transportation system has always exerted tremendous impact on the supporting activities associated with

marketing/supply of goods, and economic activity. Transportation influences the cost of supply of goods, and may even represent 20 to 40% of the total cost. Material characteristics as well as volume influences the transportation decisions. Its effectiveness, therefore, depends on the knowledge of alternative sources, rates, schedules, etc. The important aspects relate to the choice of mode of transport, route selection, rate verification, claims management for lost materials/damage and auditing.

1.8.2 Modes of Transport

a) **Water transport:** Shipping is generally considered in case of imports. It is the cheapest mode.

b) **Rail transport:** India has the foremost railway system in Asia. However this mode is preferable for raw material transportation, rather than for finished products. Rail transportation has its limitations as regards to time schedules, and freight building-up of a complete firm. However, there are some need based railway transport packages e.g. container service, quick transport service, freight forwarder scheme, and parcel express. Charges are twice that of shipping, but nearly half as compared to lorry transport.

c) **Post parcel:** Available between all essential points in the country, but carriage is limited to small packages and selected commodities only. Primary benefit is door-to-door delivery at relatively low cost.

Each mode of transport has varying service capabilities. The factors enumerated above affect the cost and pricing of transportation. The materials manager in the hospital weighs the various factors, keeping cost in the fore-front before contracting an order.

1.8.3 Miscellaneous

Responsibilities of Materials Manager: The important points to ponder over in this issue are:

a) Arranging adequate insurance cover for materials in transit, storage and warehouse.

b) Management of claims, if any in event of loss.

c) Minimization of annual insurance cost paid as premium.

An adequate insurance value is computed by adding the invoice value, freight charges payable, plus incidental charges and add on percentage to allow for likely increase in market value during total lead time involved. If the cargo is a total loss, the full insured value is collectable.

Open policy insurance: To simplify covering repetitive risks during transportation, a blanket or open cargo contract is resorted to. Under an open policy, an insured party may obtain continuous coverage for all shipments for an extended period of time or until cancelled by the other party. An open cargo policy covering general stores is usually written on "all risks" basis.

The term "marine insurance" is insurance of transit of materials by ocean voyage, air consignments and inland transit by road or other means of transport.

Third parties: These are companies similar to channel intermediaries that provide linkages between shippers and carriers. Often, third parties partner with a number of carriers who provide the necessary equipment to transport their shipments. There are several types of third parties, including transportation brokers, freight forwarders, third party logistics service providers, shippers' associations. With the increasing emphasis on supplies and management, more companies are exploring the third party option. These third party firms handle all or most of the freight offers and dedicated contract carriage.

Carrier pricing related issues: Pricing issues are important in transportation. Rates are developed in general or specific rates are determined by a carrier. These rates are followed by a description of the issues the specific rates carrier charges. The most significant approach is FOB (free-on-board) pricing. Also available are quantity discounts and allowances provided by the carrier to the buyer. The FOB pricing items that are offered have a significant impact on logistics generally and transportation specifically e.g. if a seller quotes a delivered price to the hospital's pharmacy stores at a distant location, the

total price includes not only the cost of the product, but also the cost of moving the product to the distant location store.

Check Your Progress 5

Fill in the blanks:

a) Water transport is the ..... mode of transportation, followed by rail transport which is nearly..... than shipping, but nearly half as compared to ..... transport. ..... transport is the costliest, but the .....

b) Open policy insurance gives ..... coverage for all shipments for an extended ....., or until ..... by either party.

1.9 SECURITY OF STORES

In almost all medical institutions, loss of fittings, linen, instruments, drugs, etc. is a big problem. Some of these losses occur in units which operate in limited hours. In a properly designed hospital, it should be possible for security personnel to lock certain sections, especially relating to stores area. Much of the pilferage is an inside affair. Insistence on all members of the staff having an identity badge, prominently displayed is a help.

Security implies prevention of pilferage and theft by employees, vendor's men and carrier representatives. It also means guarding the assets against burglary and dacoity.

The stores manager by virtue of being custodian of the stores, he is responsible for its security. Some security and safety considerations playing a crucial role are:

a) The security force or watch-and-ward staff should keep vigil throughout the day/night, not only in the stores area but in the entire premises of the organisation. The security staff must be carefully selected with high integrity and sufficient strength. They should be trained in all aspects of security and security checks, and should be headed by a capable officer. The appointment conditions should indicate that these personnel must not be/nor become members of hospital unions or indulge in undisciplined activities. Rotations of shift timings must be worked out, with appropriate handing over overlap.

b) All storage areas are to have proper locking arrangements and periodic checks must be carried out.

c) Personnel entering the stores must be informed that the security staff will check or search them while leaving. The security staff must forbid unauthorized entry or exit of persons.

d) Receipt or disposal of materials should be checked by security personnel for authorized documents like invoice/gatepass etc.

e) The stores premises should be properly fenced, or have high walls or efficient locking devices, depending on the type of storehouse and design of the hospital. Burglar alarms and video cameras are aided assets these days. Powerful lighting must be provided at all strategic areas with automatic switchover to battery lights in the event of power failure.

f) The hospital formulary i.e. variety of items stocked should be reduced.

g) Strict inventory control measures to be enforced, with regular checks.

h) Labeling of containers, linen, furniture, etc. so as to exhibit distinguishing marks of the institution.

i) Indent forms should be printed, not hand-written. Quantity indicated should be in figures and words.

The above guidelines should be written as policies or standing policies or standing operating procedures (SOPs), and circulated to all wards/departments so that all the hospital employees are aware of the same. Appropriate sign-posting cautioning visitors and patients regarding security measures must be exhibited.

Fill in the blanks:

a) In most medical institutions, pilferage is an ..... Identity badges displayed is a .....

b) The security personnel must not be part of .....

c) ..... of hospital formulary ..... changes of pilferage.

1.10 CONDEMNATION AND DISPOSAL OF STORES

1.10.1 Introduction

One of the important areas of materials management is that a hospital must look into the identification and disposal of scrap, surplus, recyclable or obsolete materials. This area has been coined as "Reverse Logistics", and is gaining significant importance because of increased public awareness of the environment, more stringent government legislation, and a better recognition of the opportunities it offers in return.

1.10.2 Obsolete Materials

Obsolescence, particularly technological, is well known especially in the field of electronics. Presence of obsolete items cannot be eliminated but can be controlled by better planning.

Obsolete materials are often those items which are not required at all due to changes in design or model. These materials have economic value for which the need no longer exists. These materials, no longer useful for current needs or anticipated future requirements, nor usable elsewhere in the institution, find a place in stores adding onto valuable storage place and adding to costs. Sometimes, because of the high value of materials, managers are unwilling to authorize their disposal. Disposal is necessary, when it is established as a fact that their holding cost is a real loss to the organisation. Frequent reports should be made by all wards/departments to the stores manager with recommendations for disposal of such obsolete items.

A follow-up procedure should be established so that materials department can negotiate, and expedite disposals and removal of the materials from stocks, either by selling, junking or otherwise. This entails disposal of assets of the hospital, and management must approve of the disposal within the guidelines framed for such purpose.

Identification of Obsolete Items

The stores manager or the hospital administrator has to periodically analyze the movement of items and classify them as fast-moving, slow-moving and non-moving depending on the frequency of the issue from the store. The non-moving items are subjected to the XYZ inventory value analysis. The few "x" items (about 20%) account for the bulk or about 80% of the inventory value, and the large number of "z" items account for a trivial inventory value of about 20%. This list of "x" and non-moving items is circulated to all departments for their opinion and likelihood of usage, before pending them up for disposal. All pending orders for "x" category and non-moving items are correspondingly cancelled.

Reasons for Obsolescence

a) Sudden introduction of new technology, rationalization and design changes, without adequate preparation or planning.

b) Adoption of standardization, elimination of non-standard varieties and introduction of cost-reduction methods, have led to obsolescence of certain categories of items.

c) Initial procurement of spare parts based on supplier's recommendations, leads to dumping of slow-moving/non-moving parts, leading to obsolescence.

d) Cannibalization of spare parts to feed other equipment could lead to obsolescence of denuded equipment.

e) Overstocking of spares present to prevent stock-outs contributes to obsolescent behaviour.

f) Faulty forecast, bulk purchases, faulty store-keeping, improper codification, poor materials handling etc. contributes to obsolescence.

1.10.3 Surplus Materials

Surplus items are those materials which have no immediate use but have accumulated due to faulty planning, forecasting and purchasing. Surplus stock results from overordering and significantly contribute to the quantity of obsolescent and dormant stock, if stored over a period of time.

Surplus is also the state of an item when the stock is likely to last longer than a reasonable period or when it is no longer required for the job for which it was purchased, but the material is in good condition. If the management discards the surplus materials, the inventory turnover will increase but profit will dwindle for the period. The decision to retain or salvage such surplus materials must be based on a cost-benefit ratio. In deciding to discard surplus materials, usually some arbitrary rule is applied. Materials which are not moving for two or three years are declared as surpluses.

1.10.4 Scrap or Process Waste

Scrap or process wastes are defectives which cannot be used in their present condition. Defectives can be re-worked, but the cost of such rework may be uneconomic. It may be more economical to salvage these and get the best value by discarding. Here also, materials control must use the facilities provided by the purchase manager by acting as a coordinator in order that scrap is sold for best value.

1.10.5 Condemnation and Disposal

The above three areas viz. obsolete items, surplus stores and scrap are problematic in materials management, since they are cost-points without any return on investments.

The above items are to be identified, inventory prepared, approved by management, and put up for condemnation, followed by disposal.

Delay in disposing of redundant stock increases the inventory carrying cost, and also creates the risk of deterioration and loss of sale value of the stock.

Before disposal is planned for, a minimum value, to be approved by finance, should be fixed to avoid future audit queries.

Obsolete items should be disfigured before disposal, so that the same item in a new packaging, is not re-purchased by the hospital.

Disposal is effected by:

a) Inviting offers from time to time from possible sources.

b) Entering into annual contracts, and

c) Public auction.

It is necessary to associate the finance and user departments in the process of realizing the highest value from the items being disposed.

Check Your Progress 7

Fill in the blanks:

a) Reverse Logistics involves ..... and ..... of scrap, ... and obsolete materials.

b) Surplus stock results from ..... and contributes towards the quantity of ..... dormant stock.

c) Recommendations for disposal of items must be received from the ...../ .....

d) Surplus is the state of items when stock are likely to last ..... reasonable period.

e) Condemnation of item is approved by .....

f) Disposal is preceded by a ..... value of the item, and is usually effected by ..... auction.

1.11 HOSPITAL STORES

Hospitals are consumers of a great variety of goods; and the problems of storage, inventory, and distribution of these goods are of great importance. Supplies are most often stored and distributed from the department concerned. This is especially so, when the quantity remains small and corresponds to a few days of consumption pattern. However, when the bulk of these goods is great, it becomes necessary to keep them in a central store.

In economically developed countries, where the network of trade centre is highly organized, it is generally not necessary to keep a large amount of goods in the hospital stores, because the suppliers or retail departments are able to provide the hospitals, in a matter of hours, with a great number of items upon a telephonic call. On the other hand, in a developing country or even in a remotely placed town/city in India, if a reliable medical supplies industry is not available; then the health services are dependant upon imports and bulk purchase of items.

The potential hospital administrators must weigh these aspects during planning and forecasting, before placement of the requisite quantity of orders.

It is imperative that a sound administrator must deal with the problem of medical supplies. The chief official must have knowledge and experience in handling of medical supplies. He/ She must have experience in business. It is not necessary that he should have a scientific speciality e.g. speciality of pharmacy is not necessary to fill the post of director of medical supplies, nor this official needs to be a medical practitioner. Basically, he must have a record of successful management in the field. Yet again, a scientific or medical background is an added asset.

1.11.1 Types

Hospital is an industry, has hotel management techniques, and is a health care institution, with a variety of services being rendered and departments being catered for. The types of hospital stores include:

a) Pharmacy services or drug stores
b) Medical equipment (expendable and non-expendable)
c) Bio-medical specialized equipment
d) Laundry services stores include linen (for hospital and staff)
e) Housekeeping services stores
f) Dietary services and kitchen stores
g) Hospital furniture stores
h) Stationery and office equipment stores
i) Hospital vehicles stores
j) Machinery, gas, electrical stores
k) General non-specific stores for other sundry items.

When planning for the hospital stores, these areas should be carefully demarcated, and duties, areas of responsibilities and policies of each sub-division identified.

In this unit, the students will be given a resume on Pharmacy or Drugs services and allied stores affiliated with it e.g. laboratory chemicals, X-ray films and chemicals, gases, etc.

The other type of stores including bio-medical and other medical equipment are being explained in the other units. The endeavour is to generally explain the management principles of any type of logistic stores.

1.11.2 Pharmacy Services

Pharmacy service plays a very important role in patient care. It has to ensure a constant supply of good standard of drugs for the treatment of patients at economical price. Pharmacy in OPD is generally the last place to be visited by the patients coming to the out-patient department, and when they reach there, they are in a tired state, it is natural for them

to expect quick service from the pharmacy. Likewise, availability and issue of drugs for the in-patients admitted in the hospital wards has to be carried out, on as per demand of each department, to bring total efficiency in patient care.

Definition : The hospital pharmacy may be defined as a department which deals with all aspects of drugs except prescribing and administration of drugs, which are exclusive rights of physician and nurses respectively.

Role and Function: The services rendered by the hospital pharmacy can be categorised as:

a) Demand estimation according to formulary; and in the absence of formulary, establishment of specification for drug procurement.

b) Purchasing of stores.

c) Storage and distribution of drugs to in-patients (wards), and dispensing for out-patients.

d) Compounding and manufacturing of sterile and non-sterile products, in some specialized institutions.

e) Quality control of drugs purchased, compounded and manufactured in the pharmacy.

f) Maintenance of formulary system, and implementation of the decisions of the Pharmacy and Therapeutic Committee.

g) Furnishing drugs information to physicians and other professional staff.

h) Control of medical gases services, including piped gases.

i) Maintenance of the facilities of the department.

j) Imparting training to students of school of nursing, and in the medical intern training programme.

k) Preparation and submission of periodic reports on progress of department to the hospital administrator.

Pharmacy and Therapeutics Committee

The pharmacist-in-charge is the member secretary of the Committee, and the members are chosen from the various divisions of the medical staff. The Committee should hold at least two regular meetings annually, and additional meetings as deemed necessary. The purpose of the committee shall be:

a) To develop a formulary of accepted drugs for use in a hospital.

b) To serve as an advisory group on matters pertaining to choice of drugs for stocking.

c) To evaluate clinical data concerning drugs requested for use in the hospital.

d) To add/delete drugs for use in the hospital.

e) To prevent unnecessary duplication of same basic drugs and its preparation in the stock.

f) To make recommendations concerning drugs to be stocked on the nursing units and other services.

1.11.3 Stores Management – Organisation and Staffing

Organisation

The hospital administrator should verify the qualifications of the pharmacists and their registration status with the respective board. The number of pharmacists and staff to be employed in the department varies according to the size and commitment policies of the hospitals.

Duties

The prime duty of the hospital pharmacist is to render good service to the patient. This is achievable by providing medications of the highest standards, promptly available and at reasonable expense. The pharmacist also renders a valuable professional service to the medical staff. This is feasible through regular communication between the staff and pharmacist. The latter is a source of information on merits of different brands of the same basic drug, and could advise on the dosage and strength of innumerable new preparations being marketed today. The pharmacist contributes to the education of nurses in the uses,

actions and dosage of drugs, control of narcotics, proper care of perishable items, and labeling and filling of bottles and containers. A well-organized pharmacy under an efficient pharmacist can prove to be a revenue-producing department, even in small hospitals. The medication cost per patient is reduced by proper management, despite the profitability. An exception to this may be made on the ordinary drugs stocked in the floor medicine cabinets which are often dispersed without charge to the patients. Erroneous medication should be viewed seriously, which are detrimental to patient care and is an economic loss.

Staffing Pattern

This is dependant on the work load i.e. number of items to be served per prescription and hours of service to be given. Further, the number of pharmacists required varies with the programme, policies, responsibilities, services and their utilization for in-patients, out-patients, employees and the public. The workload consists of measurable activities and quantifiable load. Generally, each category of activity requires about one-half of the time of the pharmacist. More readily measured items include filling of prescriptions, issues to patient care areas, including out-patients, compounding and pre-packaging.

On an average, in a 8-hour shift of OPD Pharmacy, a pharmacist can serve 150 prescriptions with a half-hour break. If the items are 3 to 5, then limit to serve will be reduced to 120 prescriptions in one shift. Hospital having more than 200 beds needs a Head Pharmacist, and for more than 300 beds requires one additional Asst. Pharmacist.

Studies in India indicate certain guidelines for the staffing pattern of Pharmacy Service, based on the number of beds in a hospital. These are as follows:

Bed Complement	Number of Pharmacist
Up to 50	3
" 100	5
" 200	8
" 300	10
" 500	15

It is imperative that the personnel department must create scope of promotion avenues to keep the workers motivated amongst the different services/departments.

Supervision and Control

Drug stocks in nursing units should be standardized and kept at a useful minimum level. This should be inspected by the pharmacist, with the nursing supervisor, every month. Old and deteriorated medication are to be removed; unopened original packages may be returnable to the vendor for credit. Containers and labels in poor condition to be replaced. Excess stocking to be curtailed. Some hospital pharmacies work with as two-unit container system, which provides for a full container remaining on the ward floor while an empty container is in the pharmacy being refilled. The Head Pharmacist must process managerial skills, so as to guide the performance of the subordinates towards a common goal.

Purchase and Supplies

The pharmacist's principal function in purchasing is to establish standards and specifications for medication and equipment. He/She alone is responsible for sub-standard or dangerous items reaching the patient. The pharmacist is familiar with the pharmaceutical and chemical manufacturers, their distribution system and discounts. A sound purchase and control system is essential.

Purchase card for each item stocked in pharmacy must indicate date, quantity and price, which will assist in reordering of that product in the requisite quantity. Quantity discounts may be taken advantage of, dependant on business conditions, and over-stocking should be prevented.

Inventory should be worked out on annual basis to further improve efficiency, but it is amply simplified when a purchase record system is already installed. Purchase of drugs and pharmaceuticals should be on a bid basis where practicable.

Manufacturing

In some institutions, manufacturing selective preparations could be profitable and convenient. This includes alcoholic preparations such as elixirs and tinctures, made from tax-free alcohols.

Pharmaceutical Services in Small Hospitals

Rendering quality of care is the same in all hospitals, regardless of size or services. However, hospitals with less than 100 beds, have pharmaceutical services of smaller volume which may not warranty use of full-time registered pharmacist. These are alternatives suggested for such situations. They may be utilized in addition for general administration, such as purchasing. Also, in professional medical fields like laboratory, X-ray services, or supervision of central sterilizing and supply services, pharmacists can be gainfully utilized. He may even be utilized for pharmacy services in two or more small hospitals, if the distances between them are nearby.

These methods which may appear to be feasible locally should be fully explored by the small hospitals.

1.11.4 Physical Facilities of Pharmacy

Location: Wherever feasible, the pharmacy should be located on the first floor of the hospital and readily accessible to lifts to ensure adequate and efficient service to the various nursing stations and departments. In case of out-patients department the pharmacy or a branch thereof, should be located conveniently nearer to it. Space should be provided in the OPD, for seating of patients awaiting issue of medicines.

Floor area: The total area for efficient pharmacy services varies with the layout and service of the hospital, utilization pattern and workload. However, the minimum need for any sized hospital is 27 square meters. From that point basic estimates range from 1.0 square meter per bed in 100-bed hospital; 0.6 square meter per bed in 200-bed institution; and an average of at least 0.5 square meter per bed in larger hospitals. Teaching hospitals require much larger space.

Finishes and lighting: The floors of the pharmacy should be resilient, smooth, easily cleaned and acid resistant. Rubber or asphalt tiles and heavy linoleum are satisfactory material. Walls should have a smooth surface with painted or equally washable finish in light colour. The finish of cabinets and similar items should be light-coloured wood or white enameled. Good lighting and ventilation are imperative. Venetian window blinds could be fitted onto windows, to provide maximum benefit of daylight without glare. In addition to general illumination, fluorescent lamps should be placed immediately above the prescription counter where necessary to assure adequate light. Ample electrical outlets should be provided for in all areas.

Equipment: Equipment lists will be at variance to cater for design and services of individual hospitals. Equipment includes drug stock cabinets with proper shelving and drawers for a large assortment of drugs. Sectional drawer cabinets are ideal to fit into any area. Work tables or counters are required for manufacturing solutions, powers, ointments and for filtering; also for loading of word baskets and checking orders. Counters with drawers has the advantage of providing more storage space. Standard counter height is 0.9 meters, depth 0.75 meters and minimum length of 1.8 meters. The finish of the work top may be acid resistant or of heavy linoleum.

Also necessary are an acid-proof sink with swivel tap and drain board, with a cabinet below to provide space for glass equipment. Refrigerator is a must, especially for stocking items necessitating storage at low temperatures. Space required is variable, but generally at least 0.2 cubic meters (8 cubic feet) in 50-bed hospital, 0.4 cubic meters (16 cubic feet) in 100-bed hospital, and 0.8 cubic meters (32 cubic feet) in 200-bed hospital.

A "cool-room" temperature controlled by air-conditioning is also necessary for storage of antibiotics. Office furniture, computers, communication facilities like telephone and intercoms, file cabinets for records and manufacturers current literature, cord index file system and pharmaceutical library are also to be catered for. Dispensing window/s is a must through which prescriptions are dispensed to out-patients and ward staff/nurses.

General storage: The ideal area for bulk pharmacy stores would be adjacent to the pharmacy itself. However, this may often not be feasible. The next choice would be directly below the pharmacy with dumb-waiters and special staircase connection. Bulk pharmacy stores should be kept with the general stores area, and must have an access enclosure for the pharmacy staff.

Equipment required would be open adjustable metal shelving for reserve stock, raw material, empty bottles, and packaging containers. Separate lockable fireproof room with drum cradle is necessary for alcohol storage.

Check Your Progress 8

Fill in the blanks:

a) In a developing country, reliable medical supplies industry is a must. If not available, then we are dependant upon .....

b) A sound hospital administrator must have a record of ..... in the field of hospital stores.

c) Pharmacy is a department dealing with all aspects of .....

d) Pharmaceutical services caters for ..... and also ..... patients department.

e) The head pharmacist is a member secretary of .....

f) A qualified pharmacist must be ..... with the respective board.

g) A well-organised pharmacy can be ..... producing for the hospital.

1.12 LET US SUM UP

In this unit you have been given the outlines of Logistics Management. We have exposed you to the general principles and functions of logistics management. Planning and coordination of various activities relating to materials planning and purchases have been brought out in the unit. The procedures involved in the tendering process, procurement and inspection, including quality assurance have been explained. The storage system, standardization methods and codification of stores have being outlined. The methods of distribution of stores, accounting of materials, and security of stores, have been touched upon briefly. The various types of transportation of stores have been pointed out. Finally, identification of stores for condemnation and disposal have been explained.

The students should be able to identify the management techniques outlined and aptly apply the same in their respective medical institutions, as managers/hospital administrators. The hospital stores, with detailed reference to the pharmacy service, its organisation, staffing pattern and physical facilities have been illustrated so that the students could utilize the knowledge in their perspective planning.

1.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) Obtain materials at the lowest possible price, which must go hand in hand with consistency in both quality and continuity of supply.

   b) Maintain the minimum of inventory of materials so as to free the working capital for other useful purposes.

   c) All activities should be carried out at a minimum of cost.

2) Right item/material, right quantity, right price, right source, right delivery time, right methods/systems and right people/attitude.

3) a) optimum level; right time

   b) working capital

   c) identifying items of common usage

Check Your Progress 2

a) actual buying of materials

   purchasing, traffic, warehousing/storage, etc.

b) to ensure uninterrupted flow

c) quality, delivery schedule, business ethics, promptness; competitive bids.

d) governmental; public sector undertaking

e) rate; minimum quantity

f) discussion; buyer and seller; an agreement
g) buyer and seller
h) Bureau of Indian Standards
i) accuracy

Check Your Progress 3

a) storage, minimize; proper; quick retrieval
b) integral
c) reduction; working capital
d) reduced
e) accurate; prevents; reduces

Check Your Progress 4

a) movement of materials; daily
b) details
c) quantity
d) first in, first out
e) manpower; equipment
f) as required

Check Your Progress 5

a) cheapest; double; road; air; fastest
b) continuous; period of time; cancelled

Check Your Progress 6

a) inside affair; help
b) hospital unions
c) Reduction; diminishes

Check Your Progress 7

a) identification, disposal, surplus
b) overordering, obsolescent
c) wards/departments
d) longer than a
e) management
f) minimum, public

Check Your Progress 8

a) import
b) successful management
c) drugs
d) inpatients; outpatients
e) Pharmacy and Therapeutic Committee
f) registered
g) revenue.

UNIT 2 INVENTORY CONTROL

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- define Inventory Control;
- describe aims and objectives of Inventory Control;
- enumerate various classifications of Inventory;
- discuss functions of Inventory and Criteria of Inventory Control;
- describe tools and techniques of Inventory Control.

2.1 INTRODUCTION

In this unit you will learn, what is inventory control and how this is applied effectively in various aspects of materials management particularly when you are dealing with the various consumable items like, drugs, vaccines, gauge-cotton and other disposable items in your daily use in a hospital. Also you shall learn how these consumable items can be scientifically classified and we can have a better control over these items and the drugs/ materials are available whenever required and wherever required.

In financial parlance, inventory is defined as the sum of the value of raw materials, fuels and lubricants, spare parts, maintenance consumables, semi-processed materials and finished goods stock at any given point of time. The operational definition of inventory would be: the amount of raw materials, fuel and lubricants, spare parts and semi-processed material to be stocked for the smooth running of the plant. Since these resources are idle when kept in the stores, inventory is defined as an idle resource of any kind having an economic value. Hence in simpler terms inventory may be defined as list or stock of items in store, which one can count, measure or weigh.

Inventory control is a scientific process by which an organisation is supplied with the goods and services, that it needs to achieve its objectives at optimum cost. Inventory control can be viewed as the attainment of a cost balance between shortage and excess of stock. It is one of the modern management techniques of operations research.

Without proper control over the inventory, serious problems can precipitate, related to manufacturing, marketing, revenue generation and customer satisfaction. Likewise, availability of life saving drugs and other hospital supplies can be crucial to good hospital care and patient satisfaction.

...ntrol means stocking adequate number and kind of stores so that the ...required. This has to be done

at any optimum outlay of financial and human resources. High inventory level lead to high cost of inventories by – a) blocking the finances; b) large storage space; c) large handling and administration charges; d) obsolescence; and e) spoilage etc. On the contrary, low inventories may led to frequent stock outs and high shortage costs. Balancing the cost of carrying high inventories and the cost of shortage is done through a system of scientific inventory control.

Materials management and inventory problems are common to all organisations. The importance of effective materials supplies was first recognized by the profit making industrial sector. Gradually, service organizations like educational institutions, hospitals, etc., realized the value of managing their material supply system on scientific lines. Hospitals require a variety of materials and supplies, which are essential in providing good patient care. These supplies have to be obtained at most economical rates in right quantity and right quality at right time. Effective management of these supplies is possible through the scientific system of materials management.

The goal of a good hospital supply system is to ensure that there is adequate stock of required items, so that an uninterrupted supply of all essential items is maintained taking due care, we do not overstock the supplies which not only locks up the capital, but also gives room to pilferage and obsolescence. We should also ensure that these items are properly stored, controlled, made retrievable and distributed to the points of usage.

2.2 AIMS AND OBJECTIVES OF INVENTORY CONTROL

Inventory Control deals with physical control of inventories. It is the process/techniques of deciding as to when, what and how much of each item is to be kept in stock, minimizing the ineffective stock and optimising the various costs associated with the inventories.

Objectives of Inventory Control are to:

1) maintain availability of materials whenever and wherever required in optimal quantity.
2) minimize the ineffective stock.
3) optimize the various costs associated with inventories.

The basic principle of inventory control is also to contain costs. There are four types of costs involved in the management of material supplies as described earlier. The purchase cost is the direct cost of the material, which is inclusive of taxes and freight. We can reduce this cost without compromising with the quality of the supplies. The techniques followed are bulk buying, rate contract, and combined buying, negotiating purchase prices by assuring long-term business. The carrying cost which consists of costs incurred on money invested storage space, additional manpower, obsolescence, deterioration, breakage and pilferage is difficult to calculate.

It can be generally about 30% of the actual cost of inventory. To control this cost we have to strike a balance between purchase cost and carrying cost by procuring the items in optimum quantity, known as the economic order quantity which is discussed later in this unit. The shortage cost covers the loss of hospital revenue due to the non-availability of critical items other than the extra cost, which has to be paid to procure this item from an alternate source. To contain this cost it is advisable to have two to three suppliers of good reputation for all the critical and vital items. The ordering costs both direct and indirect will go up with more frequent orders. The technique to control this cost is again by effecting economy in materials management:

i) Purchase Costs
ii) Carrying Costs
iii) Shortage Cost
iv) Ordering Cost

Economics

Control of Inventory is an important aspect of Materials Management. If the level of inventory goes up, the carrying costs

the other hand, if we have a smaller inventory, turnover is greater requiring less carrying charge but more of ordering costs, as orders have to be repeated more often. We have to strike a balance between these two costs. By inventory control we can find out optimum quantity to be stocked so that these costs are kept at the minimum. It is necessary to understand the apparent costs and the hidden costs in the management of the supplies.

Purchase Cost

It is the actual cost of the materials whether it is drugs, chemicals, linen or other stores. It is an apparent type of cost, which is easily understood by all. The aim is to reduce this cost without compromising with the quality of suplies, say drugs. The effort should be to reduce this as much as possible by following the simple techniques like 'bulk-buying', buying under generic names and **Not Trade Names** and at negotiated rates by assuring future business over a reasonable period. While having discussions with a General Manager of a large Indian Drugs Public Sector Undertaking, the author was told that the GM shall be very happy to give substantial discount [up to 25 per cent] over and above the hospital, rates if purchased in bulk quantities. But there are some inherent problems, which are associated with bulk purchasing i.e. it may lead to huge stocks/inventory, which in turn increases the 'carrying cost'.

Carrying Costs

This is hidden cost and not amenable to easy calculation. The cost of carrying an inventory can be large if one is not conscious of its implications. Carrying costs are composed of the following elements:

a) Cost of using or borrowing money
b) Cost of storage space
c) Cost of additional manpower
d) Cost of obsolescence
e) Cost of deterioration
f) Cost of pilferage, breakage

Taxes and insurance premiums may add to the above list. Most of these costs can be described as invisible costs. Invisible because they may not reflect in the drugs store budget but add on to the overall budget of the hospital.

Let us discuss in brief about the aforesaid elements of the carrying cost:

a) **Cost of money:** When we purchase the drugs in bulk, we pay also large proportion of the drug budget at one time. Imagine if you were to borrow this money from a financier how much interest would accrue to the hospital. You can look at it in a different way also. An efficient stores manager instead of purchasing in bulk would divide it into small portions and stagger the supply at a quarterly/monthly interval and release the payment only for that small portion received.

b) **Cost of space:** If the annual requirements of drugs were purchased in bulk, additional space/store rooms with fittings and furniture would be required. This would mean additional expenditure.

c) **Cost of additional manpower:** More the material more hands to deal with it. This means more storekeepers/pharmacists, clerks, orderlies etc. Their salaries/wages would add up to the cost.

d) **Cost of obsolescence:** Drugs also go out of fashion. If a drug's annual requirement in toto is purchased in bulk and right at the beginning of the year, there is every likelihood that a better/newer alternative arrives in the market. As and when it happens the demand or prescriptions for the old drug purchased in bulk will either cease or reduce considerably. It happens more often than not. Such dead stocks of medicines are a net loss to the hospital.

e) **Cost of deterioration:** Drugs are sensitive and thermolabile items. When purchased in bulk they are likely to be stored for a very long period and get exposed to hot, humid and hostile weather and storage conditions. This may lead to disintegration, colour changes, growth of fungus in glucose-saline bottles etc. That is, we are not getting the right value for our investment.

f) **Cost of pilferage:** Pilferage is directly related to the level of stock/inventory of a drug. A large stock of a drug (following bulk purchase) will result into more pilferage and vice versa.

Conservative estimates are that the carrying cost may be 25 per cent to 35 per cent of the actual inventory cost. As managers we have to be acutely aware of the carrying cost.

To reduce this cost one should buy in small quantity. But this may increase the purchase cost. The purchase cost and the carrying cost oppose each other. But there is a point/ quantity at which both are minimum/optimum. This quantity is known as economic order quantity (EOQ).

Ordering Costs

It is the cost of placing an order like cost involved in stationery, postage, telephone, fax, manpower etc. This apparently is simple but can assume higher proportions because of the costs on manpower.

Shortage Cost

It deals with the cost of not having a particular material. The direct cost is the higher price we pay for procuring a substitute from an alternate source. The indirect costs in this element are related to the business that we loose, and public criticism etc. For example, you are suddenly told that oxygen is out of stock in the hospital. The functioning of the operation theatre and other sensitive areas of the hospital will be seriously disrupted. The patients will suffer and there will be a public criticism. Arrangements will have to be made to procure oxygen or for that matter another such vital drug, at a premium from market thereby, increasing the cost. On the other hand if tablets B complex, antacid or cough syrup is out of stock hardly anything will happen. Therefore, the shortage cost would vary according to the nature of an item.

Check Your Progress 1

1) Describe the objectives of Inventory Control?

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.....

.....

2) What are the various costs involved in Inventory Management? How they oppose each other?

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3) What are the Inventory Carrying Cost?

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.....

2.3 CLASSIFICATION OF INVENTORY

For the better management of inventory one must classify the inventory so that the control of the inventory becomes much more easier and effective. The basic principle of the classification of inventory is based on **Paretos Law**. Pareto a German Economist while studying the income pattern of a given city, found out that 20% of the people have got 80% of the total money and rest of the 80% of the people were having 20% of the money. This finding of Mr. Pareto is equally applicable to so many other spheres of life as well as in the classification of inventory management.

The types of selective inventory control are as follows:

1) ABC – Based on cost criteria i.e. annual consumption cost of the items
– Does not depend on unit price of the item

	–	Hence it is also know as always better control
2) VED	–	Vital, Essential, Desirable
	–	Based on importance, criticality and shortage cost of the item in terms of availability, function, specifications, source of supply, production process, storage etc.
	–	Commonly used for management of consumable items.
3) HML	–	High, Medium, Low
	–	Based on unit price
	–	Does not depend on consumption
4) SDE	–	Scarce, Difficult, Easy to obtain
	–	Based on purchasing terms with respect to availability
5) GOLF	–	Government Ordinary, Local and Foreign
	–	Based on source of supply from which material is procured
6) FSN	–	Fast moving, Slow moving and Non moving
	–	Based on issues from stores
7) XYZ	–	Based on the value of Inventory stored
8) SOS	–	Seasonal, Of seasonal
	–	Based on seasonal requirements

Check Your Progress 2

Enumerate the various ways by which inventories can be classified.

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2.4 FUNCTIONS OF INVENTORY CONTROL AND CRITERIA OF INVENTORY CONTROL

The main functions of the Inventory Control are to have the optimal quantity of the items at any time and every time in all the service outlets. Inventory Control will ensure that there will be no stock outs whereas on the same time there should not be any overstocking.

The functions of the inventory control are mainly:

a) stocking of adequate amount, number and range of stores (or kind of stocks or materials) at all service outlet points;

b) provide maximum supply service consistent with maximum efficiency and optimum investment;

c) provide a cushion between the forecasted and actual demand for a material; and

d) gives optimal outlay of financial and human resources.

2.4.1 Needs/Necessity of Inventory Control

A good Inventory Control maintains availability of materials and also controls stock-out and under-stocking. Also by this we can ensure no idling of service providers and dis-satisfaction among the patients. The cost of not having the items sometimes is costlier than cost of having. This in long run improves the image of the Health Centre/Hospital.

On the same time good Inventory Management also controls over-stocking vis-a-vis minimize the ineffective stock. May be that is the reason that the business world says— Inventories are yard of business or the necessary evils as they drain out the company's profit.

A good Inventory Control will have a direct impact on the service provided by the Hospital/ Health Centres, as a result it will enhance the patients' satisfaction and better service conditions.

Inventory Control is also a necessary measure to control the various costs, which are discussed earlier. Larger is the Inventory greater are the problems with respect to investment, planning, procurement, handling, receiving, inspection, storage, distribution, accounting, deterioration, obsolescence, pilferage, damage, shelf life, theft etc. Other than those it also controls the costs arised due to changes in technology i.e. advent of newer drugs and antibiotics, changes in market situation, changes in line of treatments and changes in government policies for various health programmes time to time.

2.4.2 Scope of Inventory Control

An efficient Inventory Control system can:

a) Reduce costs

b) Improve service delivery

c) Increase return on investment

d) Improve liquidity

e) Improve service conditions

f) Increase efficiency of man and machine

g) And hence improve patients, satisfaction and goodwill of the Hospital in the Community.

2.4.3 Factors Involved in Determination of Inventory Policy

The basic questions asked in determination in Inventory Policy are what to order, when to order and how much to order.

1)	Requirement	–	Quantity in stock/in transit
		–	Quantity to be procured keeping in view the consumption pattern, fluctuation in demand and utilization
		–	Seasonal and peak requirements
2)	Lead Time	–	Internal and External Lead-time
3)	Cost Factors	–	Ordering cost
		–	Inventory carrying cost
		–	Under/Over stock cost
		–	Saving in transportation/quantity discounts
4)	Liquidity/Financial Position	–	This will decide capacity to buy and capacity to hold inventory
5)	Availability of Credit		
6)	Obsolescence	–	Change in design of Final Indent
		–	Change in design of Quantity of the item
		–	Advent of newer drugs and antibiotics
7)	Government Policies	–	Imported/channelised items
		–	Change in import duty/custom duty specially before the budget.
8)	Storage	–	Shelf life, inflammable, evaporation, deterioration, bulky items, air-conditioned environment to store etc.
9)	Patient Service Provider Relations	–	Smooth deliveries result in lower inventories
		–	Increase/decrease in quantity in peak/slump season or due to change in indent/consumption rate
10)	Marketing Conditions	–	Items easy to get yesterday may be difficult to get tomorrow and vice-versa

11) Other factors such as single source, multiple sources, proprietary items, location of source of supply, import substitution, make or buy decision etc.

2.4.4 How to Reduce Inventory

1) Fixing up maximum limit of inventory in terms of value.
2) Fixing up responsibility of controlling the inventories with one person preferably at Senior level reporting to top Management.
3) Meticulous materials planning and forecast.
4) A well designed and defined Inventory Control system.
5) Fixing up realistic Inventory levels i.e. maximum, minimum, reorder levels and safety stock Inventory levels should be fixed itemwise/location wise.
6) By reducing lead-time.
7) Adjustment in Inventory levels. Wherever called for Inventory levels should be adjusted as per changes in requirement/consumption, changes in market conditions etc.
8) Strict control on obsolete, slow moving and non-moving items.
9) Reducing the number of stock points.
10) Standardization and variety reduction.
11) Maintaining close co-ordination wth other user Deptts., Store, Quality Assurance, etc. and creating an awareness and positive attitude at all levels in all the Deptts. to reduce the Inventories. Push the idea that Inventories are cash.
12) Computerized the Inventory control system.
13) By improving the buyer seller relationship, selecting the right source of supply in terms of location, quantity/quality etc.

Check Your Progress 3

1) What are the functions of Inventory Control?

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2) What are the various factors which determine Inventory Policy?

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2.5 TOOLS AND TECHNIQUES OF INVENTORY CONTROL

Inventory control is basically a scientific system which indicates as to what to order, when to order, how much to order, how often to order so that the purchasing costs and storing costs are kept as low as possible. The two basic techniques of inventory control are ABC analysis and VED analysis.

2.5.1 Techniques of Inventory Control

ABC Analysis

It is based on cost criteria governed by Pareto's Law where a small number of items consume a big chunk of resources and vice-versa. The ABC principle which is generally applicable to any type of store states that:

- Around 10 per cent of the drugs/store material would cost 70% of the resources. (Group A)

- 20% of the drugs/store material generally consume 20% of resources (Group B).
- Remaining 70% of the drugs/store material would consume just about 10% of the resources (Group C).

The calculations will not be so exact and the range may vary by about 5 per cent.

Methodology for ABC analysis

i) Work out the annual consumption cost of each item/drug.

ii) The list of drugs or items should be arranged in descending value of their cost. The most expensive item is at the top followed by the next less expensive and the cheapest item which has consumed least amount will be at the bottom.

iii) The cumulative cost of the items is worked out on this list. The cumulative cost of the first item will represent its annual cost, whereas, the cumulative cost of the second item will be its annual cost plus the cumulative cost of the item above it. Similarly, that of the third item will be its own annual cost and the cumulative cost of first and second item. The cumulative cost of the last item will be the total annual expenditure on medical store. Refer Table 2.1 for further guidelines.

iv) The list is now ready for undertaking ABC analysis. Mark the figure close to 70% of the total expenditure. All items up to this figure will be A category items. This will be equivalent to only 10-15% of the total number of drugs. The interpretation – about 10% of the items cost as much as 70% of total budgetary expenditure.

v) The next figure to mark will be close to 90% of the total annual expenditure. The items between the two figures i.e., after the A category items and up to the figure close to 90% will be B category. These will be generally around 20% of all the items. The interpretation – about 20% of the items consume 20% of the total expenditure.

vi) The remaining items will be C category, which constitutes around 65-70% of the items. The interpretation – about 70% of the store items cost as little as 10% of the total expenditure.

Following is a convenient example to understand the exercise better in undertaking ABC analysis.

Let us imagine the medical store of a small hospital has 100 items on its inventory and the total annual expenditure is Rs. 10,00,000. The items can be arranged in the descending value of their annual cost in the following manner:

Table 2.1

S. No.	Name of the Items	Annual Consumption in Rs.	Cumulative Total in Rs.	Cumulative Percentage	Category
1)	Inj. Ampicillin	91,000	91,000	9.1	
2)	Inj. Ciprofloxacin	89,000	1,80,000	18	
3)	Inj. Dextrose 5% 540ml	83,000	2,63,000	26.3	
4)	Inj. Normal saline 540ml	81,000	3,44,000	34.4	
5)	Inj. Cefatoxim 1Gm	71,000	4,15,000	41.5	
6)	Inj. Streptokinase	65,000	4,80,000	48	
7)	Tab. Ciproflaxacin	63,000	5,43,000	54.3	
8)	Inj. Haemaccel iv	59,000	6,02,000	60.2	
9)	Fluothane	51,000	6,53,000	65.3	
10)	Inj. Dexamethasone 2ml	47,000	7,00,000	70	A (70%)
11)	–	–	–	–	
12)	–	–	–	–	
30)	Inj. Urograffin	–	9,00,000	90	B (20%)
100)	Acriflavine	300	10,00,000	100	C (10%)

Another method of doing ABC analysis is to pick up approximately first 10% of the items from the list arranged in descending order, which generally consume 70% of the expenditure. This is category A. The next 20% of the items in the list account for 20% of the total expenditure. This is category B. The remaining items (category C) constitute about 70% of the items which consume only 10% of the total expenditure. As mentioned earlier, the percentages will not be exactly identical and the variation may be up to 5%.

Following are the applied benefits of the practice of ABC analysis:

Table 2.2

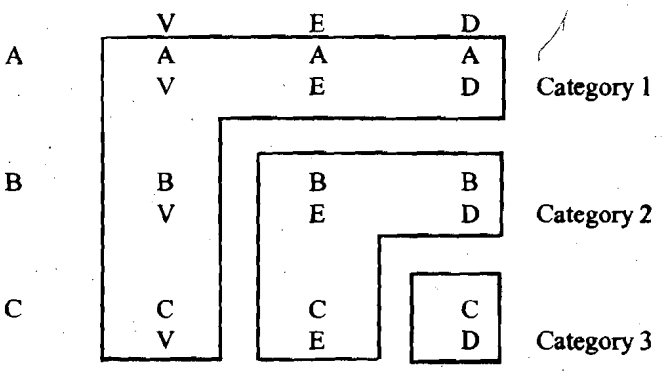
S. No.	Activity	Group A	Group B	Group C
1)	Frequent of Purchase	More Frequent	Less Frequent	Least Frequent
2)	Turnover/Consumption	High	Medium	Low
3)	Level of Control	Tight	Moderate	Routine
4)	Estimates of Requirement	Very Rigid	Rigid	Moderate
5)	Safety Stock	Low	Moderate	High
6)	Management Level	Top	Middle	Lower
7)	Monitoring	Very Strict	Strict	Moderate

VED Analysis

The limitation of ABC analysis is that it is based only on monetary value and the rate of consumption of the items. Sometimes, particularly in a hospital, and item of low monetary value and consumption (e.g. Injection Adrenaline, Anti-Snake Venom etc.,) may be very vital or even life saving. Their importance cannot be overlooked simply because they do not appear in A category of inventory. Therefore, another parameter of the materials is their "criticality". This could be in terms of the therapeutic value of a drug or intrinsic value of the material in achieving the objectives of hospital system. VED analysis is based on critical values and shortage costs of the item. Based on their criticality, the items could be classified into three categories: Vital, Essential and Desirable.

1) **Vital Items:** There are several vital items in the inventory of a hospital, which could make difference between life and death. There can be serious functional dislocation of patient care when such items are not available even for short period adversely effecting the image of the hospital. Such items should always be stocked in sufficient quantity to ensure their constant availability. Top management should control this group of items.
2) **Essential Items:** The shortage of such items can be tolerated for a short period. If these items are not available for a few days or a week, functioning of the hospital can be adversely affected (drugs like Antibiotics etc.). Top/middle level management should preferably control these items.
3) **Desirable Items:** The shortage of these items will not adversely affect the patient care or hospital functioning even if the shortage is prolonged (items like Vitamins). Middle/ lower level management should control desirable items.

As against the cost criteria in ABC analysis the VED analysis is based on subjective analysis by a group of physicians. Such an analysis enables the administrator to give more attention to vital and essential items. A combination of ABC and VED analysis can be gainfully employed to evolve a meaningful control over the material supplies particularly in a hospital system.



ABC and VED Analysis

Category I includes all vital and expensive items. These require close monitoring and strict control.

Category II covers items of essential category and they are less expensive.

Category III comprises the desirable and cheaper group of items.

SDE Analysis

This is based on the availability of items in the market. S items are scarce, D items are difficult to procure and E items are easily available in the market. Such an analysis may be handy when there is a lot of uncertainty or vagaries in the availability/procurement of the items.

Other types of analysis which are not of much significance to a materials manager are: HML analysis (based only on cost i.e., High, Medium, Low cost items) and FMS analysis based only on rate of movement/consumption (Fast, Medium and Slow moving items).

2.5.2 Types of Inventory Control System

There are two basic types of inventory control systems. Several modifications and improvements are based on these systems.

1) **The cyclical ordering system**

Based on the previous year's consumption patterns, the requirement is worked out for all the items. A fixed time base is worked out for ordering the supplies (once in a month, two months, or three months) and orders are repeated in the cyclical fashion. Although the system appears to be simple, some of the disadvantages are that it does not provide for unforeseen variations in the demand/consumption and the ordering quantities may not be economical with risk of overstocking or even going out of stock.

2) **Fixed order size system**

Also known as perpetual inventory system. Fixed number of units are ordered every time. The demand rate is constant but the time between the orders varies according to the fluctuations in use. When the stock reaches a predetermined level, fixed quantity of items is ordered. This system permits ordering the optimum quantity of each item required. Based on price, rate of usage, time taken to replace the stock, the maximum and minimum stock levels are worked out to establish the Reorder level. The ordering point is so fixed that by the time the supplies against the new order are received the stock level will fall to the minimum and when the fresh supplies are received, the stock will rise to the maximum level. This is also known as 'Min-Max' approach.

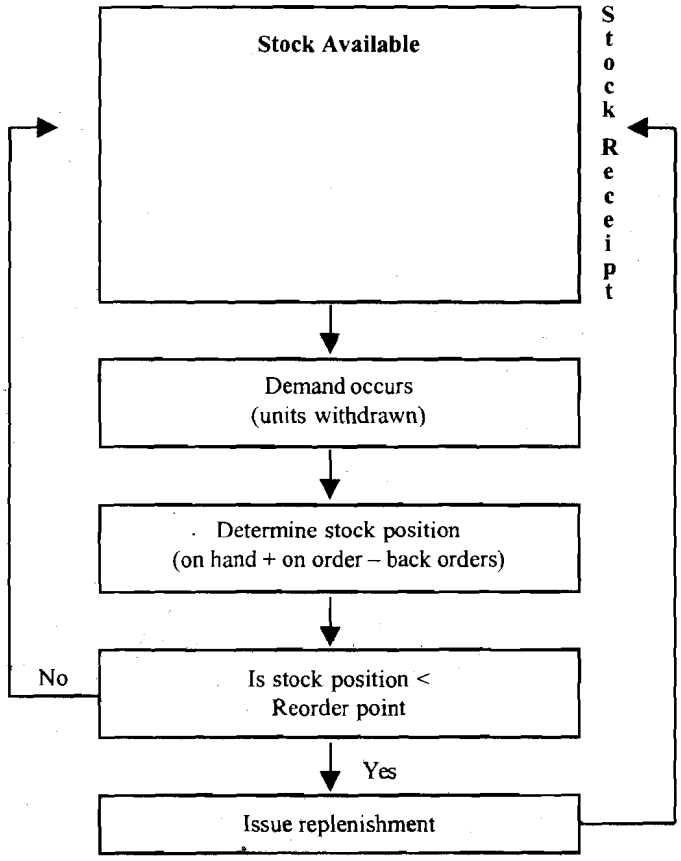
A discussion of the right quantity to purchase would not be complete without a brief summary of the "min/max" (minimum/maximum levels) approach to the "quality factor" as an alternative and comparison to the EOQ approach to quantity determination. Basically the "min/max" approach relies on the combination of two factors: (1) the order point, and (2) the total quantity to be ordered. Thus the order point is the minimum level and the combination of the order point and the total order quantity is the maximum level. The figures can be expressed in days, weeks, and months. A simple illustration of the formula is:

Minimum level	=	2 weeks
Maximum level	=	6 weeks
Supplier lead time	=	1 week
Order quantity	=	4 weeks

Therefore, in order to maintain a maximum level of six weeks supply, the order must be placed when the level on brand is at 3 weeks (one week supplier lead time plus 2 weeks minimum level); but the order must not exceed a four-week supply so that the maximum level will not be exceeded.

When recommendations for improvement are considered, it is impossible that they will exceed the resources available. In this situation, it is wise to develop a min-max strategy that identifies the minimum changes needed to environmentally improve the materials management system and the maximum changes needed to substantially improve performance.

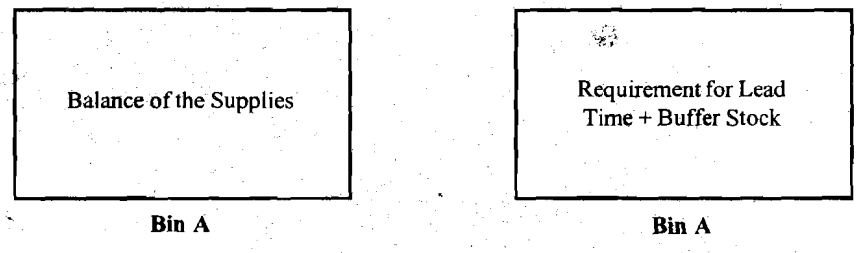
The advantage of the system is that each item can be procured in the most economic quantity. The constraints in this system are that it will function smoothly only when the lead-time (Procurement Time) and the consumption rate are constant. When these two factors are varying fresh reordering levels have to be calculated. Therefore, may be more cumbersome than the cyclical ordering system.



Fixed Order Size System

3) **Double bin or double shelf system**

This inventory control system is a modification of fixed quantity ordering system. Here, no perpetual inventory records are maintained. The stock of each item is kept in two bins or two shelves, one containing quantity equal to the reorder point and the other bin containing quantity equal to the difference between the reorder point and the maximum level. When the stock in the latter bin is used up, the storekeeper places fresh order before consuming the stock of first bin.



Double Bin System

To understand this system on simpler terms let us take a look at the system practiced by a housewife in the management of cooking gas. She acquires two cooking gas cylinders but uses only one at a given time. When one cylinder is exhausted she wastes no time in ordering a refill while connecting the second cylinder to the stove which sees her through till the fresh cylinder is delivered. There is no stock out nor any overstock.

None of the above systems are exclusive or foolproof, particularly when we cannot control the procurement time and the market availability of the items. The hospital requires a large number of material supplies constantly. It may be better to adopt Flow Control System for items required often in large quantities. The long-term contract is entered into with a reputed manufacturer/supplier for supplying a definite quantity of each item scheduled in intervals.

Other Useful Terminology

To grasp the inventory control system fully we have to understand the following terminology and formulae:

1) **Lead Time**

It is the length of time in days between the decision to replenish an item, and its actual addition to the stock. The lead time consists of internal element (time elapsing between decision making and communication of the order) and external element (time elapsing between the receipt of order by the supplier and actual receipt of the material). We can control internal lead time to an appreciable extent but will have no control over the external lead time.

2) **Buffer Stock**

Also known as Safety stock or Reserve stock. It is the minimum quantity of supplies set apart as an insurance against variations in supply and demand. This is greatly influenced by lead-time. This can be calculated by multiplying the average demand for maximum delay or the probable delay. The probable delay (D) is estimated from the past experience and graded as D1 (Least delay), D2 (mean delay), and D3 (maximum delay). If the lead-time requirement is R, the buffer stock (BS) can be calculated by using a formula: BS=D × R. If the item is very critical, value of D3 is taken into consideration to ensure almost 100% availability. The rule of thumb is to calculate the difference between maximum lead-time and average lead-time in days and multiply it by average daily consumption.

There is another method of calculating the Buffer Stock. As we know the buffer stock is the quantity of stores/cushion set apart as an insurance against stock outs. This quantity is kept as an emergency supply. It can be calculated by the following formula:

Buffer Stock = K × D

K = A constant and has three values i.e. K1, K2 and K3.
D = Average estimated consumption during the lead-time. Value of K will change according to the shortage cost or criticality of an item or how vital an item is.

The average estimated consumption during lead-time (D) can be multiplied by K1, K2 or K3.

A buffer stock of :

K1 × D will ensure that the drug is available 67 per cent of times when indented from stores.

K2 × D will ensure that the drug is available 95 per cent of times.

K3 × D will ensure that the drug will be almost always (99 per cent) available in stores whenever indented.

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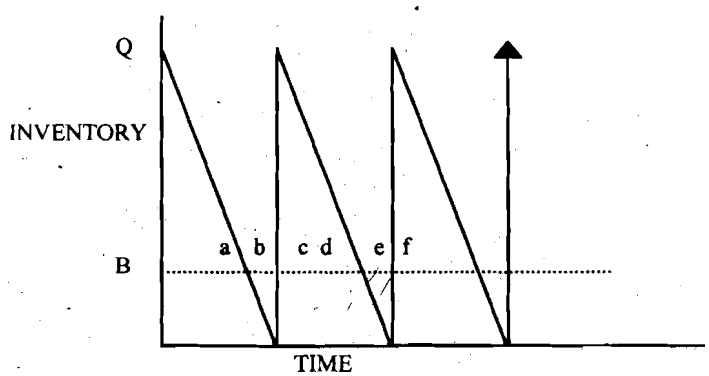

Key: Q = lot size; Q/2 = average inventory
B = reorder point;
ac = ce = interval between orders;
ab = cd = ef = lead time

Fig. 2.1: Inventory Model

The ideal inventory model is shown in Fig. 2.1. The stock on hand consists of two components, the working stock and the safety stock. Working Stock varies from zero to the order quantity (O) and represents the stock, which is used to satisfy demand between deliveries. Safety Stock (S), also called reserve stock, buffer stock or fluctuation stock, exists to protect against stockouts which would otherwise occur when deliveries are delayed for any reason or the working stock is consumed at an unexpectedly high rate.

In the ideal model, drugs are issued in response to demand and the stock on hand steadily declines until the point at which an order must be placed. Following the lead time period, during which all the activities of the procurement cycle are performed, the quantity ordered (Q) is received and the inventory level is back to its starting maximum point (Q+S).

From Fig. 2.1, it is apparent that the average working stock is one-half of the order quantity.

Average working stock = ½Q.

To reduce the average inventory and, thereby, reduce the inventory holding costs, either the working stock, the safety stock, or both should be lowered.

When drugs are used at a constant rate, the line in Fig. 2.1 representing stock on hand declines with a constant slope. The working stock can be reduced only by placing smaller order (reduce the size of Q) more frequently.

3) **Reorder Level**

This denotes the stock level at which a fresh order has to be placed. This is equal to average consumption per day multiplied by lead time plus the buffer stock. We can avoid stockouts by working out the reorder level of all important material so that immediate action can be taken as soon as the stocks drop to reorder level. In fact, the author advocates simple practice of material management by calculating the reorder level of all stored items to ensure we do not overstock or understock the material. This practice can simplify the store management particularly when we do not want to indulge in complicated mathematical calculations.

4) **Economic Order Quantity (EOQ)**

This is the most economical quantity of the material to be purchased. As mentioned earlier, the ordering costs and the inventory carrying costs are antagonistic to each other, if we keep the ordering costs low (by placing fewer orders) the inventory carrying costs go up as we have to purchase huge quantities which locks up our capital and storage space. The reverse is also true, when we keep the carrying cost low (by ordering smaller quantities). The ordering costs will tend to rise as we have to place more frequent orders. To confront this situation, we have to strike a balance between these two costs. EOQ is a tool for the same.

The formula is $EOQ = \frac{2A \times Oc}{Pc \times Ic}$

A = annual demand of items in units
Oc = ordering cost
Pc = purchase cost of item per unit.
Ic = inventry carrying cost in percentage.

Example: If annual demand (A) of Inj. Ampicillin 1 Gm is 20,000 units, the cost of placing order (Oc) is Rs. 100, the purchase cost (Pc) is Rs. 20 per unit and the inventory carrying cost is 20% of the purchase cost, the calculation will be:

$$EOQ = \frac{2 \times 2000 \times 100}{20 \times 0.2} = 1000 \text{ units}$$

While the industrial sector can precisely calculate these costs the EOQ formula will be very handy for them to buy the most economical quantity. The hospitals may find it difficult to calculate these costs particularly the indirect or hidden costs.

Check Your Progress 4

1) How to do ABC Analysis?

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2) How to do VED Analysis?

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3) What is Buffer Stock?

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4) What is Reorder Level?

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2.6 LET US SUM UP

An inventory can be identified as those goods, which are procured, stored and used for the daily requirement of the organisation. They are sort of lubrication for the supply-production-distribution system that protects it from excessive friction. Inventories isolate one part of the system from the next to permit each to work independently, absorb the stock of forecast errors and permit the effective utilization of resources when demand fluctuations are experienced.

Thus inventory management is the process of deciding what and how much of various items are to be kept in stock at optimum overall costs to the health care system. It is the science and art of weighing the costs of carrying the stock against the losses that may accrue if the material is not available when needed. No one can predict with complete certainty what the demand will be or what the subsequent loss will amount to if the material is not available. Nor is it easy to estimate the costs of following various alternative-stocking policies. However, it must be mentioned here that all systems and organisations must be primarily designed to supply drugs, medicines and other supplies in time in order to provide meaningful and effective service.

When an organisation has material inventory, costs are inevitably incurred. Money that could otherwise be profitably employed elsewhere is tied up, physical storage costs are incurred and there may be losses due to spoilage or pilferage. All these costs added together comprise what is called the cost of possession. Purchase quantity is usually the biggest determinant of inventory investment, and consequently, of average carrying cost. As long as usage is reasonably regular, inventory tends to be increased by an average amount equal to one half the purchase quantity. There is usually an inverse relationship.

2.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Objectives of inventory control:
   i) To maintain availability of materials whenever and wherever required.
   ii) To minimize the ineffective stock
   iii) To optimize the various costs associated with inventories.
2) Various costs involved in Inventory Management are:
   i) Purchase cost
   ii) Inventory carrying cost
   iii) Shortage cost
   iv) Ordering cost

If the purchase cost is lowered by buying in bulk the carrying cost will go up, and vice-versa. Also if the carrying cost is to be minimized the ordering cost will go up as frequent ordering will be required.

3) Various inventory carrying costs are:
   i) Cost of using or borrowing money
   ii) Cost of manpower
   iii) Cost of storage space
   iv) Cost of obsolescence
   v) Cost of deterioration
   vi) Cost of pilferage.

Check Your Progress 2

Various ways of classifying inventories:

i) ABC – Based on Annual consumption cost of items.
ii) VED – Based on criticality or shortage cost of items.
iii) HML – Based on rate of consumption.
iv) SDE – Based on the availability of the items in market.
v) FSN – Based on issues from stores.
vi) XYZ – Based on the value of Inventory Stored.
vii) GOLF – Based on source of supply.
viii) SOS – Based on seasonal requirements.

Check Your Progress 3

1) Functions of inventory control are:
   i) Stocking of adequate amount, number and range of stores at all service outlets.
   ii) Provide minimum supply service consistent with maximum efficiency and optimum investment.
   iii) Provide a cushion between the forecasted and actual demand for a material.
   iv) Gives optimal outlay of financial and human resources.
2) Factors determining inventory policies should be based on what to order, when to order and how much to order:
   i) Requirement
   ii) Lead tissue
   iii) Cost factors
   iv) Financial politics/liquidity
   v) Availability of credits
   vi) Obsolescence
   vii) Government policies
   viii) Storage factors
   ix) Patient service provider relations
   x) Marketing conditions.

Check Your Progress 4

1) In the ABC analysis the items in stock are classified in A, B and C categories based on the Annual Consumption cost of each item. Usually 'A' items are 10% of all items consuming 70% of total budget. 'B' items are 20% of all items consuming 20% of total budget. 'C' items are 70% of all items consuming 10% of total budget. Hence 'A' items to be under strict control of top management. Rest of the 'B' and 'C' categories can be dealt by middle and lower level management respectively.

2) In this analysis the items are classified into Vital (V), Essential (E) and Desirable (D) as per the criticality or shortage cost of the store items. 'V' Items are those, the absence of which cannot be tolerated even for single moment. 'E' items are those, where the non-availability for some time may be tolerated but not for long time. 'D' items are those, the absence even for longer duration will not seriously hamper the normal/general functioning of the hospital.

   VED classification of items will vary from Hospital to Hospital and it will purely depend on the objective of the Hospital.

3) Buffer stock or safety stock is the minimum quantity of supplies set apart as an insurance against variation in supply and demand. Hence it acts as cushion to deal with the unforeseen exigencies or emergencies.

4) This denotes the stock level at which a fresh order has to be placed. This is equal to average consumption per day multiplied by lead time plus the buffer stock. By this it will help the store manager to ensure that there will be no overstocking or understocking of materials.

UNIT 3 EQUIPMENT MANAGEMENT – PLANNING AND PROCUREMENT

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- describe briefly the present state of medical equipment in Indian Health Care Institutions;
- describe the various steps in procurement of hospital equipment;
- understand the concept of utilisation index; and
- describe the various factors affecting equipment utilisation.

3.1 INTRODUCTION

In this unit, you will learn about the essential steps for equipment selection. You will also learn about the various factors which affect equipment utilization. You are aware that hospitals have undergone a quantum change in concept and care provisioning from ancient days to the present era. The information explosion and technological advances have revolutionised the medical care. The sophistication in the medical field has led to the development of specialised care centres in an attempt to provide high quality care. Modern medical technology has contributed immensely in improving the quality of health care and state of health profile of nations. The advancement has been mainly due to:

- improved diagnostic facilities,
- sophisticated equipment, and
- spectacular progress in development in surgical procedures.

Besides surgical and technological advances development of safer anaesthetic techniques has lead to the development of disciplines like Cardiothoracic Surgery, Neurosurgery, Renal Transplant, Radioimaging and so on.

3.2 PRESENT SCENARIO

The resultant of the rapid advances in medical sciences and technology have been:

- The physicians are becoming more and more equipment oriented.
- The patients are much informed of the modern facilities available in our country and abroad. They start expecting and demanding the same.
- There is at present a flair for introduction of computer technology in the medical field.

The introduction of state of the art technology has resulted in metamorphic changes in diagnostic and therapeutic modalities in patient care activities. This has led to enhancement of quality of life and decreased morbidity and mortality rates. However, modern medical technology is not a panacea for all ills. The adverse effects include supplier induced demands, indiscriminate use, duplication and underutilization.

Studies on equipment management have indicated that any given time in most of the hospitals non-functional equipment may account for 40-50% of all equipment procured by the hospital.

Most of the states and other organisations in India have laid down rules and regulations for the procurement of equipment and other supplies in hospitals. The basic rationale behind all these rules, regulations and procedures is to maximise the value of the money invested in the purchase of equipment.

In practice the term purchasing describes the process of buying. It generally involves exchanging money for goods. The procurement should also focus on the cost benefit analysis, replacement and disposal of old existing equipment. Indigenous equipment, if available should be preferred to imported ones. Procurement is described as the total responsibility for buying. It involves choosing the items, specifications, identifying the best source of supply, establishing a delivery date and the acquisition of items at the most favourable cost.

3.3 STEPS FOR EQUIPMENT SELECTION

The following are the essential steps for equipment selection:

1) **Need assessment:** The basic purpose and reason for going in for a particular equipment should be enunciated beforehand. In the hospitals where there is requirement of new equipment, there is a need to do the survey before hand and justifying the need of a particular equipment to be provided. In many countries before a new facility is to come up a team comprising hospital administrators, hospital engineers, epidemologist, financial experts visit the particular hospital and assess the need and thereafter they issue a Certificate of Need (CON) before allowing new facilities to come up.

2) **Use coefficient:** This coefficient is applied to assess the utilisation of an equipment i.e. whether the equipment is optimally utilised or underutilised. Additional demands of the equipment may be assessed by use of the formula:

$$\text{Use Coefficient} = \frac{N}{M} \times 100$$

where, N = Average number of hours the equipment is used per day.

M = Maximum number of hours the equipment can be used per day.

If the use-coefficient is less than 50%, it is considered to be underutilised and hence a bad investment. However, life saving equipment cannot be subjected to this kind of assessment.

3) **Cost consciousness:** While procuring a new equipment the total cost of the equipment must be kept foremost in mind during the entire cycle of equipment planning and procurement. Cost containment procedures may be thought at every stage of the procurement procedures.

4) **Specifications and not the brand:** There should be insistence on exact specifications of the equipment. Tenders floated with the exact specifications will set about a healthy competition which works to advantage. Functional requirements should be known and based on these, technical specifications should be developed. Based on these one shall be able to negotiate sometimes an unimaginative price. The clinicians requirement of equipment may thus be obtained at a lesser cost.

5) **CIF destination:** Normally insurance and freight are covered up to nearest port with customer clearance facility. In case of procurement of very sophisticated, expensive and imported items moving the equipment to the institution with custom clearance may cost an additional 1-2% of the value of equipment. This should be confirmed at the time of negotiation. Most of the suppliers would be willing to absorb the additional cost and the burden of customs clearance.

6) **Installation on turn key basis:** It has been observed that costly equipment installed on turn key basis have better utilisation as total equipment planning considerations like civil, electrical, air-conditioning installation etc. are ensured by the firm. Thus the equipment when handed over to the hospital is normally fully functional. Prior to the commissioning of the facility, adequate number of personnel must be trained by the firm.

7) **Warranty with spares:** It is the age of electronics due to fierce competition in market, the manufacturers are yielding to higher and higher warranty period that too with spares. The cost of spares range from 3-5% of the value of equipment. What used to be a conventional warranty period of one year can now be bargained for 2-3 years without much additional cost.

8) **Continuous supply of consumables:** Some equipment may need expensive consumables to be imported. Every effort must be able to secure as many consumables as possible to last for a minimum period of one year. Sufficient guarantee has to be ensured for continuous supply of consumables thereafter for at least 10 years.

9) **Service contracts/After sale services:** It is important to ensure continuous and an uninterrupted functioning of the equipment. Services contract must be conceived and planned at the time of purchase. The supplier may dictate the terms and price if plan for service contract is done at the end of the warranty period. Accepted norms for the service charged is 1-2% of the cost of equipment for the first year after warranty with a 10-15% increase each year.

10) **Training of staff:** Training of staff to handle the equipment efficiently may range from training at site to training abroad depending upon the sophistication needs of the staff and institution. This should be ensured with the supplier to provide necessary training to the staff free of charge before placing the order. Timely and appropriately training the staff for handling and operating the equipment is a prerequisite for effective and optimum utilisation of an equipment.

11) **Preparation/Selection of site:** It is necessary to consult experts while planning for the site of the equipment. It calls for a team-work to plan for a proper site which does not require any modification later. The team consists of an architect, civil electrical and A.C. engineer, including the installation engineer. Their recommendations can be critically evaluated suitably by the administrator since the expert and engineers are known to be over ambitious in demanding space.

12) **Foreign exchange:** Life saving equipment are exempted from customs duty. Foreign currency value keeps on frequently fluctuating. If it is envisaged that the lead time of the equipment to be procured is more than 3 months, it may be wiser to indulge in forward booking where bank undertakes to take care of fluctuations for a specific period by charging a premium and understanding from the supplier to cover the expenses on extension of letter of credit and exchange fluctuations.

13) **Facility for back up power supply:** As most of the vital and essential equipment are functional on electricity or chargeable battery supply, facility for back up power supply should be ensured. Some arrangement has to be made in the form of stand by generators or if possible Uninterrupted Power Supply (UPS).

14) **Good economics:** There are several other factors to be taken into consideration like cost and availability of consumables, consumption of water, electricity, need for air conditioning, service contract facility and availability of spares at least for ten years. An equipment may be offered at a very low price but the consumables required may have to be imported later at a phenomenal cost. It may be wiser to purchase a more expensive equipment which can be operated with much cheaper consumables available locally.

15) **Supplier selection and purchase procedure:** It is essential that the specifications, other terms and conditions, supplier selection should be done after a careful analysis. A detailed and specific purchase order should be given. The equipment should be received by a responsible person. Board of officers constituted should certify that the equipment is as per specifications and functioning satisfactorily. Technical and users manual should accompany the equipment. The equipment should be adequately utilised and the performance monitored and evaluated.

Check Your Progress 1

1) Mark true or false:

i) Generally in most of the hospitals in India the medical equipment is in a satisfactory state. (True/False)

ii) Imported medical equipment is more reliable and easy to maintain than an indigenous one. (True/False)

iii) Purchasing encompasses the process of procurement. (True/False)

2) Enumerate the various essential steps for equipment selection in health care institutions.

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3.4 HOSPITAL EQUIPMENT UTILISATION

It should be the earnest endeavour of the management and users to optimise the equipment utilisation to obtain maximum return for the capital invested. In an era of cost-intensive medicare, every equipment being installed in health care institutions need to be fully and properly utilised.

An optimum utilisation of equipment will result in:

- Optimal patient handling and rapid turnover.
- Minimum possible cost.
- Quality patient care and satisfication.

Utilisation essentially means the use of the equipment to its full potential.

3.4.1 Utilisation Index

Utilisation index is one of the important parameters to monitor the functional status of the equipment or it is the parameter to assess the productivity of service or an equipment.

3.4.2 Important Factors Affecting Utilisation of Equipment

The important factors are:

1) **Training of staff:** Timely and appropriate training of the staff handling and operating the equipment is a prerequisite for effective and optimum utilisation of an equipment.
2) **Equipment installed on turn-key basis:** It has been observed that costly equipment installed on turn key basis have better utilisation as total equipment planning considerations like civil, electrical, air-conditioning installation etc. are ensured by the firm. Thus the equipment when handed over to the hospital is normally fully functional. Prior to the commissioning of the facility, adequate number of personnel are to be trained in their premises.
3) **Preventive maintenance and after sales services:** Insisting on regular after sales services of the equipment and a proper system of preventive maintenance, downtime of costly and essential equipment can be considerably reduced thereby increasing utilisation. Normally the annual maintenance cost of an equipment varies from 1-4% of the capital cost of the equipment. By ensuring availability of repair, maintenance and necessary spares, equipment utilisation can be significantly increased.
4) **Facility for back up power supply:** As most of the vital and essential equipment are functional on electricity or chargeable battery supply, facility for back up power supply should be ensured. Some arrangement has to be made in the form of standby generator or if possible Uninterrupted Power Supply (UPS).
5) **Time scheduling of the hospital:** Hospital timing can be scheduled in such a way that there is optimum utilisation of the costly equipment. Usually in government hospitals the facilities work only 8 hours or one shift which amounts to 33% or practically 25% of utilisation. If these facilities can be made available for two shifts, high cost equipment can be utilised for 50-60%.
6) **Use coefficient:** This is applied to assess the utilisation of an equipment i.e. whether the equipment is optimally utilised or underutilised. Additional demands of the equipment may be assessed by the following formula:

$$\text{Use Coefficient} = \frac{N}{M} \times 100$$

where, N = Average number of hours the equipment is used per day.

M = Maximum number of hours the equipment can be used per day.

If the use-coefficient is less than 50%, it is considered to be underutilised and hence a bad investment. However, life saving equipment cannot be subjected to this kind of assessment.

7) **Awareness of the Facility:** There is a changing trend in health-care delivery system. Hence, it is propised that to ensure optimum utilisation a marketing strategy be evolved where services can be made popular in the community to gain maximum benefit of the capital of the capital investment.

8) **Utilisation of the Special Facility or Skill:** Any facility, the X-ray, ultrasonography, CT scanning if underutilised due to paucity of workload, should be shared with other hospitals. Networking of resources would ensure optimum utilisation of the costly equipment.

Check Your Progress 2

1) Define the term utilisation index.

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2) Enumerate the various factors affecting the utilisation of equipment in health care institutions.

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3.5 PROCUREMENT OF IMPORTED EQUIPMENT

In this section you will learn about the procedures involved in the procurement of imported equipment. Given below is a sample of tender form for supply of imported equipment. This will help you in understanding the process of supply of equipment of foreign origin.

Sample of Tender Form

From: ..... To: .....

Letter No: ..... Date: .....

Dear Sir/Madam,

1) This hospital is interested in the supply, installation and commissioning of import of the following:

   a)

   b)

2) You are invited to send us a proforma invoice from your principals. The proforma invoice should be in a quadruplicate and in the name of the ..... The documents may please be posted at the address given above. The latest hours and date of receipt of the offer is up to ..... hours on .....

3) **Delivery of Tender**

   Tenderers should submit their tenders in three parts (i) Price bid, (ii) Technical bid and (iii) Bid guarantee, each part in separate sealed covers as under:

   Price bid (in triplicate) should be placed in a separate sealed cover duly superscribed price bid for ..... Similarly technical bid (in triplicate) should be placed in a separate scaled cover duly superscribed technical bid for .... The bid guarantee (Earnest money) should also be placed in a separate scaled cover duly superscribed Bid Guarantee for .....

   All these three envelopes should be placed in a big envelope which will form the main cover. This main cover must be superscribed Tender for ..... due on ..... at .....

   All the other three envelopes should also bear the address of this office as given above. The price bid should be kept valid for acceptance for a period of 180 days after

opening of the tender. The purchaser will not be responsible for any postal delay or any other cause that may lead to delay in the receipt of the documents in this office beyond the stipulated date and time stated in the tender documents. The detailed instructions with respect to bids are given below.

The technical bid shall be opened at hours on ..... It should be submitted in quadruplicate indicating precise details, any limitations or extension of the requirement should be clearly spelt out. Quotations which do not give precise technical information are likely to be ignored. The operating and service manual of the equipment should accompany the technical bid.

4) Only manufacturers or their sole authorized distributors/sole agents are entitled to submit the proforma invoice. The proforma invoice must be from the manufacturers abroad. All offers other than those from the manufacturers should be supported by an authority letter in original from the manufacturers authorizing the firm to tender on their behalf. Certificate to the effect that you are the manufacturers of the equipment/ authorised sole distributors or sole agents for manufacturer on whose behalf you are quoting, must be included in the documents. The said certificate should be duly attested and stamped by the authorized signatory of the firm. The firm should enclose a certificate that they are enrolled with the Directorate General of Supplies and Disposals, Parliament Street, New Delhi to act as Indian Agent.

5) In addition to quoting for the equipment as per para 1 above, tenderer must quote the charges and terms and conditions of service contract for a period of 5 years for maintaining the equipment at this hospital after the expiry of the period or warranty. During the service contract period the firm shall provide preventive maintenance and in addition attend to all emergent and breakdown calls. The service contract charges should be quoted for labour cost only and should not include the cost of any replacement parts/components that may be needing replacement. Thus the charges quoted will be of service only which would include the cost of the engineers time and travel etc. During the contract period replacement of parts/components that may be needing replacement shall be made available by the firm at the hospital's own expense and all import formalities, payment of customs duty etc. shall also be compiled with/ borne by the hospital. The charges shall be paid to after the satisfactory service.

6) The up-time guarantee of 328 days in a block of 365 days of the service contract period should be ensured. The principals or their agents are required to submit a certificate that they have satisfactory service arrangements and fully trained service staff available to support the up-time guarantees. Tenders not containing service contract charges shall not be considered and shall be rejected.

7) Tenderers must attach, along with the Technical Bid a photocopy of the constitution of the firm indicating partnership deed, if any the time of the proprietor/partners.

Foreign firms quoting direct against their tender enquiry should attach, along with the technical bid, a certificate giving the name and address of their Indian Agents or their representative they have in position for servicing the equipment in India.

In case the offer is from other than manufacturers, then a certificate that quantum of Indian Agency Commission mentioned by the firm in the proforma invoice in the same as is being charged from other departments/Institutions for similar items, must accompany the Technical Bid.

A list detailing all places in India where the same equipment or similar equipment has been installed by the Company should be attached. Documentary evidence wherever possible in support of this list and also certificates of its satisfactory working from those mentioned in the list, should also be enclosed.

In case the offer is from other than manufacturers, then an Authority letter from the manufacturers authorizing the firm to tender on their behalf must accompany the technical bid.

Tenderers must furnish along with the technical bid the latest current valid Income Tax Clearance Certificate and Sales Tax Certificate or attested photocopies there of.

Tenderers must furnish along with their technical Bid a certificate that the Indian Agency commission, if any payable has been included in FOB value and that no Indian Agency commission other than that stipulated in the proforma invoice is payable by the foreign manufacturers to the Indian Agent.

8) **Bid Guarantee and Security**

a) The tender must be accompanied with Earnest money for Rs .....

in a lump sum amount in the form of deposit at Call Receipt/Terms deposit valid for one year from any scheduled bank in the name of the ..... Earnest money in any other form will not be accepted.

b) Bids not accompanied by Earnest money as stated above or less than the amount stipulated above shall be summarily rejected.

c) Earnest money/security deposit/any other sums of the tenderers with the hospital in connection with any other tender/case will not be considered against this tender.

d) The successful tenderer shall be required to furnish a contract performance guarantee bond in the shape of Bank Guarantee for an amount equivalent to 5% of the FOB value of the equipment towards the execution of the agreement and the warranty. The Bank guarantee should be valid till the expiry of the warranty period of 24 months. The Bank guarantee for 5% of the FOB value will be submitted within a period of 15 days after the placement of the supply order failing which the order will be liable to be cancelled and the Earnest money forfeited.

e) The hospital would return the Earnest money mentioned in para (a) above to the successful tendering firm on the submission of the Bank guarantee above.

f) The successful tenderer will submit bank guarantee equivalent to 2% of the FOB value to recover the service contract period after the expiry of warranty period of 24 months. Bank Guarantee mentioned in para 8 (d) above will be returned on the receipt of bank guarantee indicated in this clause.

g) The hospital does not pledge itself to accept the lower to any other tender, and reserves to itself the right of acceptance of the whole or the part of the tender or portion of the quantity offered and the tenderers shall be required to supply the same at the rate quoted. The hospital reserves to itself the right to accept or reject any or all the tenders without assigning any reasons thereof.

9) **Customs Clearance**

i) The equipment requiring import from abroad will be imported under the OGL scheme, for which tenderer will ensure before shipment takes place, that the equipment, in question can be imported under the said scheme.

ii) It will be the responsibility of the purchaser to get the customs clearance of the equipment done (however the tenderers will assist in the clearance of consignment as and when required). The tenderer will pursue any claims with the custom authorities/insurance company/cargo operators and transporters as may arise at any stage.

iii) The N.M.I.C. (Not manufactured in India) and the duty exemption certificate and any other documents required for custom clearance will be provided by the hospital.

10) **Insurance**

The manufacturers will ensure that the equipment is properly insured for the full CIF value to cover the transit up to site of installation. If the installation is delayed beyond the agreed date of satisfactory installation commissioning and handing over of the equipment, then in that event any transit and storage damages which come to light after such delays, shall be at the risk and cost of the tenderers. The Tenderer/Indian Agent shall provide to the hospital after the inspection, a detailed list of any loss or damage to the stores that may have occurred so as to enable the purchaser to file appropriate claims with the Insurance Company. However, it shall be the responsibility of the hospital to prepare, lodge and pursue any claims that may arise with the Insurance Company. The manufacturers shall provide all assistance in pursuing any such insurance claims expeditiously. The manufacturer shall make free replacement, if required, in lieu of damaged/lost items etc. regardless of the fact whether the claim is settled by the underwriters or not. The manufacturer's liability shall be restricted to making free replacement/rectification and any local expenses such as custom duty/ clearance, etc. connected with such replacement shall be borne by the hospital.

11) It should be noted that, if, in consideration or offer of earlier delivery, the contract is placed with higher tenderer on preference to the lowest acceptable offer, the tenderer will be liable to pay to the hospital the difference between the contract rate and that of the lowest acceptable tenders on the basis of the final price for destination, including all elements of freight, sales tax, local taxes, duties and other incidentals, in case of failure to complete supplies in terms of such contract within the date of delivery

specified and incorporated in the contract. This is in addition to cover all other losses and damages resulting from delayed supplies and cancellation and risk purchase in case of failure to supply the stores and without prejudice to other rights of the hospital to recover all other losses and damages resulting from delayed supplies and of cancellation and risk purchase in case of failure to supply the stores guarantee/ warranty. The tenderers will be required to furnish guarantee/warranty from the manufacturers as under:

The guarantee/warranty against defects of manufacturer/workmanship and poor quality components for the entire equipment shall be for a period of 24 months starting from the date of satisfactory installation. Commissioning and handing over the equipment in working order..... During the guarantee/warranty period, the replacement of any part(s) of the ..... equipment of rectification of defects of works will be free of cost. In case of any replacement during guarantee period, all formalities such as connected with such import of replacement shall be completed with by the purchaser. Further the defective parts/equipment shall be returned by the purchaser to the supplier, prior to making replacement. During the guarantee/warranty period the up time as defined earlier will be maintained. If the down time exceeds seven consecutive days at the time, the guarantee/warranty period will be extended beyond 24 months to a duration equal to the total of such periods of down time during the period of warranty.

The tenderer should submit a written guarantee from the manufacturers stating that the equipment being offered is the latest model as per specifications and that spares for the equipment will be available for a period of atleast 10 years after the warranty period. The manufacturer should also guarantee that it will keep the hospital informed of any update of the equipment over a period of next 5 years and undertake to provide the same to the hospital at no extra cost.

Guarantee that they will supply regularly any items of spare parts requisitioned by the purchaser for satisfactory operation of the equipment till the life span of the equipment if and when required, on agreed basis for an agreed price. The agreed basis could be an agreed discount on the published catalogue price or an agreed percentage of profit on the landed cost.

Warranty to the effect that before going out of production of spare parts, the manufacturers and/or tenderers will give adequate advance notice to the purchaser of the equipment so that the latter may undertake to procure the balance of the life time requirements of spare parts.

The warranty to the effect that the manufacturers will make available to the hospital the blue-prints and drawings of the spare parts if and when required in connection with the equipment.

The tenderer hereby furnish the following warranty in case the contract is placed on him.

The tenderer hereby declares that the goods/stores/articles supplied to the buyer under this contract shall of the best quality and workmanship and shall be strictly in accordance with the specifications and particulars contained/mentioned in the clause here of and the tenderer hereby guarantee that the said goods/stores/articles conform to the description and quality aforesaid. The purchaser will be entitled to reject the said goods/stores/articles or such portion there of as may be discovered not to conform to the said description and quality. On such rejection the goods/stores/articles will be at the seller's risks and all the provisions have here in contained relating to rejection of goods etc. shall apply. The contractor/seller shall, if called upon to do so, replace with in period of fourteen days or such further period as may be extended from time to time by the purchaser at his discretion on an application made thereof by the tenderer, the goods/stores/articles or such portion thereof as rejected by the purchaser and in such an event the above mentioned warranty period shall apply to the goods/stores/articles replaced from the date of the replacement thereof, otherwise the tenderer shall pay to the purchaser such damage as may arise by reason of breach of the conditions herein contained. Nothing herein contained shall prejudice any other right of the purchaser in that behalf.

Note: If there are any parts of consumable nature which are not covered under the above said guarantee/warranty clause, then details of same with nomenclature etc. must be furnished.

12) **Mode of Despatch, Delivery and Commissioning of Equipment**

The equipment with all its accessories should be dispatched by duly insured, freight and insurance charges pre-paid. The tenderer is required to undertake to deliver and install the commission the equipment within a period of days from the date of opening of letter of credit.

13) **Damage of Delay in Supplies/Installation (Liquidated Damage)**

In the event of delays in supply installation and commissioning of the equipment to the satisfaction of the purchaser beyond the stipulated date, the purchaser shall have the right to recover damages at the rate of 2% of the FOB value of the equipment (including components, spares, accessories and optional items) per month or part thereof, by which the supplies or their satisfactory installation and commissioning is delayed subject to a maximum of 10% damages on this account.

The acceptance of the equipment will be based on demonstration of the satisfactory working of all models of the equipment as tested by the Head of Department. The materials, etc. required for demonstration of satisfactory functioning of the equipment shall be arranged by the suppliers.

14) **Contract**

The successful bidder will be required to enter into an Agreement with the hospital on a non-judicial stamped paper for the supply and satisfactory installation of the equipment as per specfications and terms and conditions listed in this tender document and agreed upon.

15) After satisfactory installation the firm will provide requisite training to the staff of the hospital at site at no extra cost.

16) **Uptime Guarantee**

At the end of the guarantee period of the 24 months the hospital shall enter into a service contract with the firm. The firm will be required to guarantee that during warranty period as well as during the service contract period, the equipment will be maintained in good working condition for a period of 328 days out of a period of 365 days (i.e. 90% uptime), 8 hours non functioning of the equipment may be considered as one day down time. Essential period to shut down the installation entirely or partially shall also be included in the down time while calculating the 90% guaranteed uptime. No deduction or advantage of any kind on account of Sundays, half days on Saturdays, public/Govt. holidays observed by the hospital shall be allowed from the total down time permissible as defined above except that such of Sundays, half days on Saturdays, public/Govt. holidays on which the hospital is not able to provide facilities for service/repairs of the equipment shall not be counted in the downtime. The equipment will thus required to be maintained in satisfactory working conditions for a minimum of 328 days in each period of 365 days which defines the 90% uptime required to be maintained in each such period of 365 days. This guaranteed uptime shall be calculated for each block of 365 days. The firm will be required to pay a penalty of Rs. ..... per day in case the number of days of down time in each period of 365 days in more than the down time, permissible which is to be calculated as defined above and the delay for not bringing the equipment in functioning order is in any way directly, even partially attributable to the firm.

The Penalty will apply only for the number of days the permissible down time as defined above is exceeded. For purpose of calculation of down time, any down time period less than 8 hours shall be excluded. During the service contract period the time taken by the hospital in providing to the firm the spare parts shall not count towards the down time. During the guarantee period the time taken by the hospital to provide the customs duty exemption certificate, Not Manufactured in India certificate, import licence etc. for enabling the tenderers to import any spare part, shall not count towards the downtime.

17) **Opening of Tender**

The bids shall be opened on .....Technical bid ..... hours non price bid ..... hours on ..... You are at liberty to be present, in person or through your authorized representative at the opening of the tender at the time and date specified in the tender notice. In the event of the day of receipt and opening of the tender being a holiday for the hospital then due date of receipt/opening of the tender will be the following working day at the same hour.

18) **Period for which the Offer will remain Open**

The tendering firms should keep their offers valid for acceptance for a period of 180 days from the date of the bids.

19) **Payment**

The hospital will pay 100% CIF value excluding Indian Agency Commission of the goods to the tenderer through an irrevocable Letter of Credit (LOC) against negotiable shipping documents.

Country of origin will be one and not more. Expenditure on release of LOC by the foreign firm will be borne by them. No amendment in LOC will be allowed which is not in the Quotation/Tenders.

The hospital shall make all reasonable and due efforts to pay the Indian Agency Commission out of the FOB value to the Indian Agents at the earliest possible within 30 days after satisfactory installation/commissioning and handing over of the system in good working condition and meeting any other requirements for payment of the Agency Commission. The rate of exchange applicable for converting agency commission into equivalent Indian rupees shall be the T.T. selling rate prevalent on the date of releasing the documents by the Bankers. The Indian Agency Commission out of the FOB value will be paid in Indian Currency (Rupees) to the Indian Agents.

20) **Packing and Marking**

Best trade packing suitable for safe Rail/Road/Air transit shall be used subject to packing and marking being acceptable to the Inspecting Authority.

a) The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the contract. The packing shall be sufficient to withstand without limitation, rough handling during transit and exposure to extreme temperature, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods final destination and absence of heavy handling facilities at all points in transit.

b) The packing marking shall show the description of quantity of contents, the name of the consignee and address, the gross weight, a distinctive number of mark sufficient for purpose of identification. Each package shall contain:

   i) A packing note quoting the name of the purchaser

   ii) The number and date of order

   iii) Nomenclature of the goods

   iv) Schedule of parts for each complete equipment giving part number with reference to assembly.

   Not withstanding anything stated in this clause, the supplier shall be entirely responsible for loss, damage, deterioration, depreciation of the goods due to faulty packing.

21) **Preparation and Delivery of Tender**

Tender documents must be signed by the tenderers in full along with their stamp.

If any time, any question, dispute or difference whatever shall arise between the two parties (hospital on the one hand and vendor on the other hand) in relation to the purchase, either of the parties may give to the other notice in writing of the existence of such a question, dispute or difference and the same shall be referred to two arbitrators, one to be nominated by the Institute and the other to be nominated by the firm. Such a notice of the existence of any of any question, dispute or difference in connection with this purchase shall be served by either party within 30 days of the beginning of such dispute failing which all rights and claims shall be deemed to have been forfeited and absolutely barred.

Before proceeding with the reference the arbitrators shall appoint/nominate an Umpire. In the event of the arbitrators not agreeing in their award the Umpire appointed by them shall enter upon the reference and his award shall be binding on the parties. The venue of the arbitrator shall be at .....

The provision of the Indian Arbitration and Act Reconciliation Act 1996 and of rules framed there under and any statutory modification thereof shall be deemed to apply and be incorporated for the supply, installation and commissioning etc.

Upon every or any such reference, the cost of any incidents to the reference and award(s) respectively shall be at the discretion of the arbitrators or in the event of their not agreeing, of the Umpire appointed by them who may determine the amount thereof or direct the same to be fixed as between solicitors and client or as between parties and shall direct by whom and in what manner the same shall be borne and paid, venue to the Arbitrator will be .....

Jurisdiction

The courts at ..... alone will have the jurisdiction to try any matter, dispute on reference between the parties arising out of the contract. It is specifically agreed that no court outside and other than Court shall have jurisdiction in the matter.

Force Majeure

Any failure of omission or commission to carry out the provision of the contract by the supplier shall not give rise to any claim by any party, one against the other, if such failure of omission or commission arise from an act of God, which shall include all acts of natural calamities such as fire, flood, earthquake, hurricane or any pestilence or from civil strikes, compliance with any statue and/or regulation of the Government, lockouts and strikes, riots, embargos or from any political or other reasons beyond the supplier's control including war (whether declared or not) civil war or state or insurrection, provided that notice or the occurrence of any event by either party to the other shall be given within two weeks from the date of occurrence of such an event which could be attributed to Force Majeure conditions.

The hospital reserves the right to accept or reject in whole or in part any or all the quotations received without assigning any reasons therefor.

Termination for Insolvency

The purchaser may at any time terminate the contract by giving written notice to the supplier, without compensation to the suppliers, if the supplier becomes bankrupt or otherwise insolvent (which events shall of themselves be a breach of the contract on the part of the supplier), provided such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

Termination for Convenience

The purchaser, may by written notice sent to the supplier terminate the contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of work under the contract is terminated becomes effective.

The good that are complete and ready for shipment within 30 days after the supplier's receipts of notice of termination shall be purchased by the purchaser at the contract terms and prices. For remaining goods the purchaser may elect to

a) have any portion completed and delivered at the contract terms and prices; and/or

b) cancel the remainder.

Government Language

The contract shall be written in the language of the Bid (English Language) as specified by the purchaser. All correspondence and other documents pertaining to the contract shall be in English.

Now you procure a tender form for purchase of foreign equipment from a hospital and compare it with the sample tender form. Discuss your findings with the academic counsellor at your programme study centre.

3.6 LET US SUM UP

In this unit you have learnt that the introduction of state of the art technology has resulted in metamorphic changes in diagnostic and therapeutic modalities in patient care activities. This has led to enhancement of quality of life and decreased morbidity and mortality rates. However, modern medical technology is not a panacea for all ills. The adverse effect include supplier induced demands, indiscriminate use, duplication and underutilisation.

You have also learnt about the strategies for hospital equipment which include scientific need assessment, appropriate procurement, maintenance, repairs, optimum utilisation and

timely replacement. Equipment availability, functionality, effectivity, efficiency, utility assessment are the cornerstones in which the stores administrator plays a pivotal role in provision of satisfaction to staff, cost effectiveness to the hospital management and health care to the patients. Towards the end of the unit you have learnt about various issues involved in procurement of imported hospital equipment. Further you have learnt that Efficient equipment utilisation should be ensured to optimise health care facilities. A substantial number of equipment in Indian Health Care institutions is of foreign origin. It is imperative that appropriate steps are taken in the planning, procurement, installation, usage stages of these equipment to maximise utilisation and optimise health care facilities.

3.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) i) F ii) F iii) T

2) a) Need assessment
   b) Use coefficient
   c) Cost consciousness
   d) Specifications
   e) CIF destination
   f) Installation on turn key basis
   g) Warranty\with spares
   h) Continuous supply of consumables
   i) Service contracts
   j) Staff training
   k) Preparation of site
   l) Foreign exchange
   m) Facility for back up power supply
   n) Good economics
   o) Supplier selection and purchase procedure

Check Your Progress 2

1) Utilisation index is the parameter to assess the productivity of service or an equipment.

2) a) Training of staff
   b) Equipment installed on turn key basis
   c) Preventive maintenance and after sales service
   d) Facility for back up power supply
   e) Time scheduling of the hospital
   f) Use coefficient
   g) Awareness of the facility
   h) Utilisation of the special facility

UNIT 4 EQUIPMENT MANAGEMENT – MAINTENANCE, REPAIR AND DISPOSAL

Structure

4.0 OBJECTIVES

After studying this unit, you should be able to:

- discuss the existing situation of hospital equipment;
- describe the essential features of timely maintenance and repair procedures; and
- discuss condemnation (discard policy) and disposal of equipment.

4.1 INTRODUCTION

Hospital equipment are based on sophisticated and high cost technology involving huge funds. An average hospital administrator/clinician is least aware about the complexities and technicalities involved in the right selection, procurement, specifications, installation, utilisation, maintenance and repair of these equipment. The situation is even worse when it comes to condemnation and disposal of hospital equipment. As a result of the same, the hospitals end up procuring equipment which may not be the best. Besides, we also end up paying more. The aggressive marketing by the equipment suppliers and agents may lead to various malpractices.

Maintenance and repair of these sophisticated equipment becomes the biggest casualty. Most of the hospitals are ill equipped for any organised and systematic maintenance and repair facility. In fact, even the basic facilities for maintenance and repair of hospital equipment are non-existent. This not only leads to long down time but also gross under utilisation and inefficiency, thus affecting the patient care adversely. Some surveys and studies have indicated that non-funcional equipment is a major contributory factor for wasteful expenditure in hospitals.

Optimum utilisation of equipment requires that the equipment remain in good working conditions for most of their life. Timely maintenance and repair of the hospital equipment, therefore, assumes vital importance. This unit will offer some guidelines on this complex problem and also on the condemnation and disposal of the equipment.

4.2 DEFINITION

Management, per se, is defined as the purposeful and effective utilisation of resources for accomplishing a pre-determined objective. Extending the same to equipment management, it would mean that we not only ensure greater utilisation of the hospital equipment, but also maximise their uptime and ensure the reliability, validity, efficiency and safety in their day to day functioning.

4.3 EXISTING SITUATION

The existing situation of the hospital equipment particularly their maintenance and repair is rather gloomy. Hospitals seldom have 50-60 per cent equipment in usable conditions. According to a survey by the Department of Electronics (DOE), Government of India, hightech medical equipment worth Rs. 50 crore are lying idle in government hospitals in Delhi and nine other States due to lack of spares, and non-availability of funds.

The survey was done in 132 government hospitals in nine states—Delhi, Madhya Pradesh, Orissa, Bihar, Punjab, Uttar Pradesh, Maharashtra, Assam, Haryana, Tamil Nadu. It disclosed that electro-medical equipment worth 48.61 crore out of the total cost of 180.58 crore were not in working conditions. As the survey did not cover all hospitals, except in Punjab, it extrapolated the result to conclude that equipment worth at least Rs. 50 crore may not be in working condition in these states. While presenting the findings of the survey, the then Secretary, Electronics identified some of the reasons for the non-working conditions as a) lack of maintenance policy by the hospitals and lack of provision of budget on this account, b) the non-availability of technical documents for installation, maintenance and safety since these equipment were either received as donations from various developed nations or purchased without having adequate purchase policies. The survey also found that lack of availability of spare parts, particularly for imported equipment, was also creating problems. In addition, the support for maintenance of such equipment was also grossly inadequate. "As imported equipment were also being handled through commission agents and local manufacturers had limited capabilities of providing after-sale services beyond the warranty period particularly in remote locations", the report said.

Table 4.1: Nation-wide Survey of Status of Medical Equipment

State	No. of hospitals visited/survey carried out	Cost of equipment surveyed (Rs. in crores)	Cost of equipment not working (Rs. in crores)
Madhya Pradesh	240	28.00	10.00
Orissa	4	10.50	4.60
Bihar	2	25.00	7.00
Punjab	NA	50.00	10.00
Uttar Pradesh	19	38.00	9.60
Maharashtra	24	3.20	1.14
Assam	39	10.00	2.00
Haryana	15	5.00	2.00
Tamil Nadu	5	10.88	2.27
Delhi	3	24.67	2.00
Manipur	17	0.20	0.04
	Total	**205.45**	**50.65**

The most common factors contributing to this wastage are:

Purhase of sophisticated equipment which is under-utilised or never used due to lack of technical expertise to maintain and use it.	Estimated wastage 20-24 per cent
Reduced lifetime of equipment due to mishandling and lack of maintenance and repair.	Estimated to affect 50-80 per cent of equipment value.
Additional purchases of accessories, extra spares and modification to facilities initially unforeseen due to lack of expertise in choosing appropriate equipment.	Estimated to affect 10-30 per cent of equipment value.

Lack of standardization, increased cost of spare parts or additional purchases and extra workload on limited competent staff.	Estimated to affect cost by extra 30-50 per cent
Excessive down time of equipment due to lack of preventive maintenance inexperience in repairs and lack of spare parts.	Estimated to affect 20-30 per cent of equipment
Shortage of foreign exchange compounds the problem of unfavourable purchasing contracts.	Estimated to add 10-30 per cent of equipment and spares

Check Your Progress 1

What were the important findings of the survey conducted by DOE?

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4.4 MAINTENANCE AND REPAIR FACILITIES

Once a hospital has been planned and provided with required equipment, there comes the need to manage/maintain them scientifically so that the quality service is provided to patients on a continued basis.

There is a large variety and diversity of equipment in a hospital. The nature and type of equipment vary in different hi-tech/mid-tech hospitals depending upon the competence, size, type of hospital. To illustrate, the range varies from a simple B.P. apparatus to highly sophisticated diagnostic and therapeutic gadgets, laboratory equipment, imaging equipment, anaethesia, O.T. equipment etc. This is only to name a few, hospital equipment also include those used in various other services viz., CSSD, mechanised laundry, kitchen, stores, and housekeeping.

In order to provide and establish efficient equipment maintenance service in hospitals, it is important that a written plan be developed, right from procurement and up to disposal of equipment. More so, for the reasons that the equipment are based on high cost and sophisticated technology.

4.4.1 Need for Repair and Maintenance Centre

In order to mitigate the long standing problems of hospital equipment maintenance (preventive and breakdown) which results in non-utilisation or under-utilisation of vast national resources thereby adversely affecting quality of health care delivery. Department of Electronics, Government of India has started a national programme through decentralised repair and maintenance centres in 12 States of the country. These centres are joint venture of DEO with State Electronics Corporations. At present, there are 13 such Electro Medical Maintenance (EMM) Centres in the country.

Objectives

The objectives of setting up of these centres are:

- to render repair and maintenance facility to hospitals, medical institutions and dispensaries in the State;
- to provide consultancy service to hospitals and medical institutions on electro-medical equipment in the area of pre-installation and operation of equipment; and
- to conduct training course for medical and paramedical personnel.

It was proposed to establish regional workshops on equipment maintenance in 6th Five Year Plan. First regional workshop was established at Medical College, Cuttack immediately after the 6th Five Year Plan.

4.4.2 Outline of the Plan of Biomedical Engineering Operations for Maintenance

There are enormous variations between hospitals according to different climate, location, the States size, the form of care provided and the type of patients seeking care. Still there are number of parameters common to almost every institution. In order to provide efficient maintenance services, it is important to develop a routine plan and guidelines. This plan should focus the attention on the common elements in the organisation, related to procurement and maintenance of the medical equipment in order to optimise and get the most out of the limited amount of money and other scarce resources. In planning of the biomedical engineering equipment for use in health institutions the elements involved are discussed below:

a) **Requirement of equipment:** At the every outset a realistic estimation of the requirement of equipment for different medical institutions would be the most important step for all future activities related to equipment. This exercise has not only to identify the bio-medical equipment, but also assess the quantity in which they are required based on estimated patient load needing the equipment. Give the specification of the same and also the sources of procurement of these equipment. Secondly, the bed strength of the hospital and type and range of services provided in the hospital would be other guiding factors for assessing requirements.

b) **Workload in terms of patients:** The need of these equipment would be directly related to the workload i.e. inpatients, outpatients, those attending the emergency services and intensive care units. The workload of patients would also help in assessing the requirement of the equipment in the other diagnostic, therapeutic, supportive and ancillary services.

c) **Budget planning:** The hospital and health care equipment are based on high-tech and are expensive. The meagre resources should take into account not only the purchase of equipment but its maintenance as well. Often ad-hoc grants/donor agency grants are used for the purpose without taking into account the maintenance which causes problem later on. Every hospital should have a part of budget allocated for maintenance of equipment.

d) **Preventive maintenance:** The preventive maintenance is an important aspect of equipment management. It is essential for efficient and effective functioning of equipment as well for increasing the life of equipment. As regards the preventive maintenance is concerned, care should be taken that new equipment are under warranty for a sufficient period to test its performance. Adequate steps should be taken for preventive maintenance of equipment while outlining the plan for equipment operations for maintenance.

4.4.3 Maintenance and Repairs

Maintenance as well as repairs are the two terms which are closely related to each other and also used combinedly. Broadly classifying, the equipment maintenance and repairs would include the following:

1) Preventive Maintenance

2) Master maintenance plan

3) Repair of equipment

a) As regarding the preventive maintenance of all expensive and sophisticated equipment is concerned, care should be taken that the new equipment/machines are under warranty for a sufficient period to test its performance. The essential spares should be obtained along with the equipment as a part of the configuration and the integral part of the purchase contract, to last for sufficiently long period say 5-10 years. The equipment should also be under service contract after 5 years also. Some penalty clause may be included in the purchase contract to this effect. For electronic equipment necessary safeguards should be carefully observed which may include:

   - Voltage stabilizers, built in or othewise
   - In high priority areas like operation theatre, ICU, ICCU, diagnostic services etc. voltage stabilization should be done areawise preferably through an uninterrupted power supply (UPS) system.
   - Separate line should be laid where voltage fluctuation is considerable

- Automatic switchover for emergency should be provided with a generator.

The requirements of electricity, water, space and atmospheric conditions should also be taken into account. For example, for certain life saving equipment, a three-phase supply of electricity should be provided. Such equipment should also be protected from the vagaries of weather in order to minimize the breakdown and also enhance the life of equipment.

b) As regard the routine equipment/instruments such as sphygmomanometer, suction apparatus, centrifuges, incubator, hot air ovens, ECG machine, etc. the maintenance cell (workshop) should have the required facilities in terms of skilled and trained manpower, adequate spares and infrastructural facilities.

c) The preventive maintenance will give rise to the following advantages:
   - Reduction in down-time of the equipment
   - Safety of equipment
   - Effective and economic functioning
   - Increased life of the equipment

The advantages of preventive maintenance can best be illustrated by following two examples.

Illustration I

The illustration is presented from the experience of a medium size trust hospital in Gujarat. Recently, because of non-functioning of simple equipment in the pathology department some very important investigation could not be carried out in time. Following a number of surgical operations a few specimens/excised tissues were sent to laboratory for histopathological reports. The histopathological test could not be carried out for the reasons that the microtome, an equipment which cuts out thin slides of excised tissue matter for microscopial examination, was not in a working order. It was found to be rusted and its blades could not be opened due to the rusting. This happened because this microtome was not washed, cleaned and oiled after its last use. This resulted in delay in reporting and more costs for getting reports from outside.

Illustration II

In another case the ultrasonography used in various departments for getting the image of different body organs could not be used for want of simple maintenance. The transducer (the rounded portion which is placed on the body) of this sonography equipment is always applied on the vairous parts of the body with the help of lubricating jelly. After a couple of months use this equipment stopped working. The reason was that the jelly which was repeatedly applied on the transducer before each use, formed a thick coating all around its surface which transmits the ultrasounds into the human body for getting an image (resolution) of that particular organ for helping in diagnosing the problem. This thick coating interfered with this transmission and gave a very poor resolution. All this could have been prevented if after each use the jelly was cleaned off the transducer with the help of simple normal saline solution and dried with muslin cloth.

Check Your Progress 2

1) What are the four elements of the Plan of Bio-medical engineering operations for maintenance?

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2) Discuss advantages of preventive maintenance?

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3) What went wrong with the Ultrasonography equipment?

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Master Maintenance Plan

The master maintenance plan should be drawn in consideration of the load of the user departments including the following aspects of equipment maintenance and repairs:

- Recruitment of skilled manpower
- Arranging regular training programmes on maintenance and repairs of equipment of the technicians and other concerned personnel
- Establishing a bank of spare parts and crucial components
- Establishing detailed records of the purchase, procurement and maintenance of equipment
- Periodic checks and repairs
- Monitoring of the annual maintenance contract for expensive and sophisticated equipment
- Developing a 'maintenance cell' for maintenance and repair
- Establishing a nucleus of communication between this cell and the supplier of equipment
- Follow up of the maintenance and repair services.

Repair of Equipment

It is necessary to have basic in-house facilities for the routine repairs of the common equipment. It has been generally seen that many a times the hospital equipment are not working for want of simple repairs, such as faulty switches and plugs, loose wiring and sparking, fuse problems, lack of spare parts, lack of training in handling the sophisticated equipment and many other factors.

The in-house repair facility should be organized keeping the following in mind:

- Head of maintenance cell (workshop) should be completely accountable and responsible for the task under his control.
- The availability of skilled manpower for the repairs.
- Provision for a bank of spare parts and crucial components.
- All technicians and other workers handling important equipment should be provided with a separate tool kit consisting of all essential items required for repairs and maintenance.

The repair procedures must underline the following:

a) Repairing and servicing of sophisticated equipment only under the guidance of a skilled person.

b) This cell should also evolve and develop the procedures for requisitioning repair services as and when a particular equipment breaks-down or stops working.

c) If in-house facilities cannot repair a particular equipment, then the procedure for its repair from outside agencies should also be developed.

d) The downtime of each equipment should be specified and adhered to by the maintenance cell.

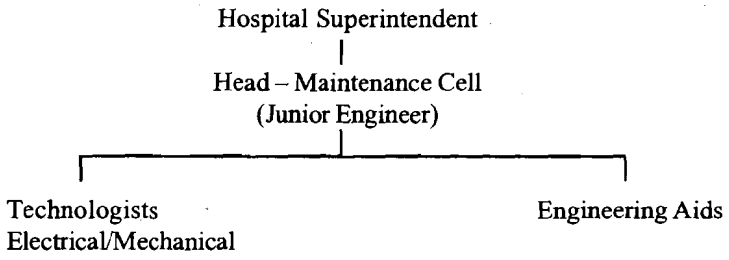
e) The technical personnel involved should be trained either by the established institutions or by the company supplying those equipment.

Staff and Organisational Structure

The staff and organisational structure for equipment management would vary depending on the nature, type size of a hospital. However, for a large district hospital following staff may be recommended:

1) A Junior Engineer (Electrical/Mechanical)
2) Two Technologists (Electrical/Mechanical)
3) Engineering Aids

The organisational structure is given below:



In large hospital the staff working in the maintenance cell would be the integral part of the hospital engineering services which should be under the direct supervision of the designated medical officer or the hospital superintendent.

4.5 CONDEMNATION AND DISPOSAL

It becomes imperative that every hospital must develop proper maintenance and repair facilities for hospital equipment in the manner suggested above to minimize the periodic breakdowns as well as increase the up time of the equipment to its maximum. However, over a period certain equipment either become obsolete or beyond economic repair and occupy precious space in the respective departments or in the hospital on the whole. These equipment need to be condemned and disposed off at regular intervals.

Continuous use and exploitation of equipment and various other factors including environment cause its progressive wear and tear and finally render it unserviceable. Lack of trade support for old equipment and rapid pace of technological development further influence the expected useful life of the equipment.

At present no provisioning action of non-expendable stores can take place unless these are declared unserviceable/BER (Beyond Economic Repair). As the process of provisioning takes at least 2 years, this often leads to serious deficiencies of vital equipment at unit level. It is proposed to remedy this lacuna by initiating programme of periodical phasing out of all equipment in relation to its anticipated life.

Anticipated/expected life of equipment is to be used only as a guide. It is neither a Death Warrant nor an insurance for the life of the equipment. While proper and careful use may prolong the useful life of an equipment, certain unforeseen factors may render it BER/ unserviceable within a few weeks of its procurement. Therefore, the concept of anticipated life and discard policy is to be used with utmost discretion by repair and maintenance agencies.

Frequent and recurring defect, failure of equipment, unreliability of its performance and reduced and unacceptable levels of accuracy in certain cases may lower the confidence of the user in its employability. Unreliable performance and frequent failures may thus render it unusable and necessitate its replacement. Depending upon the nature of the equipment the state of its fitness should be well known to the repair/maintenance agency. When the repair agency is convinced that the equipment is beyond economic repairs, discard action should be initiated. In the meantime all attempts to repair the equipment must be made. The equipment must be declared as unserviceable/BER after all attempts to repair it have failed.

It has also been seen that the condemnation procedures are not being undertaken on a regular and periodical basis for the following reasons:

a) lack of adequate record and other details with respect to date of procurement, purchase cost, source, and cost incurred on maintenance, repair etc.

b) The unwillingness and reluctance on the part of the senior hospital authorities to take decision for condemnation and disposal of equipment.

In view of the above, it is essential that the proper procedures should be laid down for condemnation and disposal of hospital equipment. It is also essential that proper records with respect to every expensive equipment should be maintained to facilitate their effective and efficient use and ultimately justify their condemnation and disposal.

Minimum criteria to be followed for condemnation and disposal of equipment is given below:

The equipment has become:

a) non-functional and beyond economical repair
b) non-functional and obsolete
c) functional but obsolete
d) functional but hazardous
e) functional but no longer required.

Procedure for Condemnation

Purchase and maintenance records of all costly and sophisticated equipments should be maintained in the form of a separate history sheet and logbook for each equipment. The contents and format of the history sheet are given here under:

History Sheet of Equipment to be maintained for every equipment and should incorporate:

- Identification data i.e. make, model and date purchased
- Details of sources and reputation of suppliers
- Availability of spares
- Purchase cost
- Details of breakdown and down time
- Repairs undertaken and expenditure incurred
- If imported details thereof (custom clearance)
- Details of procurement procedure.

The History sheet may have the following tabular format:

Sl. No.	Name of Firm with Address & Tel. No.	Name of Local Servicing Agent	Quantity	Cost	Date of Receipt	Date of Breakdown	Date of Repair	Remarks
1	2	3	4	5	6	7	8	9

A column may be added for determining the life of equipment at purchase.

Items like disposables and I.V. sets, linen, patient cot, and related furniture items, bowels and trays etc. can be condemned on the recommendation of the user department.

Condemnation Committee

A Condemnation Committee should be constituted for assessing whether or not an equipment should be condemned and disposed off based on the history sheet and the recommendations of the user department. This committee should meet periodically at regular intervals, at least twice a year. The condemnation committee may consist of:

1) Designated Medical Officer-in-charge
2) Concerned Head of Department
3) Technologist in-charge of Maintenance Cell
4) Stores-in-charge

However, for condemnation of costly hospital equipment, a special condemnation board may be constituted as per rules of the organisation. Any of the following procedures can be adopted for **disposal** of equipment after condemnation.

a) Circulate within the hospitals, wards and OPD
b) Return to vendor if he is willing to accept
c) Sell to other hospitals
d) Sell to scrap dealers

e) Local destruction

f) Auction

Check Your Progress 3

1) Fill in the blanks:

   a) History Sheet gives details of ..... time.

   b) History Sheet gives details of ..... incurred.

2) Describe composition of Condemnation Committee.

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Equipment Audit

Another requisite for an efficient system of equipment management is to carry out the equipment audit. In other words, there is a need for periodic evaluation of the quality of performance of equipment in a hospital. It is hoped that if such an audit is performed, it will be advantageous to all concerned viz., hospital, professionals, Government and the management so that, better utilisation of scarce resources is ensured and it will also contribute to the improvement of quality of hospital care.

The stages involved in equipment audit are as under:

a) **Procurement:** The steps involve the checking for:
   - Justification for the purchase of equipment including the technical specifications provided, with the help of indents received for the purpose from the user department.
   - Suitability of the specification in the supply order the choice of supplier to whom the order has been placed through tenders floated and quotations received.
   - Receipt of equipment as per the specification in the supply order, and
   - Ensuring availability of the essential spares, after sales maintenance service and the training to be provided by the supplier to the hospital staff for efficient use of the equipment wherever required.

b) **Installation and commission** involves checking with the help of history sheet whether the installation instruction viz. Safety, electrical instructions, etc. has been followed.

c) **Performance:** After having gone through the above steps, the performance aspect of the equipment audit should be checked with the help of the history sheet and logbook. The user department itself should also review the history sheet and logbook periodically.

Equipment Audit Committee

The equipment audit committee may consist of medical officer-in-charge, user department, head of maintenance cell and the matron. The equipment audit committee shall elect its own Chairman and the Secretary from amongst the members in the first meeting and then meet periodically — minimum once in six months — to perform equipment audit based on the history sheet of the equipment. Maintenance of history sheet and its subsequent write-up is essential for performance of equipment audit by the Committee.

Some of the advantages of equipment audit are as under:

a) To evaluate the concurrent performance and utilisation.

b) It provides a satisfactory mechanism to assist the process of condemnation.

c) The equipment audit reports provide an objective method for procurement of equipment in future.

d) To identify inadequacies and recommend remedial measures.

e) Cost per reportable result and cost effectiveness can be evaluated.

Training and Development

There is an urgent need for developing and conducting regular inservice training programmes for technicians and other paramedical personnel who are engaged in the day-

to-day operation of hospital equipment in various departments.

Training in hospital equipment can be broadly classified under the following categories:

1) Training by the supplier of the equipment dealing with its operation.
2) Training within the hospital dealing with routine maintenance/repairs.
3) Training outside the hospital in a recognised institution dealing with maintenance/ repairs for electronic equipment.

Important elements in the training and development of the technicians include:

a) Training the technicians in quality management.
b) Education of technicians on the repair/maintenance policy, objectives and concepts of patient satisfaction.
c) Awareness programmes for new entrants (induction training programme).
d) Procedures for specifying and verifying that technicians received suitable training.
e) Teamwork and communication methods.
f) Assessing carefully the technicians requirements and subsequently providing assistance and encouragement.
g) The performance evaluation of technicians to assess their development needs and potential.

This training may be provided in different modules. Some of which may be of the following types:

a) Use and practice of equipment including proper handling of the equipment.
b) Preventive maintenance and trouble shooting.
c) Following the instructions manual in day to day use of the equipment
d) Use of tool kit
e) Knowledge about common and recurrent causes of breakdown.
f) Identification of common spare parts which are responsible for frequent breakdowns such as fuses, washers, nuts and bolts etc.
g) Inspection and routine maintenance: Daily/periodic check/servicing schedule with information on all aspects of inspection – removing, dismantling, cleaning, examining, lubricating, assembling, adjusting, testing and reassembling of equipment/system where required.
h) Calibration
i) Testing and safety guidelines
j) Basic concepts of physics and electronics as relevant to hospital equipment.
k) Technology upgradation.

To sum up, suitable mechanism should be developed with requisite infrastructure for evaluating the performance of the maintenance cell and other departments relating to procurement, utilisation, maintenance, repair and condemnation/disposal of the equipment. The feedback arising out of such evaluation should be recorded and made use of in improving the quality-related activities of equipment management in future.

Check Your Progress 4

1) List the advantages of Equipment Audit.

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2) Fill in the blanks:

a) The Equipment Audit Committee should meet for a minimum of ..... in six months.

b) Proper maintenance of ..... is essential for the proper functioning of Equipment Audit Committee.

4.6 LET US SUM UP

In this unit, you have learnt about the existing status of hospital equipment in the governmental set-up. The non-functioning of a good percentage of the equipment for want of timely and proper repair and maintenance leading to blockage of funds and idle equipment has been explained. This has been used to emphasize the necessity of planning timely and proper preventive maintenance and maintenance in respect of costly equipment in the hospitals.

The need of timely proper condemnation and disposal thereafter of equipment to facilitate early replacement has also been discussed. The necessity of proper training for the staff to improve equipment utilisation has also been touched upon. You have also been exposed to the growing awareness in the use of equipment audit as a management tool.

4.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) Hospital equipment maintenance and repair situation is gloomy.

b) Hospitals seldom have 50-60 per cent equipment in usable condition.

c) High-tech medical equipment worth Rs. 50 crores are lying idle in government hospitals in Delhi and 9 other states.

Check Your Progress 2

1) a) Requirement of Equipment
   b) Workload in terms of patients
   c) Budget planning
   d) Preventive maintenance

2) a) Reduction in down-time of the equipment
   b) Safety of equipment
   c) Effective and economic functioning
   d) Increased life of the equipment

3) The transducer got a thick coating of the jelly. It was not cleaned properly after each use.

Check Your Progress 3

1) a) down
   b) expenditure

2) a) Designated Medical Officer-in-charge
   b) Concerned Head of Department
   c) Technologist in-charge of Maintenance Cell
   d) Stores-in-charge

Check Your Progress 4

1) a) To evaluate the concurrent performance and utilisation.
   b) It provides a satisfactory mechanism to assist the process of condemnation.
   c) The equipment audit reports provide an objective method for procurement of equipment in future.
   d) To identify inadequacies and recommend remedial measures.
   e) Cost per reportable result and cost effectiveness can be evaluated.

2) a) Once
   b) History Sheet

NOTES

UNIT 1 BREAK EVEN ANALYSIS

Structure

1.0 OBJECTIVES

After going through this unit you should be able to:

- discuss the major Cost Volume Profit (CVP) analysis technique known as break even analysis;
- apply the break even analysis with a view to determine the level of sales needed to be achieved to avoid losses;
- determine sales level required to earn a target profit;
- determine sale price needed to avoid losses; and
- determine further BEP with the changed conditions to avoid loss.

1.1 INTRODUCTION

During the course of your study, you must have learnt about the importance of Cost Volume Profit (CVP) analysis. You must have also learnt about break even analysis the most widely known form of CVP analysis. In this unit we will firstly revise the basic concept and theory and then work on practical exercises. This will enable you to prepare and present break even analysis in various formats in support of your proposals in the course of your duties as managers. The purpose of this unit is essentially to help you prepare for the actual application of the theory in practical form.

1.2 BROAD CONCEPT OF BREAK EVEN ANALYSIS

An important indicator of an organisation's performance is the profit. An analysis of the effects of various factors on profit is an essential step in financial planning and decision making.

A break even analysis is a specific technique of studying and presenting the inter-relationship between costs, volumes and profits. It is an efficient and effective method of financial reporting and planning.

At the start of any financial activity for profit say introduction of a new facility in a hospital; it becomes logical and essential to analyse with facts and figures to whether the venture would be profitable in near future. However, before the actual profit, one would come to a point of level of operation where there is no profit or loss i.e. the costs and revenues of the activity have become even and further efforts would take the organisation on the profit side. This is a point of equilibrium and is commonly known break even point. Thus the break even point is that point of sales volume for a given project or activity at which there is no profit and no loss i.e. total revenue is equal to total cost. For the purpose of further studies it is essential to know about the fixed costs, variable costs, total costs and contribution. These are briefly explained in subsequent paragraphs before taking up practicals.

Fixed Costs

These are the costs that cannot be avoided and are essential for the business. These remain fixed irrespective of the changes in the volume i.e. the number of units of goods produced. For example, the total rent of hospital facilities may be Rs. 1 lakh a year. This cost will remain the same whether patient traffic is zero or 1,00,000 patients. In nursing home the rent will have to be paid irrespective of number of x-ray images or other clinical tests performed. The other examples are:

a) Depreciation

b) Insurance

c) General administrative expenses like salaries, and maintenance of office

d) Repairs and maintenance

Variable Costs

These are the costs (expenses) which vary in direct proportion to the changes in volume of production. The examples are:

a) Cost of raw materials; say x-ray film the quantity of which will go on increasing in direct proportion to the x-ray images made.

b) Direct labour cost.

c) Direct activity cost say electric power, which will go on being consumed in direct proportion to the number of units of goods or number of units of service provided say with every x-ray image made.

d) Commission payable on unit basis.

Variable costs are those that go on increasing in direct proportion to the production activity. The recovery of this cost is by the way of sales. Each unit of product sold will cover its own variable cost and leave a balance to cover fixed costs and profit.

Contribution

This difference between selling price per unit and variable cost per unit is called contribution per unit or simply unit contribution. The sum total of all unit contribution is called 'Total Contribution'. The total contribution is contribution per unit multiplied by number of units produced. In break even point the total contribution is equal to the fixed cost. Thus at break even point the fixed cost has been overcome by the contribution and any further activity would have additional contribution to generate profit. In a break even analysis we would determine this point break even point (BEP).

Contribution Ratio: The contribution ratio is defined as contribution divided by the selling price. It can also be written as

$$\text{Contribution ratio} = \frac{\text{Selling price} - \text{Unit Variable cost}}{\text{Selling price}}$$

$$= \frac{\text{Sales} - \text{Variable cost}}{\text{Sales}}$$

1.3 APPROACHES TO COMPUTE BREAK EVEN POINT

There are two approaches to determine the break even point. These are (a) the formula approach and (b) the chart approach as described in succeeding paragraphs.

1.3.1 Formula Approach

This approach stems from a very simple logic as under :

Unit selling price – unit variable cost = unit contribution

Unit contribution × units sold = total contribution

Total contribution = total fixed cost + profit

At break even point (BEP), the profit by definition is zero, and hence, total contribution will be equal to total fixed cost. The BEP can be expressed in term of number of units sold, or in terms of rupees of sale or as a percentage of the total estimated/budgeted sales. This is brought in subsequent paragraphs.

1.3.2 Determination of BEP as Number of Units/Events

BEP (units) = (Total Fixed Costs) / ((Selling price) – (Variable costs per unit)) ... (1)
= (Total Fixed Costs) / (Unit Contribution) ... (2)

The above equations will give the units required to be produced and sold so that the break even point is achieved. The following example will illustrate the point:-

Example 1

A nursing home laboratory has priced its x-ray test and report for Rs. 200/- each. The variable cost is Rs. 120/ per test. The annual fixed cost is Rs. 2,40,000/-. Find out the number of x-ray tests to be performed per year at break even.

Solution

Total fixed cost = 2,40,000

Unit selling price = 200

Unit variable cost = 120

Therefore BEP (units) = 240000/(200 – 120) = 3000 as per Eqn. 1

Thus a minimum of 3000 x-ray tests must be carried out so that the nursing home breaks even.

Example 2

A manufacturing firm produces a single product whose selling price is Rs. 100/- per unit and a variable cost of Rs. 60/-. The annual fixed cost is Rs. 10,00,000/-. How many units the firm must produce at BEP.

Solution

Total fixed cost = 1000000

Unit selling price = 100

Unit variable cost = 60

Unit contribution = unit selling price – unit variable = 100 – 60 = 40

Therefore BEP (units) = 100000/40 = 25000 numbers as per Eqn. 2

Thus a minimum number of 25000 must be produced so that the firm achieves breaks even point.

1.3.3 Break Even Point in Rupees Term

In the above examples we have calculated the break even point in terms of number of units of the product. It is sometimes convenient to express the BE point in terms of monetary value i.e. in terms of say rupees of sale. One way would be to calculate in terms of number of units and then multiply with the sales price. In the Example 2 above the number of units at BEP is 25000. The corresponding value of BEP sales can be calculated by simply multiplying by 100 (sales price) i.e. 25000 × 100 = Rs 25,00,000/-.

Alternatively by simple mathematics this value can be expressed with the following formula:

BEP (rupees) = Total fixed cost/contribution ratio ... (3)

The term contribution ratio is defined as (unit contribution/selling price). Thus,

Contribution ratio = Unit contribution/selling price

= (Selling price – unit variable cost)/(selling price) ... (4)

= 1 – (unit variable cost)/(selling price)

= 1 – (total variable cost)/(total sales) ... (5)

Apply Eqn. 4 above

Contribution ratio = (100 – 60) ÷ 100 = 0.40

BEP (rupees) = 10,00,000 ÷ 0.40 = 25,00,000 as calculated above.

1.3.4 Break Even Point as a Percentage of Capacity

Many a time it may be required to compute the BEP as a percentage of the capacity. In this case we need to know additional information about the estimated capacity (units)/ budgeted sales. Assume in the Example 2 above the budgeted income from an ECG equipment is Rs. 40,00,000/- which correspond to the estimate usage of 40,000 times at the assumed selling price of Rs. 100/-. We can summarize the data as under :

a)	Estimated budgeted sales	Rs. 40,00,000
b)	Estimated usage in units	40,000 times
c)	Actual sales at BEP	Rs. 25,00,000
d)	Actual sales units at BEP	25000 nos.
e)	Fixed cost	Rs. 10,00,000
f)	Selling price	Rs. 100
g)	Unit variable cost	Rs. 60
h)	Unit contribution 100 – 60	Rs. 40
j)	Total contribution 40 × 40000	Rs. 16,00,000

BEP (% of capacity) = (BEP (units)/Sales (units)) × 100

= (25000 ÷ 40000) × 100 = 62.5 %. Also

= ((Actual sales at BEP) ÷ (Estimated Budgeted Sales)) × 100

= (25,00,000 ÷ 40,00,000) × 100 = 62.5%

This can also be expressed in a simple formula as under:

BEP (% of capacity) = (Fixed Cost) ÷ (Total contribution) × 100 ... (6)

= (10,00,000) ÷ (16,00,000) × 100 = 62.5 %

Thus you have seen that in the above examples we have calculated the BEP in terms of number of units of sales in rupees term and as a percentage of Budgeted sales or estimated number of units i.e. as a percentage of capacity over a period of time usually a year. Now we will solve Example 2 by means of chart.

1.4 CHART APPROACH

A graphical presentation, which gives a pictorial view, is far more quickly and easily understood by the senior manager whose time is at premium. A break even chart is thus a convenient tool of BEP analysis. The chart basically consists of drawing a two dimensional chart showing costs and revenues Y-axis (vertical) on and volumes on the X-axis (horizontal). We will plot the above data in the chart by drawing the following as under :

a) **Sales volume lines** : Sales volumes are plotted on X-axis. Sales volumes may be expressed in rupees, units or as a percentage of capacity. Convenient equal distances are marked along X-axis to show sales volume at different activity level i.e. 0, 8,16,24,32,40 lakhs, and 0,8,16,24,32,40 in thousand of numbers. We can also mark these in percentage of sales i.e. 0,20,40,60,80,100.

b) **Cost and revenue lines** : The fixed, variable costs and revenues from sales are plotted on the Y-axis, which correspond to the activity level. These can be plotted in Rs. lakhs from Rs. 0 to Rs. 40 lakhs. A similar vertical line may also be drawn on the right hand side of the chart to complete the square.

c) **Fixed cost line** : As the fixed cost does not change in value it becomes a horizontal line parallel to the X-axis at the fixed cost point. In an alternative form this can be drawn marking fixed cost on both sides of the variable cost line and joining the same. The fixed cost is Rs. 10,00,000 (10 lakhs). This can be represented by 10 units.

d) **Variable cost line** : This line can be drawn starting from the origin i.e.point (0,0) rising upto the total variable cost marked on the right hand side corresponding to the budgeted sales in Rs./units. In our case this value is Rs. 24,00,000/- at Rs. 40,00,000 sales/40,000 units. Alternatively the start point of this would be above the fixed cost line and end point Rs. 10 lakhs + Rs. 24 lakhs = Rs. 34 lakhs.

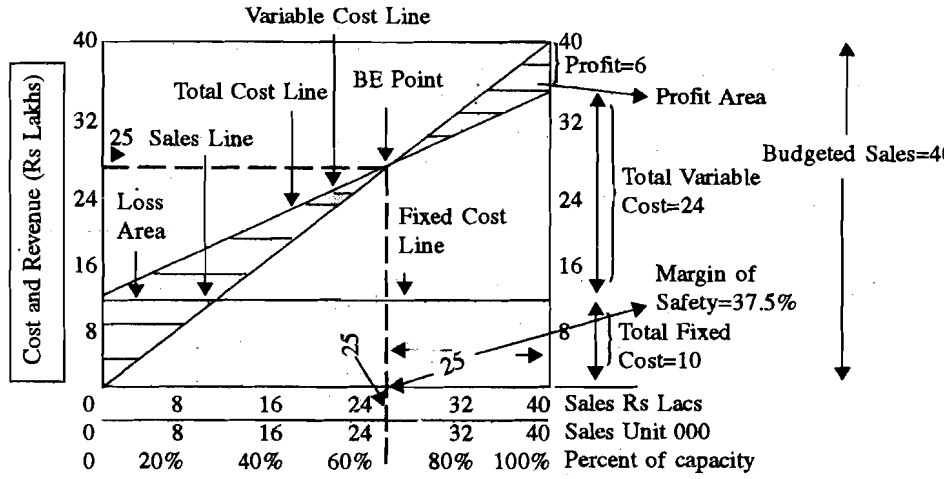
e) **Total cost line** : As the total cost represents sum of fixed and variable costs, this can be drawn either by drawing the variable cost line first and the marking fixed cost over it on both left hand and right hand side or drawing the fixed cost line first and then marking variable cost (0) on the left hand side and Rs. 24,00,000 on the right hand side. In both the cases the final line would be the same. LHS Rs. 10,00,000; RHS 10,00,000 + 24,00,000 = Rs. 34,00,000.

f) **Sales line** : As the name suggests this line shows sales revenue on the Y-axis plotted against the volume at the X-axis. In our case the line will start from the origin and join on the right hand Y-axis at budgeted sales; in our case this is Rs. 40,00,000.

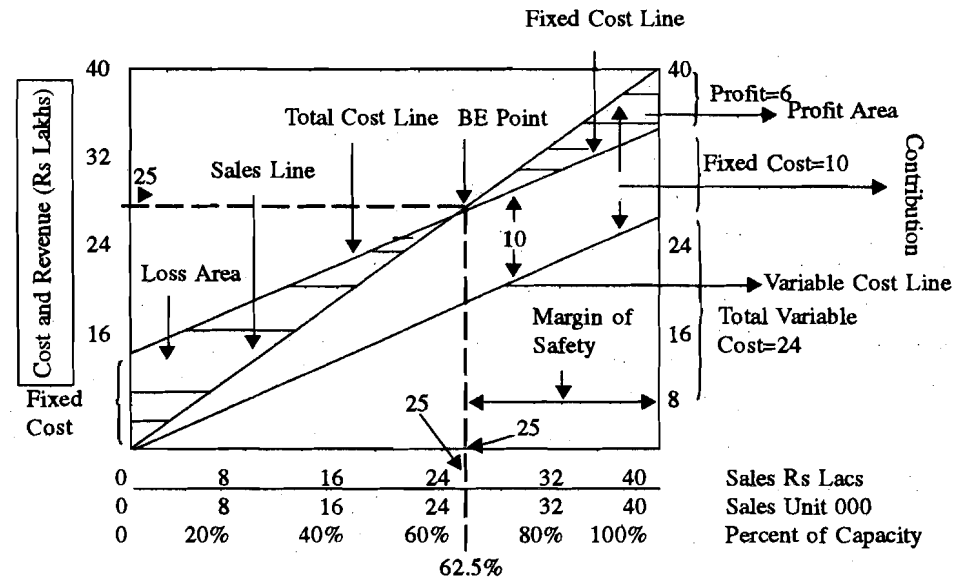
g) **Profit** : The difference between the Sales Revenues and the Total Cost is profit. It would be seen the sales and the total cost lines intersect. At the point of intersection the value total cost is equal to sales revenue thereby meaning that the profit at this point is zero. This is thus the BE point. The BE point can be scaled and easily seen in terms of rupees, units or percentage of capacity.

h) Both alternative forms of charts have accordingly been drawn below.

Alternative Chart 1 with Variable Cost above the Fixed Cost Line



Alternative Chart 2 with Fixed Cost Line above the Variable Cost Line



It would further be seen from these charts that before the BE point the total cost line is above the sales revenue line meaning thereby that the cost is more than the revenue hence there is loss upto this point. However beyond this the sales revenue line is above this point hence there is profit beyond this point. The area on the left of the break even point is the "Loss area" while to the right there is profit area. A comparison of both the alternative charts would indicate that there is no changes in the sales line, total cost line and break even point. Only the fixed and variable cost lines have changed. It would also be noticed that in addition it also indicates the value of contribution at different levels of sale. At BE point the contribution is equal to the fixed cost.

1.5 MORE ON BREAK EVEN ANALYSIS

In examples 1 and 2 consolidated figures for the fixed and variable cost have been given. This was to present a simplified understanding of the break even analysis. Now we will examine the same example in greater detail nearing the practical problems. The same data has been detailed as under:

S.No	Description	Rs.	Rs.	Rs.
1)	Estimated Sales	40,000 units @ Rs. 100		40,00,000
2)	Variable Costs	a) Direct materials	8,00,000	
		b) Direct labour	10,00,000	
		c) Consumption of electric power in manufacturing (E)	3,00,000	
		d) Commission on sales (C)	3,00,000	24,00,000
3)	Fixed Costs	a) Factory rent (R) @ 30,000 pm	3,60,000	
		b) Depreciation (D)	50,000	
		c) Fixed Administrative charges i/c insurance and maintenance (FA)	5,90,000	10,00,000

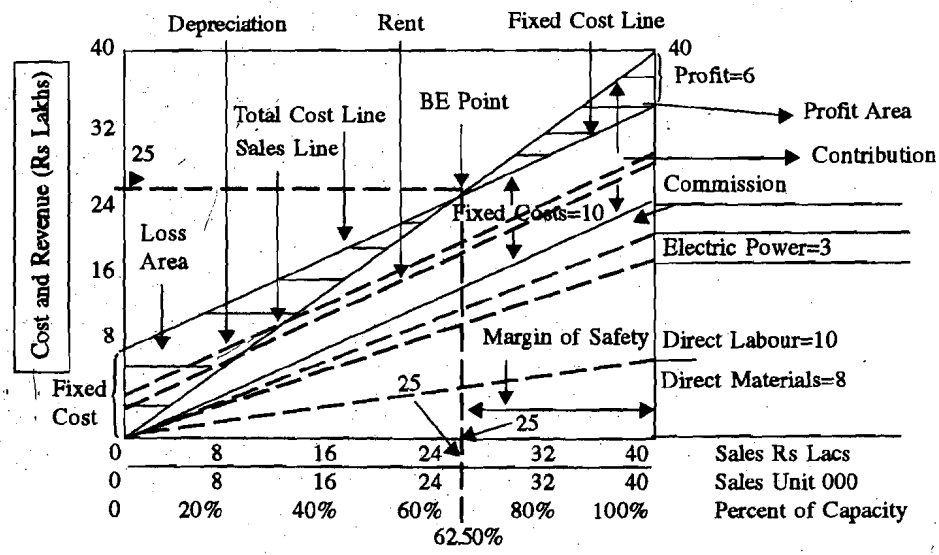
We shall draw a detailed BE chart by the following steps:

a) Draw the sales line as done in the earlier at alternatives 1 and 2

b) Mark variable costs on the Y-axis one over the other and join these points to the origin. The top most line will become the total variable cost line as before.

c) On both sides of the variable cost line mark fixed costs one above the other and join these points. The resultant line would become the total cost line and would intercept the sales line at BEP. This detailed chart 3 is given below :

Chart 3



Even though as expected there is no change in the BE point but detailed graphical presentation gives a direct appreciation of the breakup of costs. You would observe that the above chart shows separate lines for every individual cost and effect of each on the final fixed and variable cost and total cost. On examining this BE chart a manager would visualize the various costs. For instance a reference to the graph he may think of having an own building rather than to go on paying high rent or he may consider to cut down the direct labour or direct materials cost. Additionally the chart above also shows the following:

a) **Profit** : This is indicated by the intercept between the total cost line and the sales line. It would also be seen that before the BEP there is no profit and the profit zone starts only from this point onwards. In case of the above chart the profit in lakhs is 6. By actual measurement you can read the profit at any sale level. It would be observed from the chart that in order to increase the profit, either the sales line should be higher or the total cost line should be lower or a combination of both.

b) **Contribution** : The value of contribution, which is represented by the intercept between the sales line and the variable cost line. A closer look would also indicate that this value is equal to the total fixed cost plus the profit. At BEP this value is equal to the total fixed cost. This has already indicated in the formula approach.

c) **Margin of safety** : The excess of actual or budgeted sales over the break even point is known as margin of safety. In case of the above chart equal to 40,000 – 25,000 = 15000 units, which correspond to Rs. 15,00,000 of sale and 100 – 62.5 = 37.5% capacity. This value is indicative of the extent to which the sales may fail before the firm suffers a loss. It therefore follows that larger the margin of safety, safer would be the firm. In order to increase the margin of safety, it would be seen from the chart above that the BEP be lowered for which again either the sales line should be higher or the total cost line should be lower or a combination of both.

Break Even Analysis for a Target Profit

As already explained, at the BEP the profit is zero. The difference between the sales in excess of the break even sales and the variable cost is the organisation profit. The reason is that the total fixed cost has already covered at break even point; therefore, any extra sales will simply add to the profit (after deducting variable costs). This can also be seen from the charts above that the profit is the vertical distance between the sales line and the total cost line is the profit and at the BEP it is zero. It would also be seen from the chart that Fixed cost + Profit = Contribution.

This equation can be written as under:

Contribution = Fixed cost + Profit

Sales volume × Contribution ratio = Fixed cost + Profit

$$\text{Therefore, Sales Volume (to earn desired profit)} = \frac{\text{Fixed cost + Profit}}{\text{Contribution ratio}}$$

Thus, if the desired profit is to be achieved we can apply the above formula to calculate the same. In our previous example the profit as seen from the chart is Rs. 6 lakh i.e. Total sale – Total cost = 40 – (24+10) = 6. Suppose we target a profit of Rs. 10 lakhs, what should be the increased sales; various cost remaining the same.

Solution

Sale price per unit	=	Rs. 100/-
Variable cost per unit	=	Rs. 60/-
Unit contribution	=	100 – 60 = 40
Contribution ratio	=	$\frac{\text{Unit contribution}}{\text{Sale price}}$ 40 ÷ 100 = 0.40
Fixed cost	=	Rs. 10 lakhs
Sales volume	=	$\frac{\text{Fixed cost + Profit}}{\text{Contribution ratio}}$ (10+10) ÷ 0.4 = 50 i.e. Rs. 50 lakhs

Thus instead of a sale of Rs. 40 lakhs with a profit of Rs. 10 lakhs in the previous case, the sale should be Rs. 50 lakhs for a target profit of Rs. 10 lakhs. This corresponds to a sale of 50000 units instead of 40,000 units in the previous case. The sales must be increased by ((50 – 40) ÷ 40) × 100 = 25%.

Let us now check the above

Total Sale amount for 50,000 units @ Rs 100/- per unit	=	50,00,000
Fixed cost	=	10,00,000

Variable cost for 50,000 units @ Rs 60/- per unit = 30,00,000

Total Cost = fixed cost + variable cost = 10,00,000 + 30,00,000 = 40,00,000

Profit = Total Sale amount – Total cost = 50,00,000 – 40,00,000
= 10,00,000 i.e. Rs. 10 lakhs

Exercise 1

With the revised data of sales draw a BE chart to indicate

a) Cost and sales line

b) BEP in terms of units, rupees, as percentage of sales

c) Profit and loss zones

d) Profit

e) Contribution

f) Margin of safety

Thus we have learnt how to apply break even analysis to determine the sale so as to achieve target profit costs and sales price remaining unchanged. Now we will foresee a situation where it is not possible to increase the production i.e. 40, 000 units and cost and target profit is to be achieved. It now required to determine the Sale price to achieve a profit of Rs. 10/- lakhs.

Solution

Variable cost per unit = Rs. 60/-

Variable cost for 40,000 units @ Rs. 60/- each = 40,000 × 60 = 24,00,000 i.e. 24 lakhs

Fixed cost = Rs. 10 lakhs

Total cost = 24 + 10 = 34 lakhs

Target profit = Rs. 10 lakhs

Total sales = total cost + profit = 34 + 10 = 44 lakhs. Therefore sale price = 44,00,000 ÷ 40,000 = 110 i.e. Rs. 110/- each. The selling price should be increased by 10% to get a target profit of Rs. 10 lakhs.

Thus it would be seen that for the same target profit, the number of units had to be increased by 25% in the first case and the same has been achieved by only 10% increase in the selling price. Increase in selling price does increase the profit faster but the price is determined by the market forces and at higher price the product may not sell.

1.6 A CASE STUDY FOR INSTALLATION OF A NEW FACILITY IN A NURSING HOME BY BREAK EVEN ANALYSIS

A nursing home plans to install ultra sound equipment in their existing complex but have to construct an extension of the building. They have planned to take loan from the bank, purchase and install equipment, recruit staff for this facility. The current price for this test in the area is between Rs. 400-450/-. After studying the various aspects the following data emerges:

S.No	Description	Amount Rs.	Remarks
1)	Cost of equipment	500000	Including installation
2)	Cost of extension of the building	500000	Extension on existing land
3)	Cost of new furniture	30000	
4)	Salary of staff and other incidentals	300000	

5)	Loan from the bank	1050000	
6)	Yearly installment of loan	200000	
7)	Rate of depreciation per year (equipment)	20%	
8)	Rate of depreciation per year (building)	2%	
9)	Rate of depreciation per year (furniture)	15%	
10)	Other incidentals; property tax, maintenance of equipment, building, furniture and administrative expenses.	300000	
11)	Average number of tests that may reasonably be expected to be carried out per day	12	
12)	Average working days in a year	275	
13)	Market price per test	400-450	
14)	Cost of electricity per test	50	
15)	Other consumable and stationery per test	50	
16)	Targeted profit after tax	200000	
17)	Tax rate	20%	

It is proposed to charge @ Rs. 400/- per test. It is required to examine if the price planned is feasible. If not what should be the price per test.

Solution

	Fixed Costs			
1)	Yearly installment of loan	200000		
2)	Depreciation equipment 5,00,000 @ 20%	100000		
3)	Depreciation building 5,00,000 @ 2%	10,000		
4)	Depreciation furniture 30000 @ 15%	4500		
5)	Other incidentals; property tax	300000		
6)	Salary of staff and other incidentals	300000		
	Total Fixed Cost	**914500**		
	Variable Costs			
1)	Cost of electricity per test	50		
2)	Other consumable and stationary per test	50		
3)	Variable cost per test (1) + (2) above	100		
4)	Total number of test per year = no. of test per day × average working days =12 × 300 = 3600	3600		
5)	Total Variable Cost = (3) × (4)	360000		
	Profit			
1)	Targeted Profit after tax	200000		
2)	Profit before tax = 200000 ÷ (1 – 0.2) = 250000	250000		
	Sales Revenue			
1)	Proposed charges per test	400		

Contribution per test = proposed charges per test – variable cost per test = 400 – 100 = 300

Total contribution = contribution per test × No. of tests proposed = 300 × 3600 = 1080000

Fixed cost + proposed profit after tax = 914500 + 250000 = 11,64,500

Against the above figure of 11,64,500, the total contribution expected is only 10,80,000 thus there is a shortfall of 11,64,500 – 10,80,000 = 84500/-

It is seen that the proposals falls short of the expectation and requires additioffal revenue of Rs. 84500/-. This can be met by increase in the proposed price per test. This increase is = 84500 ÷ 3600 = 23.47 say Rs. 24/-

Therefore, the proposed price per test = 400 + 24 = 424/-

Let us now find out the BEP.

BEP units = (Total Fixed Costs)/((Selling price) – (Variable costs per unit)) ... (1)

= (Total Fixed Costs)/(Unit Contribution) ... (2)

With the increase in the price to Rs 424, the unit contribution would be 424 – 100 = 324

Therefore, BEP units = 914500 ÷ 324 = 2882 nos. Thus after carrying 2882 tests the Nursing home would be breaking even i.e. at no profit, no loss situation. This would incidentally after 2882 ÷ 300 = 9.6 months after the yearly plan of 300 test per year.

You are now required to find:

a) BEP in rupee term.

b) BEP as a percentage of capacity.

c) Draw a BEP chart and verify.

1.7 A CASE STUDY FOR COMPARISON OF TWO PLANS FOR RUNNING OF A DIETARY SERVICE IN A HOSPITAL

Break even analysis is a simple tool for financial analysis so as to make a right decision in business proposals when more than one alternative is available. Here is a case study for a hospital that wants to run dietary service by constructing an extension to the existing building. The management has visualized two practical options as under:

a) Purchase, install and maintain costly kitchen equipment with completely running the catering. The furniture and building including its maintenance has also be carried out by them. Further they plan to take loan from a bank and pay fixed annual repayment that includes interest and return of principal.

b) Get into a contract with a firm who is willing to install the kitchen equipment (including the cost of the equipment and cost of installation) and maintain it in good working condition at a fixed commission per meal. The hospital will however make provision of building, furniture including its maintenance as in the previous option.

The problem has to be analysed by break even analysis to select the better option financially.

The data and calculation of profit in both the cases is given in the following tables:

Option 1

S.No.	Description Plan 1	Amounts	Fixed costs	Remarks
1)	Cost of kitchen equipment	5,000,000		
2)	Depreciation of kitchen equipment @ 15% per year		750000	

3)	Cost of extension of the building	1,000,000		
4)	Depreciation of building cost @ 2% per year		20000	
5)	Cost of new furniture	200000		
6)	Depreciation of furniture cost @ 2% per year		30000	
7)	Loan from the bank	7500000		
8)	Yearly installment of loan		1000000	Includes interest and principal
9)	Salary of maintenance staff for equipment	2000000	200000	
10)	Salary of maintenance staff for building	1000000	1000000	
11)	Salary of cooks, waiters and other kitchen staff	1200000	1200000	
12)	Administrative charges	60000	60000	
	Total Fixed cost		**4,260,000**	
	Variable costs		**Variable costs**	
1)	Cost of materials per meal		20	
2)	Cost of electricity, water etc.		3	
			23	
3)	Sale price per average meal = 55	55	**55**	
	Contribution			
1)	Contribution per meal = 55 – 23		32	
2)	Average No. of meals per day = 450			
3)	Total contribution per year = 32 × 450 × 365 =		5,256,000	
	Profit before Tax			
1)	Profit = Total Contribution – fixed cost			
	4260000 – 5356000		996,000	
2)	Tax rate = 30%			
3)	Tax = 996000 × 0.30 =		298,800	
4)	Net profit after tax = 1374750 – 41425=		**697,200**	

Option 2

S.No.	Description Plan I	Amounts	Fixed costs	Remarks
1)	Cost of kitchen equipment	0	0	being supplied by the contractor
2)	Depreciation of kitchen equipment @ 15% per year	0	0	Contractors' equipment
3)	Cost of extension of the building	1,000,000		
4)	Depreciation of building cost @ 2% per year		20000	

5)	Cost of new furniture	200,000	
6)	Depreciation of furniture cost @ 2% per year		30000
7)	Loan from the bank	1,200,000	
8)	Yearly installment of loan		160,000
9)	Salary of maintenance staff for equipment	0	0
10)	Salary of maintenance staff for building	1000000	1000000
11)	Salary of cooks, waiters and other kitchen staff	1200000	1200000
12)	Administrative charges	40000	40000
	Total Fixed cost		**2450000**

	Variable costs		**Variable costs**
1)	Cost of materials per meal		20
2)	Cost of electricity, water etc.		3
3)	Payment per meal to the equipment contractor		10
4)	Total variable cost per meal		**33**
	Contribution		
1)	Sale price per average meal = 55	55	**55**
2)	Contribution per meal = 55 – 23		**22**
3)	Average No. of meals per day = 450		
4)	**Total contribution per year = 22 × 450 × 365 =**		**3,613,500.00**

Profit

Profit before tax = Total contribution – Fixed cost = 1,163,500.00

3613500 – 2450000

Tax rate = 30%

Tax = 1153500 × 0.30= 349050

Net profit after tax = 1374750 – 41425 = **814,450.00**

Summary

	Option 1	Option 2	
Loan from bank	7500000	1200000	
Profit after tax	697,200	814450	
Maintenance of equipment	hospital	contractor	Clearly option 2 is more profitable and logical better option.

Thus we have seen that by break even analysis we can come to logical financial conclusions.

1.8 LET US SUM UP

The break even analysis is a most widely form of cost volume profit analysis. It indicates the level of sales at which the total revenues are equal to the total costs. For the purpose of this analysis the various costs are divided in two parts i.e. fixed costs and the variable costs. The fixed costs are the costs that cannot be avoided and are essential for the business. These remain fixed irrespective of the changes in the volume i.e. the number of units of goods produced such as rent, insurance etc. Variable costs are expenses, which changes in direct proportion to the changes in volume of production like raw materials etc. For every unit of goods produced the sale/activity generate revenue and the difference of the price minus variable cost is called unit contribution. The following simple equations lead to its determination applications to study cost, volume and profit analysis:

Unit selling price – Unit variable cost = Unit contribution

Unit contribution × units sold = Total contribution

Total contribution = Total fixed cost + Profit

At BEP the profit is zero and hence at this point, Total contribution = Total fixed cost. This is known as the formula approach.

Apart from the formula approach the financial analysis can be effectively presented in chart form for easy understanding. A BE chart essentially consists of (a) Sales line, (b) Fixed costs line, (c) Variable costs line. The chart also shows BEP (no profit, no loss point), loss area, profit area, contribution, and margin of safety. Thus a chart becomes specific technique of studying and presenting the inter-relationship between costs, volumes and profits. It is an efficient and effective method of financial reporting and planning and easily understood by the senior executives when compared to accounting data.

You would have also persued two case studies specific to a hospital and learnt how:

- to determine the level of sales needed to be achieved to avoid losses;
- to determine sales level required to earn a target profit;
- to determine sale price needed to avoid losses; and
- to determine further BEP with the changed conditions to avoid loss.

The break even analysis is based on certain assumptions like variable per unit remaining constant and thus being directly proportional to the manufacture or other business activity. Also the cost should be separated into fixed and variable costs. The selling price is also assumed to be constant and the fixed cost remaining fixed. These assumptions may not be valid as the situation may go on changing. Hence constant reviews are necessary. The breakdown of various costs must also be done with great care to represent the actual position. As a final word of caution the decision making cannot be based on this analysis alone in view of the limitations mentioned above.

1.9 EXERCISES FOR THE STUDENTS

Exercise 1

The following data has been collected after analysis of the accounts of a manufacturing firm:

S.No.	Description	Amount (Rs.) (breakup)	Amount (Rs.) (total)
1)	**Sales**		**2000000**
	Variable Costs		
1)	Raw materials	600000	

2)	Direct labour	600000	
3)	Electric power for manufacturing	60000	
4)	Commission for sales	40000	
5)	Total Variable cost		**1300000**
	Contribution = Sale – Variable costs		**700000**
	Fixed Costs		
1)	Rent	60000	
2)	Administrative expenses	100000	
3)	Total Fixed cost		**160000**
4)	Net profit before tax = Contribution – fixed cost		**540000**

You are required to compute:

a) Contribution ratio

b) BE point

c) Revised BEP, contribution ratio and profit due to planned modernization which requires an increase in the fixed cost by Rs. 40000/-. Also as a result of this modernization, the firm is expected to decrease its cost of electricity for manufacturing process by 20% and direct labour by 30%.

d) Draw BEP chart in both cases and mark the BEP in rupees and as a percentage of sales. Also mark profit and loss zones, contribution and margin of safety.

Exercise 2

Two firms A and B, deal in identical diagnostic equipment in the same market. Their budgeted profit and loss accounts for the same year are as follows:

S.No.	Description	Amount (Rs). (breakup)	Amount (Rs.) (total)	Amount (Rs.) (breakup)	Amount (Rs.) (total)
1)	**Sales**		600000		600000
	Costs				
1)	Variable costs	400000		360000	
2)	Fixed costs	50000	450000	90000	450000
	Net Profit = total sales – total cost		150000		150000

You are required to:

a) Calculate the BEP for each firm

b) State what shall be the effect on the profits with increase in demand by 10% and decrease in demand by 10%.

c) Draw BEP charts with changed conditions.

UNIT 2 PREPARATION OF FINANCIAL STATEMENT

Structure

2.0 OBJECTIVES

After going through this unit of practical manual you should be able to:

- gain more knowledge about the main financial statements i.e. Balance Sheet and Profit and Loss statement;
- prepare and present above statements in a prescribed manner with a given data; and
- interpret the above statements.

2.1 INTRODUCTION

During the course of your studies, you must have learnt about the importance of the Financial Statements or accounting reports. You must have also learnt about the two most important financial statements namely:

i) Balance sheet (or the statement of financial position)

ii) Profit and loss account (or income statement)

In this unit you will firstly be made to revise the basic concepts and theory and then to work on practical exercises. This will enable you to prepare, present and interpret these statements in the course of your professional duties as managers. The purpose of this unit is essentially to help you prepare for the actual application of the theory in practical form.

2.2 BROAD CONCEPT OF BALANCE SHEET – ASSETS AND LIABILITIES AND OWNER'S EQUITY

Balance sheet is one of the most significant financial statements. It indicates the condition or state of a business at a particular point of time. The Balance sheet contains information about the resources and obligations of a business entity and about it's owner's interest in the business at a particular point of time. Even though the balance sheet can be made for any date, these are normally made annually as on year ending 31 March to cover the accounting period of the financial year. It is a formal statement of presentation of Assets, Liabilities and Net Worth of the business firm. These are briefly explained in subsequent paragraphs for revision before taking up practicals.

Assets

These are economic resources of an organisation capable of being measured in monetary terms. These are cash, money claims, marketable securities, stock of materials, land, buildings, equipment, furniture, investments and even patents, goodwill, copyrights etc. You will learn more about it as you proceed.

Liabilities

These are economic obligations of an organisation to pay cash or to provide goods or services in some future period. These are creditors, bills payable, wages and salaries payable, interest payable, taxes payable, bonds, debentures, if issued by a corporate hospital, borrowings from banks and financial institutions. You will learn more as you proceed.

Owner's Equity

The financial interest of the owner in monetary terms is called owner's equity. Owner's equity represents owners claims against the hospital as an entity as of the balance sheet date. This is the difference of the assets minus liabilities. Initially owner(s) equity arises on account of the funds invested by the owner(s). But it changes due to the earnings of the hospital and their distribution. The owner's equity will increase when the hospital makes earnings and retains whole or part of it. If there are losses owner's equity (claim) will be reduced. It also known as Net worth of the organisation. In case of the hospital is registered with a company the owners of the organisation are called shareholders and the owner's equity is referred to as "Shareholders' Equity" or "Shareholders' Fund" or "Capital" or simply as "Share Capital".

Shareholder's equity has two parts as under:

a) **Paid up share capital** : Paid up share capital is the amount of funds directly contributed by the shareholders. If shareholders are actually required to pay more than the stated or par value of the share, the amount is separately shown as "share premium". The paid up share capital is shown unchanged in the balance sheet.

b) **Retained earnings or Reserve and surplus** : This is the difference between total earning to date and total amount dividends to date. This represents total undistributed earnings. This part is changed while making a balance sheet.

The broad concept of balance sheet derives from the equation,

$$TA = TL + OE \text{ or } TA - TL = OE$$

$$OE = SF + RS$$

Where, TA = Total assets

TL = Total liabilities

OE = Owner's equity

SF = Shareholder's fund

RS = Reserve and surplus

Thus in a balance sheet you have to balance both sides by the application of the above

equations. A balance sheet always presents liabilities and owners equity on one side and the assets on the other side. The assets are as accounted for in the books at a point of time (when the balance sheet is being made) and to balance both sides, the "Reserve or Surplus" part of the owner's equity or capital is changed.

You will learn more about the same while actually preparing balance sheet later.

2.3 BROAD CATEGORIES OF ASSETS AND LIABILITIES

In order to make and interpret a balance sheet it is important to understand the nature of assets and liabilities.

The assets are classified as current assets and long-term assets as given below:

a) **Current Assets** : These are sometimes also called liquid assets and are either held in the form of cash or are expected to be converted into cash within the accounting period. These are as under:

   i) *Cash* : Actual money in hand and cash deposit in bank accounts.

   ii) *Marketable Securities* : A firm usually invests in marketable securities when in temporary surplus in cash. These are units of Unit Trust of India, or any Mutual fund, which can be converted into cash within the accounting period.

   iii) *Book Debt (or account receivable)* : These are the amounts due from debtors (customers) to whom the goods or services have been sold on credit and are realizable within the accounting period; examples: health care contracts carried out for an organisation and payment is expected within the accounting period.

   iv) *Bills Receivable* : These represent the promises made in writing by the debtors to pay definite sums of money after some specified period of time. Bills are written by the firm and become effective when accepted by the debtors; examples: payments to be made by the organisation every month by say 7th.

   v) *Stock (inventory)* : These include stock of goods kept for serving the customers; examples : stock of medicines, bandages and other consumables required for the patients and for maintenance etc.

   vi) *Prepaid Expenses and Accrued Income* : Prepaid expenses are the expenses of future period paid in advance; examples: prepaid insurance, prepaid rent or taxes in advance. Accrued incomes are benefits that the hospital has earned but they have not been received in cash; examples: pending claims from insurance, accrued interest from the bank etc.

   vii) *Loans and Advances* : These include dues from employees or associates, advances for current supplies and advances against acquisition of capital assets. Except for the advance payment for current supplies, for advances given for purchase of machinery or x-ray items, etc., it is not proper to include loans and advances in current assets.

b) **Long-term Assets** : These are held for a period longer than the accounting period. These are held for the use of business, and are not for the purpose of sale. These are given below :

   i) *Fixed Assets* : These are tangible fixed assets, which include land, building, equipment and furniture etc. These are normally recorded at cost price. As these assets are allocated a fixed life, the value goes on reducing every year. The reduction in amount is called depreciation, which is accounted for every year in the balance sheet.

   ii) *Intangible Assets* : These include patents, copyrights, trade names, if any, and goodwill. Cost of intangible is amortized over their useful life. That is to say these too are reduced every year or in some case like goodwill may enhance every year.

iii) *Gross Net Block* : The term Gross Net Block is used to represent the original of the total fixed asset minus accumulated depreciation. This is thus depreciated cost.

iv) *Long-term Investments* : These represent firms investments in shares, debentures and bonds of other firms or Government bodies for profit and control. These investments are held for a period greater than the accounting period. Usually these are shown at the original cost.

v) *Other Assets* : All other assets, which cannot be included in any of the above categories, are grouped as other assets. Prepayments of services or benefits for a period longer than accounting come in this category and includes advertising expenditure and preliminary expenses etc.

The liabilities are classified as current liabilities and long-term liabilities as given below.

a) **Current Liabilities** : These are debts payable within the accounting period; examples : creditors, bills payable, bank overdraft, outstanding expenses and incomes received in advance. These are as under:

i) *Sundry Creditors* : These represent current liability towards all kind of suppliers from whom purchases have been made. This liability is shown in the balance sheet till payment has been made to the creditors.

ii) *Bills Payable* : These are promises made in writing by the firms to make payment to the creditors at some specific date. Bills are raised by the creditors on the firm and become payable once accepted by the firm. Bills payable have a life less than one year. Therefore, they are shown as current liabilities.

iii) *Bank Borrowing* : Amount borrowed by the firm for a short-term to be paid within the accounting period.

iv) *Provisions* : These include provision for taxes, dividend etc. to be paid during the accounting period. The taxes are calculated and provided for as a short-term liability.

v) *Expenses Payable and Income Received in Advance* : These include provision of wages, rent, commission which is payable within the accounting period. Also organisations can sometimes receive income in advance for services to be supplied. For example, payments made by clients on account of corporate health coverage for an accounting period, the services for which will be rendered in due course. As goods and services have to be provided within the accounting period, such receipts are shown as current liabilities in the balance sheet. Long-term loans are repayable periodically. The portion of loan which has is repayable within the accounting period will form part of current liability.

b) **Long-term Liabilities**: These are some-times also called fixed liabilities and are the obligations or debt payable in a period of time greater than the accounting period as under:

i) *Debentures or Bonds* : When the organisation has to raise large sum of money as debt from the public, it issues "debentures" or bonds. In health services this is a relatively less utilised practice. Interest on these has to be paid by the organisation and principal has to be returned as per the agreement. This is to be accounted for as long-term liability. The portion of the interest to be paid during accounting period will be shown as short-term liability.

ii) *Secured Loan or Mortgages* : These are long-term borrowings with fixed assets, say some building or equipment pledged as security. Mortgages are shown as secured long-term liabilities in the balance sheet.

2.3.1 Exercise 1 : To Distinguish between Assets and Liabilities

You should now be able to distinguish between the assets and the liabilities. In the table given below you may please identify, the asset and liabilities and indicate whether these are classified as long term or short term categories. A few columns have been filled. You may fill in the remaining.

	Description	Asset	Liability	Long Term	Short Term
1)	Actual money in hand	yes			yes
2)	Cash deposit in bank accounts	yes			yes
3)	Amount due from an organisation whose employees have been given medical treatment	yes			
4)	Stocks of medicine, maintenance and other consumable stores	yes		yes	
5)	Insurance which has been prepaid				
6)	Rent paid in advance				
7)	Advance tax paid	yes			yes
8)	Provision of tax		yes	yes	
9)	Accrued interest not yet received				
10)	Accrued dividend on mutual funds and shares etc.	yes			
11)	Commission payable				
12)	Overdraft from the Bank		yes		yes
13)	Advance payment made for supply of medicines, and consumable stores		yes		
14)	Supplies received from suppliers but		yes		yes
15)	Land, building, medical equipment,				
16)	Portion of long-term loan payable within the accounting period				
17)	Mortgaged assets to secure loan from the financial institutions				
18)	Portion of long-term loan payable		yes	yes	
19)	Amount spent on advertisement				
20)	Amount spent on stationery and stamps				
21)	Patents				
22)	Long-term investments in shares				

2.4 TYPES OF BALANCE SHEETS

There are two types of balance sheets namely "Accounts Form" and "Report Form". In the account form, the balance sheet has two sides i.e. Left Hand Side and Right Hand Side. The standard format is shown below:

It would be noted that the column reserves and surpluses is shaded and will have to be calculated as per the basic equation given in paragraph 2.2 to make Total Liabilities and Equity = Total Assets.

Account Form Balance Sheet					
XYZ Hospital As on 31 March 2000					
	Sch*	Rs.000		Sch*	Rs.000
Equity and Liabilities			Assets		
Share Capital			Fixed Assets		
Reserves and Surplus			Less Depreciation		
			Net Block		
Long-term Liabilities			Investments		
Current Liabilities and Provisions			Current Assets		
			Other Assets		
Total Liabilities & Equity			Total Assets		

In the report form the format is changed to give a logical sequence to show the Sources of Funds followed by the Application of Funds. In this statement you would list out, on the basis of the information in the balance sheet, where your money come from (sources of funds) and where was this money utilised (uses or application of funds). This structure is as under:

Report Form Balance sheet		
XYZ Hospital As on 31 March 2000		
	Sch*	Rs.000 (in thousands)
I) Sources of Funds		
Shareholders Funds		
1) Share Capital		
2) Reserve and Surplus		
3) Long-term Liabilities		
Total of 1 + 2 + 3		
II) Application of Funds		
1) Fixed Assets		
2) Less Depreciation		
3) Net Block		
4) Investments		
5) Current Assets		
6) Current Liabilities and Provisions		
7) Net Current Assets 5 – 6		
Total 3 + 4 + 5 + 6		

2.4.1 Exercise 2 : Preparation of a Balance Sheet in Account Form

We will now prepare a balance sheet in account form with the following data:

		Sch	
	Share Capital (SF)	1	
	100000 Shares issued @ Rs 10/- paid up each share		**1000000**
	Long-term Loan	2	
a)	Debentures issued for expansion (unsecured)		100000
b)	From Financial Institutions (bank)		100000
	Total of Long-term loan		**200000**
	Current liabilities and provisions	3	
a)	Provision for interest on debentures		30000
b)	Provision for interest on bank loan		30000
c)	Sundry creditors for goods and services		20000
d)	Provision for unpaid wages and rent		20000
e)	Provision for dividend		60000
f)	Provision for unclaimed dividend		20000
g)	Provision for bank overdraft		30000
	Total of current liabilities and provisions		**210000**
	Long-term Assets	4	
a)	Land, building, equipment and furniture		1500000
b)	Depreciation	5	-150000
c)	Net Block a-b above		**1350000**
d)	Investment in long-term mutual fund		75000
	Total of Long-term Assets		**1425000**
	Current Assets	7	
a)	Cash in hand		10000
b)	Cash in bank		100000
c)	Units of UTI encashable within the accounting period		50000
d)	Book debt from ABC company for health check up of its Employees		50000
e)	Advance tax paid		80000
f)	Accrued interest on investments		12500
	Total of Current Assets		**302500**

It would be seen that the item of reserve and surplus does not figure in the data. This has to be calculated from the basic equation

$$RS = TA - TL - SC$$

Where, TA = Total assets = 1425,000 + 302,500 = 1727,500

TL = Total liabilities = 200,000 + 210,000 = 410,000

SC = Share capital = 1000,000

Hence Reserve and surplus = RS = 1727,500 – 410,000 – 1000,000 = 317,500

Account Form Balance Sheet					
XYZ Hospital					
As on 31 March 2000					
	Sch*	Rs.00		Sch*	Rs.00
Equity and Liabilities			**Assets**		
1) Share Capital	1	1000	1) Fixed Assets	4	1500
2) Reserves and Surplus		317.5	2) Less Depreciation	5	150
			3) Net Block		1350
3) Long-term Liabilities	2	200	4) Investments	6	75
4) Current liabilities and Provisions	3	210	5) Current Assets	7	302.5
			6) Other Assets		0
Total Liabilities and Equity 1 + 2 + 3 + 4		1727 5	Total Assets 3 + 4 + 5 + 6		1727.5

2.4.2 Exercise 3 : Preparation of Balance Sheet in Report Form

We will now reformat the above Balance Sheet in Report Form as under:

Report Form Balance Sheet		
XYZ Hospital		
As on 31 March 2000		
	Sch*	Rs.000 (in thousands)
I) **Sources of Funds**		
1) Shareholders' Funds		
a) Share Capital	1	1000
b) Reserve and Surplus		317.5
2) Long-term Liabilities	2	200
Total of (1) and (2)		**1517.5**
II) **Application of Funds**		
1) Fixed Assets	4	1500
2) Less Depreciation	5	150
3) Net Block 1-2		1350
4) Investments	6	75
5) Current Assets	3	302.5
6) Current Liabilities and Provisions	2	210
Net Current Assets 5 – 6		92.5
Total of 3 + 4 + 5 + 6		**1517.5**

* Reference to schedule which gives details of each category of asset and liability

2.4.3 Exercise 4 : Find Defects in Given Balance Sheet

From the structure of two types of balance sheets it would be seen that the essential elements of the balance sheet are:

a) Heading: This includes the name of the firm (hospital) and type of the statement and specific date to which the statement applies.

b) Listing of all assets and liabilities properly.

c) Total assets (TA) must be equal to total liabilities (TL) + owner's equity (OE)

d) The report must be Audited and signed by the management and auditors.

Given below is a balance sheet. You are required to find defects in the same.

Assets		Rs.	Liabilities and Equity		Rs.
Fixed Assets					
Land and building		1500000	Share capital		1000000
Long-term loans			Investments		500000
a) Debentures		100000	Current liabilities		70000
Loan from bank		100000	a) Creditors		20000
Current Assets		200000	b) Bank borrowing		
a) Cash			c) TDS		
b) Debtors			d) Stock		
c) Provision for tax			e) Provision of		
			Other Assets		30000
Total Liabilities		1900000	Total assets		1600000

Hint on list of defects:

1) Type of statement has not been mentioned in heading.

2) Date: The year of report has not been mentioned.

3) Assets: Shown on left hand side.

4) Liabilities: Shown on right side

5) Depreciation: Not shown and net block not calculated.

6) Long-term loan: Shown incorrectly under Assets.

Find out rest of the defects. Assume 10% depreciation complete the balance sheet.

2.4.4 Interpretation of Balance Sheet

The three important functions served by the balance sheet are:

a) It gives a concise summary of the organisation's resources (assets) and obligations (liabilities and owner's equity), it reflects the economic results and management policies.

b) It indicates the organisation's "Liquidity" i.e. hospital's ability to pay debts as these mature. That is greater the Net Current Assets (current assets – current liabilities), better will be the liquidity.

c) It indicates the organisation's "Solvency" i.e. the hospital's ability to meet its entire short and long-term debts.

For the purpose of interpretation, we should check the following:

a) Check the difference between "Current Assets" minus "Current Liabilities" also known as "Net Current Assets". This figure should be positive and greater its value better is the financial health of the organisation.

b) Compare Total of the "Share Capital" and "Reserves and Surpluses" with "Long-term Loans". In the case of the balance sheet at 2.4.1 above, the total of "Share Capital" and Reserves and Surpluses is Rs. 1317500/- and "Long-term Loans" is Rs. 200000/-. This is good position. Supposing this figure of loans was say Rs. 2000000/- this would be a cause of concern as this figure is much more than the "Share Capital" plus "Reserve and Surpluses". This means should the loans be withdrawn the firm will not be able to even clear its debts. Thus a comparatively high figure of debt compared to its assets would need rethinking on the part of the management.

Notwithstanding the above, balance gives a summary of the organisational resources and obligation. To evaluate the performance over a year's period, the figures must be compared to the last year's figures. In fact a number of Firms publish there Balance Sheet along with figures of last year's Balance Sheet. One such balance sheet is given below.

Liabilities & Equity				Assets			
Particulars	**31 Mar 99**	**31 Mar 98**	**+/–%**	**Particulars**	**31 Mar 99**	**31 Mar 98**	**+/–%**
Capital	2000	2000	0	Fixed Assets	2200	2400	–9
				Less Depreciation	200	210	
				Net Block	2000	2190	–9.5
Reserve and Surpluses	500	400	+25	Investments (at cost)	700	570	37.25
Loan Funds	500	400	–25				
Current Liabilities and Provisions	350	300	0	Current Assets	650	500	+30
Total Liabilities and Equity	3300	3200	+4.47		3300	3200	+4.47

You can now observe the differences and make some interpretations as under which could be said to be performance highlights:

Performance Highlights

a) The total assets of the firm have increased by 4.47%.

b) The reserve and surplus has increased by 25% (good performance).

c) The current assets have increased by 30% but current liabilities have not increased. Also against the current liability of Rs. 3.5 lakhs the current assets are Rs. 6.5 lakhs (more than capable of meeting short-term debts).

d) The investments of the firm have increased by 37.25% (Growing business).

e) Against a long-term loan of Rs. 5 lakhs the shareholders' funds are Rs. 25 lakhs (Good solvency position).

2.5 BROAD CONCEPT OF PROFIT AND LOSS ACCOUNT; REVENUE AND EXPENSES

Whereas Balance Sheet indicates the firm's financial strength as measured by its resources (assets) and obligations (liabilities), the earning capacity and the potential of

the summary of revenues (income), expenses and net income or net loss of a firm for a period of time; generally accounting period of one year for the period ending the financial year. It is also known as income statement.

Revenues

These represent a gross inflow of assets or gross decrease of liabilities that result from certain profit directed activities of an enterprise that change owner's equity. These are cash received or receivable from customers (patients etc. in case of a hospital), rent of a portion of building or equipment rented out, interest on deposits in the bank, dividend on investments, sale of some fixed assets (say old equipment), sale of shares held etc.

Expenses

The cost of earning revenues is called expenditure. Expenses occur when assets are consumed or liabilities are increased to produce revenues. These represent gross decrease in assets or a gross increase in liabilities that result from profit directed activities that change owner's equity. These are cost of goods consumed, salaries, managerial remunerations, interest paid or payable on loans, depreciation, taxes and other expenses.

Net Income

The amount by which the total revenue earned during the accounting period exceeds total expenses incurred during the same period is called "Net Income". If on the other hand total expenses exceed the total revenues, then the difference is referred to as "Net Loss".

2.6 BROAD CATEGORIES OF REVENUE AND EXPENSES

In order to make and interpret a Profit and Loss Statement, it is important to understand nature of Revenues and Expenses.

The revenues are some times classified as operating revenues and non operating revenues. These are explained below:

a) **Operating revenues**: These are the revenues arising from the actual operation of a business firm. In case of a hospital these would be OPD collections, fees for surgery, fees for clinical tests and other hospital charges to be paid by the patients.

b) **Non-operating revenues**: These are revenues which are incidental to the main operations of the business; examples : interest from temporary investments, sale of old equipment etc.

Like revenues, expenses are sometimes classified as operating expenses. These are given below:

a) **Operating expenses**: These are the expenses relating to the main operations of the business firm; examples : cost of stores consumed, general and administrative expenses, depreciation etc.

b) **Non-operating expenses**: These are the expenses incurred in generating the non-operating revenues.

It is also important to know about the following terms in connection with profit and loss account:

a) **Gross Profit (GP)**: This is the difference between the sales and cost of goods and services provided.

b) **Operating Profit (OP)**: This is the difference between the gross profit and the operating expenses (OExp) consisting of general and administrative and selling expenses and depreciation (DEP).

OP = GP – OExp – DEP . The operating profit is also known as Profit before interest and Tax (PBIT), which is a measure of performance of firms operations.

d) **Net Profit (NP)**: This is the profit after paying the taxes. NP = PBT – Tax.

The Account Form of Profit And Loss State has two sides i.e. the left-hand side showing Expenses and right hand side showing Revenues. The standard format is as shown below:

Account Form Profit and Loss Account	
XYZ Hospital	
As on 31 March 2000	
Expenses	**Revenues**
Cost of goods and services provided	Sales of goods and services
General and administrative expenses	Other Income
Interest on loans	
Depreciation	
Non-operating expenses	
Net Profit	
equal	equal
Appropriation	
Provision for dividend *	
Reserve and surplus	

* Dividends are paid if the hospital is a corporate entity and owners are entitled to share of profits and dividend.

2.6.1 Exercise 5 : To Distinguish and Categorize Revenue and Expenses

Based on what you have read in section 2.6, you should now be able to distinguish between Revenues and Expenses. In the table given below indicate whether these are classified as operating or non-operating. A few columns have been filled. You may fill the remaining.

Description	Revenue	Expenses	Operating	Non Operating
1) Receipts from radiology	yes		yes	
2) Interest received	yes			yes
3) Interest paid on loan		yes	yes	
4) Cost of medicines		yes	yes	
5) Depreciation		yes	yes	
6) Rent received for rented out portion	yes			yes
7) Rent paid				
8) Provision of tax		yes	yes	
9) Cost of old furniture				
10) Accrued dividend	yes			
11) Commission				
12) Overdraft from the bank				

13) Advance payment for supply of stores written off as bad debt.				
14) Sale price of old equipment sold				
15) Salary, wages				
16) Maintenance for rented out portion				
17 Maintenance cost for other portion				

2.7 TYPES OF PROFIT AND LOSS ACCOUNT

The Profit and Loss account can be presented in several forms. Two popular forms are: the Account Form and Report Form.

It would be seen that column "Net Profit" is to be calculated from "Revenues" – "Expenses" so that both sides become equal. The Net Profit is then reappropriated to provision of dividend and reserve and surpluses.

The report form of profit and loss account statement is further subdivided into "Single Step Profit and Loss account" and "Multi Step Profit and Loss account". In these non-operating expenses are shown separately. In case of Multi Step form more useful information is displayed. The structure of both these formats is given below:

Single Step Report Form of Profit and Loss Account		
XYZ Hospital		
As on 31 March 2000		
	Rs.000	Rs.000
Revenues		
1) Sales of goods and services		
2) Other income		
Total		
Expenses		
Cost goods and services provided		
General and administrative expenses		
Interest on loans		
Depreciation		
Non-operating expenses		
Provision for Tax		
Total		
Net Profit (after tax)		
Appropriation*		
Provision for dividend		
Reserve and surplus		

Multi Step Report Form of Profit and Loss Account	
XYZ Hospital	
As on 31 March 2000	
1)	Sales
2)	Less: Cost of goods and services sold
	Gross Profit (GP)
	Less : Operating expenses (OExp)
1)	General and administrative expenses
2)	Depreciation (DEP)
	Operative Profit (OP = GP – OExp – DEP)
1)	Less: interest
2)	Plus: other income
3)	Less: Non-operating expenses
	Profit Before Tax
1)	Less: Provision of tax
	Net Profit = PBT – Tax
	Appropriation*
	Provision for dividend
	Reserve and surplus

2.7.1 Exercise 6 : Preparation of a Profit and Loss Statement in Account Form

We will now prepare a profit and loss statement with following data:

Expenses	Rs.000
Operating Expenses	
Cost of medicines and other stores used	1100
General and administrative expenses	120
Interest on loans	40
Depreciation	110
Provision for unclaimed dividend	10
Provisions for taxes	120
Electric, water supply and insurance	50
Auditor's remuneration	20
	1570
Non-operating Expenses	
Book value of the old machinery sold	50
Advertisement charges (for sale)	2
Maintenance charges for room given on rent	10
Revenues	**62**

Operating Revenues	
Services rendered	1500
Sale from pharmacy	200
	1700
Non-operating Revenues	
Dividend from investments made	40
Sale price of old equipment sold	100
Rent received	50
Other Income	10
	200

The profit and loss account in account form is given below:

Accvount Form Profit and Loss Account			
XYZ Hospital			
As on 31 March 1999			
Expenses		**Revenues**	
Operating Expenses		**Operating Revenues**	
Cost of medicines and other stores used	1100	Services rendered	1500
General and administrative expenses	120	Sale from pharmacy	200
Interest on loans	40	**Non-operating Revenues**	
Depreciation	110	Dividend from investments made	40
Provision for unclaimed dividend	10	Sale price of old equipment sold	100
Provisions for taxes	120	Rent received	50
Electric, water supply and insurance	50	Other Income	10
Auditor's remuneration	20		
Non-operating Expenses	0		
Book value of the old machinery sold	50		
Advertisement charges (for sale)	2		
Maintenance charges for room given on rent	10		
Net profit	268		
	1900		**1900**
Appropriations			
Provision for dividend	**160**	Net Profit	**268**
Reserve and surplus	**108**		
	268		**268**

It would be seen that the element of Net Profit was not been given in the data and has been arrived at by subtracting total Expenses from total Revenues so as to make both sides equal. Now we make this report in single step report in exercise 7 given below.

2.7.2 Exercise 7 : Preparation of a Profit and Loss Statement in Single Step Form

The profit and loss account in single step report form is given below:

Single Step Report Form of Profit and Loss Account				
XYZ Hospital				
As on 31 March 1999				
			Rs.000	Rs.000
1)	**Revenues**			
	Operating revenues			
	Services rendered		1500	
	Sale from pharmacy		200	
	Non-operating revenues			
	Book value of the old machinery sold	50		
	Advertisement charges (for sale)	2		
	,Maintenance charges for room given on rent	10		
	Revenues	**62**		
			1900	1900
2)	**Expenses**			
	Operating expenses			
	Cost of medicines and other stores used		1100	
	General and administrative expenses		120	
	Interest on loans		40	
	Depreciation		110	
	Provision for unclaimed dividend		10	
	Provisions for taxes		120	
	Electric, water supply and insurance		50	
	Auditors remuneration		20	
	Non-operating expenses		0	
	Book value of the old machinery sold		50	
	Advertisement charges (for sale)		2	
	Maintenance charges for room given on rent		10	1632
	Net Profit (after Tax) 1-2			268
	Appropriations			
	Provision for dividend			160
	Reserve and surplus			108

It would be seen that we have rewritten the data in continuous form and Net profit has been arrived at by straight subtraction unlike the account form where we had to balance both sides. Now we will make a more detailed form of statement in multi step form as given below in the next exercise.

2.7.3 Exercise 8 : Preparation of a Profit and Loss Statement in Multiple Step Form

The profit and loss account in multi step report form is given below:

Multi Form Report Form of Profit and Loss Account				
XYZ Hospital As on 31 March 1999				
		Rs.000	Rs.000	Rs.000
1)	**Sales of goods and services**			
	a) Services rendered	1500		
	b) Sales from pharmacy	200	1700	
2)	Less : Cost of medicines and other stores used	1100	1100	
3)	**Gross Profit (GP) 1–2**			**600**
	Less : operating expenses (OExp)			
	a) General and administrative expenses	120		
	b) Depreciation (DEP)	110		
	c) electric/water supply and insurance	50		
	d) Auditor's remuneration	20		
		–310		**–310**
4)	**Operative profit (OP = GP – Oexp – DEP)**			**290**
	Less: Interest	–40		250
	Plus other incomes			
	Dividend from investments	40		
	Sale price of old equipment sold	100		
	Rent received	50		
	Other Income	10		
		200		
	Less : Non-operating expenses			
	Book value of the old machinery sold 50			
	Advertisement charges (for sale) 2			
	Maintenance charges for room given on rent 10			
	Total of 4	– 62	**138**	**138**
5)	**Net Profit = PBT – Tax**			**388**
	Less: Provision of tax		120	120
6)	**Net profit after Tax**			**268**
	Appropriation*			
	Provision for Dividend			**108**
	Reserve and Surplus			**200**

2.7.4 Exercise 9 : To Find Defects in a Profit and Loss Statement

From the structure of three types of profit and loss statement it would be seen that the essential elements of the profit and loss statement are:

a) Heading: This includes the name of the firm (hospital) and type of the statement and specific date to which the statement applies.

b) Listing of all revenues and expenses properly.

c) Net Profit =Total Revenues – Total Expenses

d) The report must be Audited and signed by the management and auditors. Given below is a balance sheet. You are required to find defects in the same.

Balance Sheet		
XYZ Hospital		
As on 31 March 2000		
	Rs.000	Rs.000
Expenses		
Operating Expenses		
Cost of medicines and other stores used	1100	
General and administrative expenses	120	
Rent received	40	
Interest on loans	40	
Maintenance charges for room given on rent	10	
Provisions for taxes	120	
Advertisement charges (for sale)	2	
Non-operating Expenses		
Book value of the old machinery sold	50	
Provision for unclaimed dividend	10	
Electric water supply and insurance	50	
Auditor's remuneration	20	**1632**
Operating Revenues		
Services rendered	1500	
Sale from pharmacy	200	
Dividend from investment	40	
Non-operating Revenues		
Sale price of old equipment sold	100	
Provision for rent	50	
Other Income	10	
	1900	1900
Net Profit (after Tax) 1 – 2	268	**268**
Appropriations	200	
Provision for dividend	160	
Reserve and surplus	108	

Hint on list of defects:

1) Type of statement has not been mentioned in heading.

2) Date: The year of report has not been mentioned.

3) Expenses: Shown at top

4) Revenues: Shown after expenses

5) Depreciation: Not shown accounted for in operating expenses.

6) Dividend from investment shown as Operating Revenue instead of Non-operating revenue.

Find out rest of the defects. Assume depreciation as 110 and complete the profit and loss account.

2.7.5 Exercise 10 : Interpretation of Profit and Loss Statement

The three important functions served by the profit and loss account statement are:

a) It gives a concise summary of the firm's resources revenues and expenses during a period of time and reflects the economic results and management policies.

b) It indicates the firm's "profitability", i.e. profits on investments. That is greater the Net profit, better it is.

c) It communicates information regarding the firms activities to owners and others including for calculation of income tax.

For the purpose of interpretation, we should check the following:

a) Check the difference between "Operating revenue" minus "Operating expense" which is also known as "Operating Profit". This figure should be positive and greater its value better is the financial health of the organisation. It indicates that the firm is making good profit from its main business. This figure can be increased either by cutting down expenses or increase revenue or both.

b) Check the amount of Net Profit and examine if it is sufficient as compared to the total expenses.

c) Check whether there is adequate reserve and surpluses generated i.e. whether the firm has been able to add to the reserve and surpluses after payment of dividends so as to reinvest for expansion of the business.

Notwithstanding the above, the profit and loss gives a summary of the organisation's revenues and expenses and profit. To evaluate the performance over a year's period, the figures must be compared to the last year's figures. In fact a number of firms publish their Profit and Loss statement along with figures of last year's statement.

		31 Mar 2000	31 Mar 1999	% +/–
1)	**Sales of goods and services**	**1700**	**1400**	**+21.42%**
2)	**Less:** Cost of medicines and other stores used	–1100	–1000	+10%
3)	Gross profit (GP) 1–2	**600**	**400**	**+50%**
	Less : Operating expenses (OExp and DEP)			
		–310	**–285**	**+8%**
4)	**Operative profit (OP = GP – OExp – DEP)**	**290**	115	**+152%**
	Less: Interest	–40	–40	Nil
	Plus other income	200	150	30%
	Less : Non-operating expenses	–62	–50	24%

5)	Net Profit before Tax	**388**	**175**	**+41%**
6)	Tax	120	53	
7)	Net Profit after Tax	268	122	119%
	Appropriations			
	Provision of dividend	160	80	+60
	Reserve and surplus	108	42	157%

You can now observe the differences and make some interpretations as under which could be said to be performance highlights:

a) Gross profit increased by 50%.

b) Operative profit increased 152%, which indicates that the firm has done well in its business of operations by good policies and operation.

c) The firm has given 60% more in dividend.

d) The firm has been able to increase the reserve and surplus by 157 % thus giving more investment power to the firm.

2.8 LET US SUM UP

The Financial Statements – Balance Sheet and Profit and Loss account – are the basic instruments of financial accounting system and are required to communicate financial information to owners, creditors, managers, employees, customers, suppliers, Government and society.

Balance sheet shows the financial status or state of affairs of an organisation at a particular point of time and contains information about the hospital's assets, liabilities and owner's equity. Although it can be made at any point of time but it is usually made for the end of the financial year and is required both for the purpose of income tax and for the information of the shareholders.

The profit and loss account is actually income statement and shows the profitability of the firm by giving details about Revenues, Expenses and Income (or Loss). The cost of economic resources used in providing goods or services to the customers is called expense. Revenues are the benefits that the customers contribute to the organisation in exchange for goods and services provided by it. Profit is the difference between revenue and expenses. This can also be prepared for any period of time although it is made annually for the financial year ending. This statement is required to be submitted to income tax authority in support of the calculation and justification of tax liability. Both these statements are financial statement of utmost importance have to be made carefully and must contain all material accounting information with complete and fair disclosure both unfavourable or potentially unfavourable. A study of these could give insight to the working of the firm and the corrective actions required as a manager.

UNIT 3 MANUAL : UTILISATION OF EQUIPMENT

Structure

3.0 OBJECTIVES

After going through this unit you should be able to:

- make plan for selection and procure right type of equipment;
- ensure optimum utilization of equipment;
- evolve proper mechanism for timely preventive and breakdown maintenance; and
- forecast and cater for essential spares for imported and indigenous equipment.

3.1 INTRODUCTION

In this unit you will learn about analyzing a given problem systematically and steps in solving a problem being faced by a Hospital.

You may be aware that so many costly medical equipments are lying in the hospitals which are either never installed in time or are out of order for want of spares or proper maintenance. These type of happenings are very common and most of the big government hospitals are plagued with this problem, which not only gives bad publicity to the Hospital Administration but also leads to wastage of scarcely available resources of the country. Proper planning of medical equipment in a hospital will not only economise on resources but will also result in availability of maximum equipment in functional state all the time.

In this study we will systematically try to analyse the problem of equipment management in a hospital and also devise means to minimise such problems.

3.2 REVIEW OF SITUATION

Here is a case of 600 bedded teaching hospital, where medical superintendent wanted to hold an annual meeting of the heads of all departments to discuss the requirements of medical equipment for modernisation of the departmental facilities. Medical superintendent is an experienced administrator and before taking decision he asked all the departments to submit a list of equipment already held by them with their status on serviceability and utilisation. During course of further discussion following facts came to light:

a) Some of the equipment though procured more than one year ago but have not been installed as yet.

b) Some of the equipment was underutilised.

c) Some of the equipment were reparable.

d) Some of the equipment though serviceable but were outdated, as new models were available in the market.

(**Note** : The Medical superintendent is an experienced administrator and he decided to consider the proposal for modernisation after thorough scrutiny of factual position of the equipment already held by the departments. He, therefore, convened a board of officers to survey the costly equipment held by each department and to recommend plans for procurement, installation, maintenance and repair).

3.2.1 Biomedical Equipment

Biomedical equipment: Biomedical equipment are those equipment which are required for diagnostic, therapeutic and monitoring purposes for patient care and for research purposes. Though these may also include house keeping equipment such as testing, data processing and record keeping devices which may have direct patient connection, but may warrant special consideration. Our study will comprise only to first group of equipment.

3.2.2 National and International Regulatory Mechanism for Manufacturers

In America in 1976, the Food, Drug and Cosmetic Act were amended to establish the Food and Drug Administration's Bureau of Medical Devices to regulate medical device manufactures. During this period only, many new professional and institutional standards were generated by groups such as the Joint Commissioner on Accreditation of Health Care Organisations (JCAHO), the National Fire Protection Association (NFPA), Association for the Advancement of Medical Instrumentation (AA MI) to govern hospitals' arrangement and use of equipment.

With the advent of modern technology the dependence on medical equipment is increasing every day and equipment are becoming complex and costlier. It all has resulted in more and more investment on equipment in the health care industry. Before 1970 biomedical equipment was relatively simpler and could be bought, used and maintained with minor on the job training. Between 1970 and 80, sales of medical equipment tripled, its complexity increased and more and more patient safety features were incorporated. In America the Medical device industry of 1970s grew from $ 3 billion to $ 12 billion in total shipments in 1980. In India the health care industry is estimated to be 70,000 crore

rupees (Business India 15 July and 03 August issue). The role of Hospital Administrators in India is more difficult as there are no separate statutory devices available to regulate the production, import, sales or quality of the medical equipment used in the country. We will subsequently know the adverse impact of these serious legislative lacunae in details.

3.3 FACTORS RESPONSIBLE

Every organisation has different purchase procedures, rules and regulations for procurement and maintenance of equipment. Even the person involved in procurement does effect the type and quality of equipment purchased hence to have a fair idea about the real equipment state, it is necessary to see the equipment on ground, to see the documents relating to procurement and the procedure being followed to maintain and repair them. A few explanations are as follows:

3.3.1 Overenthusiastic Projection

Some equipment are procured, but are never used as the existing equipment is running satisfactorily and workload has not increased as anticipated. The anticipated future workload was not estimated scientifically, and requirement was projected for on an empirical basis for procurement.

3.3.2 Improper Coordination of Physical Facility

In some cases equipment have been imported and delivered but the building in which it was to be installed is not ready and by the time building is ready the equipment does not remain use worthy as some parts get rusted, some are stolen and some part go defective due to non use. Firm also does not take responsibility because warranty period is over and no provision was kept in supply order for such contingencies.

In a few cases equipment is delivered in Central Medical Depot from where it is intended to be distributed to some of the hospitals, but by the time it reaches there and installed warranty period is over and firm does not accept responsibility. This type of situation is encountered in larger organisations like Defence, Railways, and ESI where Central procurement is made for number of distant hospitals.

3.3.3 Complicated Procedures

In some cases firm gives sub-standard equipment and claim major part of the cost 90 % or so and leaves the hospital in lunch by not installing it. In such cases firm is willing to forgo the balance of payment as the equipment it supplied was of much lesser value than the cost quoted. Though it happens with the connivance of the purchase/user agency, the firm knows that organisation may not resort to legal action as legal procedures are very complicated and management wants to avoid it.

3.3.4 Fly by Night Suppliers

There are cases where firm does not supply adequate spares and does not have repair/ servicing facility and after a year or so of supply they even change the agencies leaving the hospital high and dry. Hospital purchase authority did not have much control because the firm happened to be the lowest bidder.

3.3.5 Improper Coordination with Infrastructure

Electricity requirement should be well planned, it is invariably seen that equipment has been installed but requisite voltage/power supply is not available. Modern electronic machines are very sensitive to surge and fluctuations in electricity and slight aberration may make the machine non-functional. In some cases machines have been reported to have gone out of order just because earthing was not done properly and firm delivered the responsibility as it was not the part of contract.

Laundry and CSSD plant require adequate amount of water of required quality and if water is hard the Ca&Mg salts get deposited at higher temperature and supply pipe line is

blocked because of chemical deposition. Even the heater coils in a boiler are required to be changed frequently because of salt deposition on them. Thus water treatment plant like ionization filter or reverse osmosis plant is a very important requirement. For facilities using radioactive material like nuclear medicine, there is a requirement of obtaining NOC/License from BARC or such agencies. It has been reported that though facility for such intervention are ready but due to non initiation of license process in time it cannot be used for months.

3.3.6 Selection of Inappropriate Technology

Machines do get defective for various reasons but in the absence of preventive maintenance the down time keeps increasing (down time is the period for which machine remains idle for want of repair). It is not infrequent to see that machines are technologically so advanced and sophisticated that specialist concern will insist for its procurement but when it goes defective, facility is not available there to repair it. Thus selection of appropriate technology is of paramount importance. It is also true that the technicians and their technology level do not support the level of sophistication of the machine. Since recruitment of highly qualified technical staff may not be possible especially in Government set-up, hence machine selected should be user friendly.

3.3.7 Environment Bye-laws

Provision for prevention of environment pollution, with use of Radioactive Material, x-ray installation and the procedures liberating pollutants and infected by-products should be taken care of otherwise the pollution control board authorities may ask for shut down of such facilities and machines are bound to remain unutilized till it satisfies the local bye-laws for environment

3.3.8 Spares and Consumables

More often then not machines remain out of use for want of spares or consumables especially when procuring agencies are different for equipment and consumables. There are more chances of such mismatch for instance in case of Biochemistry or Blood Gas analyses, the consumable kits are machine specific (close end system) and cannot be used with other analysers.

3.3.9 Modification and Upgradation Aspects

Conventional conditions like temperature and humidity also affect the working of a machine, since most of the equipment were imported from Western Countries where temperatures remains subzero to 20°C or so, whereas in India it shoots upto 45°C. Though air conditions are used but only during working hours and it does happen that due to heat the lubricant melts away or the calibration may go haywire. Upgradation of software is an important part as no firm takes responsibility of obsolete software if not mentioned in the contract.

3.4 MATERIALS AND METHOD

The whole process of evaluation and equipment audit has to be in a comprehensive and holistic approach covering aspects like equipment planning, including the electrical, mechanical installations, acquisition process, storage, equipment installation, utilisation, maintenance programme, spares and accessories, cost-effectiveness, safety measures, training of personel, etc. Approach to evaluation should be sequential process as follows:

3.4.1 Visit to Central Equipment Store and other Important Cost Centres

Visit to these areas will give first hand information on various aspects and help to evaluate the bottlenecks in the system. The evaluation process of functioning of equipment may be done on following parameters:

Evaluation of process and functioning of equipment:

a) Direct observation of equipment's operation and functioning

b) Spot evaluation : Making a visit to a particular department can do this, say for example OT. If it is found that only a few are working and others are non-functional or not installed. The following questions can then be asked:

1) Since when are the equipment non-functional?

2) What was the reason for equipment break-down?

3) Were the equipment within warranty period?

4) Has any repair work been carried out so far?

5) Why one equipment is not yet installed? Is it due to inadequate structural design, mechanical and electrical requirements or due to some equipment accessories?

6) What are the preventive maintenance and running maintenance schedule being carried out for two equipment which are working?

3.4.2 Questionnaire Study

A check-list is given at Appendix 'A' to include all the aspects on which a machine or facility should be checked. This feedback will give valuable information about the reasons as to why the equipment have gone out of order and what precautions are to be taken at every level while installing a machine in any department.

3.4.3 Study of Documents

A convenient check list can be followed as follows:

i) List of equipment on inventory and tallying it on grounds for make, date of manufacture, model and number.

ii) History/Log book: Logbook gives complete history of the equipment, about downtime uptime, time log between two breakdowns, type of defect which occurs frequently, type of spare required more often, its maintainability, the efficiency of the firm undertaking repairs etc.

iii) Equipment maintenance manual whether supplier with the equipment or not, is it in the common language like English or Hindi of local language. Does it also give circuit diagram?

iv) Codified list of spares along with cost and place of availability.

v) Local vendor/Service centre list

vi) Copy of supply order: It gives complete details of terms and conditions warranty period, rate of annual maintenance contract, frequency of preventive maintenance and its scope. Another important aspect included in so is the security deposit and Bank guarantee and other payment related terms.

vii) Policies and procedure Register

It is always useful to make policy for initial inspection, checking of document and keeping record of the accessories and consumables required. It can be in the form of standing operative procedures (SCP). It will help the new staff and young specialist as a ready recorder.

3.4.4 Analysis of Critical Incident Reporting

This will bring out the aspects like how is the defective functioning of an equipme reported, what corrective actions are taken and within what interval

3.4.5 Calculations of a Few Indices

a) Use Coefficient $= \frac{\text{Average number of hours eqpt used a day}}{\text{Maximum No. of hours it can be used}} \times 100$

b) Down Time Index $= \frac{\text{Down time hours}}{\text{Service hours}} \times 100$

c) Breakdown Maintenance Index $= \frac{\text{No. of hours spent on breakdown}}{\text{Total man-hours available}} \times 100$

d) Maintenance Cost Index $= \frac{\text{Maintenance cost}}{\text{Capital cost}} \times 100$

3.4.6 Analysis of the Observation Data and Preparation of Report

After going through the above procedures one can have a fair idea about the actual problem stage whether it was:

a) at the selection stage of the equipment

b) due to faulty purchase procedure

c) due to wrong selection of vendor

d) due to shortcoming in tender document or supply order

e) due to incompetent supplier

f) due to improper planning in terms of

- Physical facilities
- Electricity
- Any other intrinsic factor

g) Non existent or faulty maintenance policy

After pinning down the defect the management can always take remedial measure and also take necessary step so that the mistake is not repeated in future.

Discussion

After analysing the equipment state, it is not difficult to find out the reasons as to why equipment remain out of order. More often than not the reason lies with inadequate policies and faulty procedures. Greedy and unscrupulous suppliers with the convenience of gullible officials and users take advantage of loopholes in the procedures. They even interpret the rules in their favour. In public sector undertakings there are so many agencies involved that it is difficult to pinpoint the responsibility for the lapses. More the number of agencies involved in procurement more are the chances of exploiting the loopholes by master interpreting the rules and more difficult it becomes to take remedial action or fire the person responsible.

3.5 RECOMMENDATIONS

Following guidelines are recommended to help in procuring a right type of equipment, at right cost in right time and of right quality.

3.5.1 Need Assessment

A user specialist should ask following questions before projecting a requirement:

a) Is the new equipment really required in terms of case load? How many patients are likely to use it now and as per trend analysis how many patient are likely to use after 6 months, 1 year and 2 years? If equipment is likely to be used to its optimum capacity within 6 months or less it should be procured immediately, if after 6 months to 1 year but procurement process will take more than 6 months, still case should be

initiated now. But if optimum case load is likely to be after 1 year or more it will be wise to wait for 6 months to .

i) confirm the expected trend, and

ii) assessment of alternative models.

b) If the existing equipment has outlived its utility and there is no alternative then it becomes overriding priority to buy a new equipment now.

c) After introduction of new technology does old technology becomes totally irrelevant? This question is very pertinent specially in developing countries where resources are scare, the temptation of buying a new equipment with a few more advanced features should be resisted if the existing equipment is serving the purpose adequately. The wait will be worth as by that time there may be a more sophisticated and relevant equipment may be introduced and also will give time to assess the equipment from other sources. The opportunity cost saved due to such decision can be utilised gainfully elsewhere.

d) Are you familiar with the equipment? It is always advisable to ensure that the equipment being procured has been analysed on following aspects:

i) Have you worked on it and are concerned about the utility?

ii) Any neighbouring institute has use it with satisfaction

iii) The source of information advocating its used is reliable and is not concerned with the supplier/firm.

e) It will be an excellent idea if out of 3 or 4 discarded equipment one can be canalized to take useful spares and put it in other equipment and put it on road.

f) Type of equipment : The technological advancement and its assimilations in medical equipment is so fast that within 1 to 2 years the existing equipment starts appearing obsolete. Though every new equipment manufacturer will claim a few advanced features but there may not be necessarily required.

After assessing the requirement it should also be ensured that the equipment will conform to local requirement like environment laws, emission norms, pressure (boiler) regulations etc. It should also be ensured that building and other infrastructure like water, electricity, ventilation etc. would also be ready before the equipment is likely to be procured.

After satisfying on above aspects the requirement should be forwarded to the management. The case for projection should include:

a) Justification of the requirement

b) Technical specifications, any brand name or manufacturer's name should be avoided rather qualitative requirements should be given.

c) Appropriate cost

d) Names of known supplier with address

e) If it is proposed to procure imported equipment then advantage of imported equipment over the indigenous one should be mentioned.

f) Annual servicing and maintenance cost for a period of 5 to 10 years should also be reflected with the demand note.

3.5.2 Role of Management

Medical superintendent or management after receiving the requirement from various departments should prioritise the requirement and if required a committee should be formed for this which can have members from major specialities. Committee should have a meeting where all the specialists and super specialist will justify their projected requirements. The Committee based on available funds will allocate Prioritised Procurement Plan. It is always advisable to prepare the Prioritised Procurement Plans before beginning of financial year in Public Sector Hospitals. The plan may be given to

Composition of CEPC

Medical Superintendent	Chairman
Specialist officer of concerned speciality	Member*
One Senior Medical Officer	Member
Accounts Officer	Member

* Specialist officer who has prepared the Technical Specifications (Qualitative Requirements) should be co-opted member in attendance for on the spot technical guidance.

3.5.3 Functions of CEPC

i) CEPC will take procurement action for item in Priorities Procurement Plan.

ii) While selecting equipment for procurement, upgradibility, maintenance requirement, cost and availability will be taken into consideration.

iii) It will undertake tender action, technical evaluations and procurement action for all equipment.

iv) In bigger establishments two separate sub-committees can be detailed for technical evaluation and opening of price bid.

v) Technical evaluation committee will give its recommendations for those manufacturers whose bid confirm to the acceptable technical parameters. Preferably minimum three firms should be selected.

vi) Price bid will be opened only for those firm whose product are recommended by the technical evaluation committee.

vii) Price Negotiation*

* (CEPC will carry out price negotiation with the representatives of short-listed firm as recommended by Technical Evaluation Committee. As per Central Vigilance Committee (CRV) guidedlines, price negotiations can only be done with the lowest quotee).

viii) CEPC can also recommend to dispense with the above procedure if item is manufactured by single firm (Proprietary Article) or for any convincing reason item of only particular firm is required.

ix) After price negotiation supply order may be placed on the firm.

x) Earnest money/security money may be deposited from the supplier as per rules. It may be in the form of bank guarantee also.

xi) A clause may be included in the supply order that balance 10 – 25 % of the cost of equipment be paid only after completion of three months period, from the date of installation and final inspection from the user specialist.

xii) Performance bond : Performance bond should be signed by the firm on which supply order has been placed incorporating clause that in case of failure of rectification of error, failure to provide spares, failure to conduct training to staff will render the contract invalid and no payment will be made to the firm and the balance of the cost of equipment/earnest/security money will be forfeited.

xiii) Date of delivery should be within 6 weeks of the date of supply order. Extension of date of delivery may be done only in genuine cases by the CEPC with penalty. Supply order will be cancelled after a period of 6 months from the date of placement of order.

A) As it is difficult to judge the correctness of the price of equipment quoted, the following aspects will be taken into considerations:

a) Imported or indigenous item

b) Distances involved between source and destinations

c) Mode of carriage of the machine

d) Additional cost of installation

e) Application of sales tax

f) Quantitative discount

g) Amount of earnest/security or final payment of balance of cost of equipment.

h) Custom duty, freight charges and insurance.

j) Component of foreign exchange

B) The members of CEPC should preferably carry out independent inquiry about the approximate cost of the equipment.

C) As far as possible supply order by other Hospital may be obtained for comparison of prices.

D) CEPC may consider distributing supply order amongst two lowest quotees for purpose of competition in service/repair and maintenance facility.

Progressing of supplies: CEPC should progress the supply of item and if prospects of supply from a particular firm are bleak, appropriate action should be taken to cancel the order and fresh rate inquiries should be issued limited to only those firms who qualify for quick supply as per technical specifications.

Receipt of Certified Receipt Vouchers (CRV), Satisfactory performance and Final Inspection Certificate:

i) CRVs will be forwarded by the user department after installation of equipment by the firm, that the item is taken on ledger charge, signed by user specialist/inspecting authorities and Store Officer.

ii) Satisfactory Performance Certificate certifying that equipment is working satisfactorily signed by specialist concerned, countersigned by HOD will be prepared alongwith CRV after installation of the equipment.

iii) Final Inspection Certificate: Final inspection will be carried out after three months from the date of installation of equipment.

Clearance of Bill

i) All payment will be made to the firm on receiving intimation about CRV/ Satisfactory Performance. Final Inspection Certificate and payment is approved by CEPC.

ii) 75-90% of the cost of equipment (as per supply order) will be paid to the firm on receipt of CRV and satisfactory performance and balance of 10-25% after final inspection report.

Guarantee/Warranty: The stores supplied against the supply order will be dimmed to have warranty of the firm against defective material, workmanship and performance for a period of 3 years from the date of satisfactory installation at the consignee end. If during this period/the stores/spares supplied are found by the consignee to be defective, the same will be replaced immediately with the serviceable stores by the firm free of cost/charges at site within 30 days otherwise firm will accept suitable penalty as may be decided by the purchaser.

Maintenance/Repair

a) Supply order will also include the undertaking by the firm about maintenance and repair after completion of Guarantee/Warranty period. The Annual Maintenance rate per year should also be mentioned. It may be upto 2% of the cost of equipment per first year after conclusion of warranty period.

b) A clause will be incorporated in the supply order that the spare parts and components will be made available by the firm concerned during next 10 years after installation, in case of non-fulfillment of the clause firm will accept the penalty as decided by the purchaser. The cost of spare and code numbers of the spares will be supplied by the firm along with the equipment.

c) Firm will also supply the chart diagram and maintenance schedule of the equipment.

3.6 LET US SUM UP

With the advent of the new technology more and more diagnostic and therapeutic procedures are becoming equipment oriented. Since equipment increase cost of treatment it is of paramount importance that these are utilised properly. If you can follow the guidelines, we have discussed above, you should be able to project right type of equipment and procure at correct cost, at right time with right terms and conditions.

3.7 REQUIREMENT

You are required to visit a local hospital (200 beds or above) and carry out a study of equipment management system, as per questionnaire attached in Appendix A.

QUESTIONNAIRE

1) How was the need analysis carried out at the time of acquiring the equipment?

   a) Was the equipment required for the hospital after taking into consideration factors like expected workload?

   b) What was the basis of deciding the requirement of the equipment?

      - Cases requiring investigations were sent to other hospital.
      - Facility not available in Town.

   c) Was it considered on a Scientific basis through instituting a committee of more than one user speciality?

   d) Was it decided to go in for latest technology based on subjective consideration or the user specialist had some experience of working on the machine in India or abroad?

2) How was the vendor/supplier selected?

   a) Was it an open tender or limited tender?

   b) Was it a two-bid system i.e. technical and price bid?

   c) What is the credibility of the firm? Was it analysed properly? Where all have the firm installed the equipment earlier than this and what is the report?

3) Is the technology up-gradable?

4) Has a specification audit been carried out meticulously including trial runs at both manufacturers end and hospital location after installing the equipment?

5) When did the warranty period start and how long will it last?

   Ideally the hospital should negotiate for starting of warranty period after 1 month of installation of the equipment and its functioning.

6) Is there an equipment inventory available in the hospital, which includes all details related to technical classification, e.g. electrical, mechanical, electronic, etc.?

7) Are descriptions like make, model, and identification numbers, date of purchase, original cost, date of entering into service contract properly maintained?

8) Is there any penalty clause in case the OEM fails to provide maintenance/repair service within a stipulated time-frame after the equipment suffers breakdown?

9) Whether adequate expertise, spare parts for repairs are available? Is there any specific agency earmarked for repair and maintenance of a particular equipment?

10) What is the level of physical supplies, staff, engineering support system, and expertise required for each item? Is it available with the hospital?

11) What are the measures/support going to be offered or being offered by the OEM, such as,

   a) Is the equipment going to be replaced by another one during the time of repair?

   b) Warranty services and its compliance level.

   c) Provision at spares/accessories/consumables.

   d) Training for the concerned staff : It should be carried out in English or in a language which would be easily understood.

   e) Whether the training package for the staff abroad or within India include their lodging and food apart from training aspect.

12) Is there a continuing training programme running from all concerned technicians?

13) Is there a standby power supply facility with the hospital? What is its reliability and sustenance?

14) In case of an equipment failure, what is the alternative course of action with the hospital, so that there is no deficiency in service?

15) What is the performance level and utilisation of the equipment?

16) How is the critical incident reporting system?

17) How is the overall satisfaction level, i.e., satisfaction of clientele and that of hospital authority?

18) Is there a set of clearly laid down policies and procedures?

UNIT 4 MANUAL : INVENTORY ANALYSIS

Structure

4.0 OBJECTIVES

After reading this unit, you should be able to:

- understand the principles of Inventory Analysis;
- apply the methodology of Inventory Analysis; and
- do the analysis for Inventory Control.

4.1 INTRODUCTION

You have already learnt in Block 3 Unit 2 of Course 3 about the concepts, functions and application of Inventory Control for effective and efficient materials management particularly for the consumable including drug items. Also you have learnt why to classify the consumable items scientifically so that we can have a better control over these items and ensure the availability of these items whenever and wherever required.

In this unit, you will learn the principles of Inventory Analysis. You will also learn the detail methodology of Inventory Analysis including various steps involved in analysis for classifying the consumable items in the various groups so that you can have a better control over the consumption pattern of these items. This analysis will help you in better and more effective and efficient store management particularly for the consumable items and you can ensure the availability of these items whenever and wherever required.

4.2 PRINCIPLES OF INVENTORY ANALYSIS

The term Inventory refers to the stock at hand at a given time [a tangible asset, which can be seen, weighed or counted]. It refers to the material held in an idle or incomplete state, awaiting future sale or use. Broadly, inventory is an idle resource.

Inventory control is an activity with the objective of minimizing the total cost of maintaining inventories and of acquiring them in order to render the stipulated level of service.

Inventory control means stocking adequate number and kinds of stores so that the materials are available whenever required and wherever required. High inventory level leads to high cost through:

a) Locking up of finance

b) Large storage space

c) Large handling and administration charges

d) Obsolescence and spoilage.

On the contrary, low inventories may lead to frequent stock outs and high shortage cost. Balancing the cost of carrying high inventories and cost of shortage is done through a system of scientific inventory control.

For the better management of inventory one must classify the inventory so that the control of the inventory becomes much more easier and effective. The basic principle of the classification of inventory is based on **Pareto's Law.** Vilfredo Pareto, an Italian philosopher and economist while studying the economic status of the population of a given city, found out that 20 % of the people have got 80 % of the total money and rest of the 80 % of the people were having 20 % of the money. This finding of Mr. Pareto is equally applicable to so many other spheres of life as well as in the classification of inventory management. This philosophy helps in classification and subsequently identification of the items, into various categories which enable the store mangers, to manage and control the items more effectively and efficiently. Based on the utilisation pattern and/or some other criteria the store items can be classified as per one or in combination of more than one type of classification given below in Table 4.1.

Table 4.1 : The Types of Selective Inventory Control

Types of Control	Basis	Main Use
1) A-B-C	Value of consumption of item	Control inventory value
2) H-M-L	Unit Price of item	Control purchase
3) X-Y-Z	Value of items in store	Review inventories
4) V-E-D	Criticality of item	Inventory control of spares
5) F-S-N	Consumption pattern of items	Control obsolescence
6) S-D-E	Problems of procurement	Lead time analysis and purchasing strategies
7) G-O-L-F	Source of supply	Procurement strategies
8) S-O-S	Nature of supply	Procurement and holding strategies for seasonal items

Manager of each individual store is required to apply any one or combination of more than one type of the above mentioned classification, as per the requirement of his/her store. Analysis of doing some of these classifications like A-B-C and V-E-D are given in detail in the following pages.

4.3 METHODOLOGY OF INVENTORY ANALYSIS

Inventory control is basically a scientific system which indicates as to what to order, when to order, how much to order, how often to order so that the purchasing costs and storing costs are kept as low as possible. The two basic techniques of inventory control, which can be very effectively used in the medical stores, are A-B-C analysis and V-E-D analysis.

By now you have already learnt that the inventory analysis helps the materials managers to exercise selective control and focus his attention only on a few important items when he is confronted with thousand of store items. For doing this you have already learnt of the various types of classification of the store items in the previous para. In the following pages, we shall learn the two basic and appropriate techniques of Inventory analysis based on A-B-C and V-E-D classification of the items in detail.

A-B-C Analysis

A-B-C analysis is a basic analytical management tool, which enables any store managers to expand his effects and energy where the results will be the best. This analysis is purely

based on Selective Management Principle or Pareto's Law. It is also popularly known as "Always Better Control" or the alphabetical approach, has universal application in many areas of human endeavour. A-B-C analysis does not depend on the unit cost of the items but only on its annual usage and not on their importance because all items are important. Analysts commonly classify inventory into three categories 'A', 'B', and 'C'. The 'A' items have a high annual usage in terms of money investment. 'B' items are average, while 'C' items have a low value of usage. Every item in inventory is ranked and listed in order of items annual value of usage. At the top of the list would be the high value items, followed by a longer list of medium value items and finally a long list of low value items. The dividing line between classes of items is arbitrary. The normal items in most organisations show the following pattern:

1) 10 per cent to 15 per cent of the top number of items account for about 70 per cent of the total consumption value. These items are called 'A' items.

2) 20 per cent to 25 per cent of the number of items account for 20 per cent of the total consumption value. These items are called 'B' items.

3) The remaining 65 per cent to 70 per cent of items account for the balance 10 per cent of the total issue value. These items are called 'C' items.

It is evident that controlling the small number of items amounting to 10 per cent of the total number of items will result in the control of 70 per cent of the monetary value of the inventory held and ordered.

Hence, the main aim of this technique is to distinguish those items that have the most bearing on the inventory costs, so that management can concentrate efforts on those items that promise the highest possible pay offs in terms of savings. Thus, with A-B-C analysis more attention can be paid to few high value items rather than low value ones.

Mechanics of A-B-C Analysis

The mechanics of classifying the items into 'A', 'B' and 'C' categories is described in the following steps:

1) Calculate rupee annual issues for each item in inventory by multiplying the unit cost by the number of units issued in a year. It is assumed that the issues and consumption are the same.

2) Sort all items by rupee annual issues in descending sequence.

3) Prepare a list from these ranked items showing item no., unit cost, annual units issued and annual rupee value of units issued.

4) Starting at the top of the list, compute a running total, item-by-item issue value and the rupee consumption value i.e. cumulative cost of the items.

5) Compute and print for each item the cumulative percentages for the item count and cumulative annual issue value.

Short Cut Method to the A-B-C Analysis

Compute the average usage value and multiply it by 2.25 to get the dividing line between class 'A' and 'B'. The dividing line between class 'B' and class 'C' is taken as half the average usage value.

The average usage value can be obtained by dividing the total number of items by the total usage value per year (or month or week, depending on inventory practices). This data is available with the accounts department. This quick and rough method may have to be adjusted in the light of experience, or when a sample analysis or a complete analysis is made later. However, it will provide a reference value to start with.

Other than this mathematical analysis, A-B-C classification of stores items can be done by a graphical representation also.

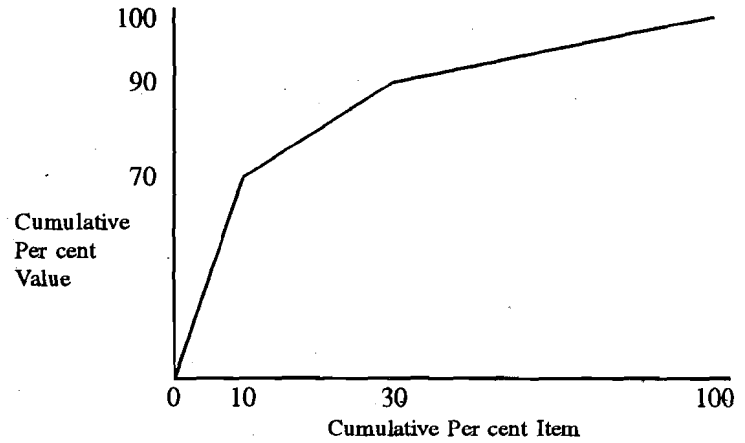


Fig. 4.1 : A Graph on Cumulative Value against Cumulative Percent of Items

A graph on cumulative value against the number of items arranged in the descending order list prepared to visually see the A-B-C categories. Instead of doing A-B-C analysis, as discussed earlier, many drug stores classify items by this graphical representation which is to be done purely on the visual assumption of the interpreter. Here as it is shown in the graph the vertical lines are drawn on the curve of the graph where it is showing the steep bends (as it is shown in Fig. 4.1). From this graphical analysis we classify the items (arranged in the serial order in the X-axis of the graph) into A category, B category, and C category of A-B-C analysis.

Hence, you must remember the basic principles in A-B-C analysis are:

i) the analysis does not depend upon the unit cost of the items but only on its annual consumption value;

ii) it does not depend on the importance of the item; and

iii) the limits for A-B-C categorisation are not uniform but will depend upon the size of the undertaking, its inventory as well as number of items controlled.

Purpose of A-B-C Analysis

The object of carrying out A-B-C analysis is to develop policy guidelines for selective control.

Normally, once A-B-C analysis has been done, the following broad policy guidelines can be established in respect of each categories (Table-4.2) :

Table 4.2 : Broad Policy Guidelines for the Control of Items as Per A-B-C Classification

	A Items High consumption value	B Items Moderate value	C Items Low consumption value
1)	Very strict control	Moderate control	Loose control
2)	No safety stocks (or very low)	Low safety stocks	High safety stocks
3)	Frequent ordering or weekly deliveries	Once in three months	Bulk ordering once in six months
4)	Weekly control statements	Monthly control reports	Quarterly control reports
5)	Maximum follow-up and expediting	Periodic follow-up	Follow-up and expediting in exceptional cases

6)	Rigorous value analysis	Moderate value analysis	Minimum value analysis
7)	As many sources as possible for each item	Two or more reliable sources	Two reliable sources for each item
8)	Accurate forecasts in materials planning	Estimates based on past data on present plans	Rough estimates for planning
9)	Minimization of waste, obsolete and surplus (review every 15 days)	Quarterly control over surplus and obsolete items	Annual review over surplus and obsolete material
10)	Individual postings	Small group postings	Group postings
11)	Central purchasing and storing	Combination purchasing	Decentralized purchasing
12)	Maximum efforts to reduce lead time	Moderate	Minimum clerical efforts
13)	Must be handled by senior officers	Can be handled by middle management	Can be fully delegated

V-E-D Analysis

The limitation of A-B-C analysis is that it is based only on monetary value and the rate of consumption of the items. Sometimes, particularly in a hospital, an item of low monetary value and consumption (e.g. Injection Adrenaline, Anti-Snake Venom etc.,) may be very vital or even life saving. Their importance cannot be overlooked simple because they do not appear in A category of inventory. Therefore, another parameter of the materials is their criticality. This could be in terms of the therapeutic value of a drug or intrinsic value of the material in achieving the objectives of hospital system. V-E-D analysis is based on critical values and shortage costs of the item. Based on their criticality, the items could be classified into three categories – Vital, Essential and Desirable.

Mechanics of V-E-D Analysis

V-E-D classification is applicable to a large extent in spare parts management. Stocking a spare part is based on strategies different from those of raw materials. While the consumption of raw materials depend directly and definitely on the market demand, the spare part demand, on the other hand, depends on the performance of plant and machinery. Therefore, the method of classification designed for one type of inventory may not be compatible with another type of inventory. Statistically too, it has been noted that the demand for spares follows a Poisson distribution. Spare parts are classified as vital, essential and desirable to the operation of the equipment. This implies that 'V' class spares have to be stocked adequately to ensure continuity in the operations of the plant. Vital spares can cause havoc and bring the wheels of the machines to a grinding halt, if they are not available. Some risk can be taken in the case of 'E' class spares. Stocking of desirables, 'D', can be done away with if the lead time for procurement is low. It is important that this classification should be done with the assistance and concurrence of those who are responsible for maintenance of stores. Hence for the management of the drug stores also the same classification can be applied for the drug items. Applying the following principles can do the classification of the drug items as per V-E-D analysis:

1) **Vital items**: There are several vital items in the inventory of a hospital, which could make difference between life and death. There can be serious functional dislocation of patient care when such items are not available even for short period adversely effecting the image of the hospital. Such items should always be stocked in sufficient quantity to ensure their constant availability. Top management should control this group of items.

2) **Essential items**: The shortage of such items can be tolerated for a short period. If these items are not available for a few days or a week, functioning of the hospital can be adversely affected (drugs like Antibiotics etc.). Top/Middle level management should preferably control these items.

3) **Desirable items**: The shortage of these items will not adversely affect the patient care or hospital functional even if the shortage is prolonged (Items like Vitamins). Middle/lower level management should control desirable items.

As against the cost criteria in A-B-C analysis the V-E-D analysis is based on subjective analysis by a group of physicians. The group is required to sit together and decide/classify the store items according to its critically into **vital, essential and desirable category.** The criticality of the item will be depending upon the objective and the functioning of the hospital in general and the various service departments in specific. Hence, the V-E-D classification will vary from hospital to hospital and even within the hospital, department to department.

Such an analysis enables the administrator to give more attention to vital and essential items.

Combination of A-B-C and V-E-D Analysis

A combination of A-B-C and V-E-D analysis can be gainfully employed to evolve a meaningful control over the material supplies particularly in a hospital system.

There are two models of this combination, which are generally in use (as shown in Fig. 4.2):

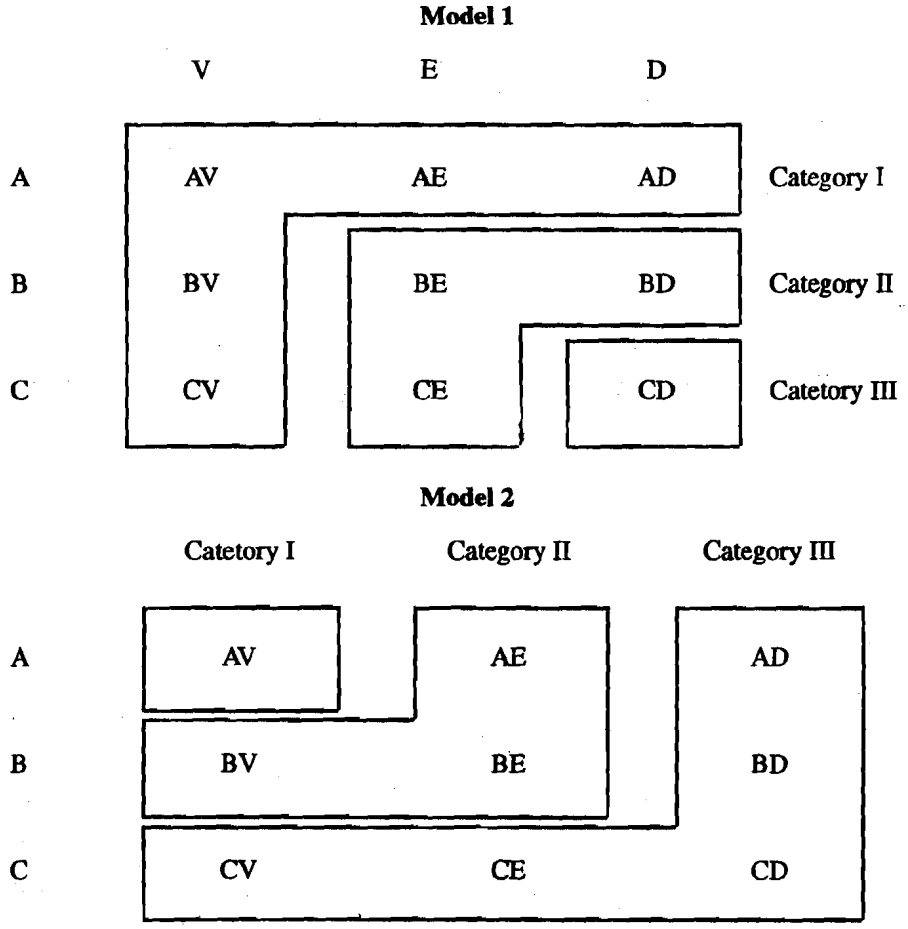


Fig. 4.2 : Models of A-B-C and V-E-D Combinations

Category I includes all vital and expensive items. These require close monitoring and strict control.

Category II covers items of essential category and they are less expensive.

Category III comprises the desirable and cheaper group of items.

A high degree of control on inventories of each item would neither be practical considering the work involved nor worthwhile since all items are not of equal importance. It is desirable to classify them into groups of items to control, which is commensurate

with its importance (Table 4.3). These analyses are based on the principle of "Vital few Trivial many", and a higher degree of attention is focussed on vital few which affects the results significantly. The service levels of various items should take into account of these classifications and from the overall objective point of view.

Table 4.3 : Control of Items by A-B-C and V-E-D Combination

Classification	V-Items	E-Items	D-Items
A Items	Constant control and regular follow-up	Moderate stocks	Nil stocks
B Items	Moderate stocks	Moderate stocks	Very low stocks
C Items	High stocks	Moderate stocks	Low stocks

X-Y-Z Classification

In contrary to A-B-C classification, which is based on value of annual consumption, X-Y-Z classification is based on value of inventory available on a particular date in the store. This classification is required to be done at least once in a year. X items are those items whose stock value is high, while Z items are those whose stock values are low. Understandably Y items fall between the two categories. This classification helps in identifying the items, which are being extensively stocked. If this is not properly done in time one may find C items in the X category. Therefore, controls should be developed for A-B-C items in conjunction with X-Y-Z items.

As V-E-D classification is based on the criticality of the item, at times it can be used in the case of some special materials, which are difficult to obtain. A combination of V-E-D and X-Y-Z methods may give some indication about the items that should be disposed off so as to trim the inventories.

Procedure to Carry out X-Y-Z Analysis

After annual stock-taking is over, arrange the closing stock values of items in descending order, enter the respective cumulative values against each item; the descending number of item is computed as a percentage of the total of all items in stores; the cut-off points are set depending on the distribution.

F-S-N Classification

The classification of the items is based on the consumption pattern or the movement of the items from the store. Items are classified as **fast moving, slow moving and non-moving** based on their consumption pattern. If there is rapid change in technology, this classification should be updated more often.

F-S-N analysis is specially useful to control obsolescence, spillage and deterioration in all kinds of items. Cut-off points for fast-, slow- and non-moving items usually depend on the characteristics of the items, their value and utility for operations. For example, zero issues may be placed in the non-moving class, as many as 10 issues in the past two years may be placed in the slow-moving category, and more than 10 issues in the fast-moving category.

Combination or X-Y-Z and F-S-N Classification

The combination of X-Y-Z and F-S-N classification can be more successfully applied to control the piling up of obsolete items. Disposal of obsolete items becomes important to prevent building up of the inventory over the years. Organisations have to choose between obsolete items as dead investment or prevent obsolescence by timely and appropriate control. The X-Y-Z and F-S-N classification exercise (Table 4.4) will help in timely prevention of obsolescence.

Table 4.4 : Combination of X-Y-Z and F-S-N Classification for Control of Store Items

Classification	F Items	S Items	N Items
X Items	Impose tight inventory control	Reduce stock to low level	Dispose of items at the best price
Y Items	Apply normal inventory control	Keep low level of stock	Dispose of as quickly as possible
Z Items	Increase stocks to reduce clerical work	Keep low level of stock	Dispose of even at low price

4.4 INVENTORY CONTROL ANALYSIS

You have already learnt the principles and the methodology of Inventory Analysis. Also you have understood the importance and significance of the classification of store items in various ways and in combinations to get the better result for management of inventory. Now let us see how we can classify the commonly occurring drug items available in our drug stores so that we can have a better control over these items.

Steps to do A-B-C Analysis

For this refer to the list of hundred drug items given in the annexure. The list of these drug items shown in the Annexure is taken from the actual drug list of a medium size hospital. The steps do the A-B-C analysis from this list is as follows :

Step 1

Identify all the drug items given in the list and check the estimated quantity to be consumed during a year and also the unit cost of each of these items. Then you are required to calculate the annual consumption cost of each item. You can drive the annual consumption costs by multiplying the unit cost of the item and estimated quantity to be consumed during a year.

Annual consumption cost = Unit cost of the item × Total quantity consumed per annum

Step 2

Once you have calculated the annual consumption cost of each of the items, arrange the same in the descending order list i.e. the costliest item (as per the annual consumption cost) at the top followed by next and so on and at the bottom will be the least costliest item. Exactly in the similar way the drug items are arranged in the list given in the annexure.

Step 3

After arranging the drug items as per the descending order list, we have to calculate the cumulative amount of each item. The cumulative cost of the first item is the annual consumption cost itself. The cumulative cost of the second item will be the cumulative cost of first item plus the annual consumption cost of the second item. Similarly, the cumulative cost of the third item will be the cumulative cost of the second item plus the annual consumption cost of the third item. In this manner you are required to calculate the cumulative cost of each item separately and the figure is to be mentioned against that item as it is shown in the drug list given in the annexure under the column cumulative amount.

Step 4

Once you have done the cumulative cost of each item separately, you will find that the cumulative cost of last item is also the total expenditure incurred in procuring all the drug items of the hospital for a year. Now as we know that 70% of the total cost takes care of around 10-15% of the drug items, which are shown in the descending, order list. Hence, if you calculate the 70% of the final cumulative amount of Rs. 2,54,51,234 as given in the

drug list, you will find the value of Rs. 17815864. Now in the column of the cumulative amount of the drug list, try to find where this value is lying. In our drug list you will find that this value is lying between item no. 12 and item no. 13, because the value calculated above is more than the cumulative amount of item no. 12 is less than the cumulative amount of item no. 13. Hence this is the dividing line which demarcates that all the items above this line i.e. all the drug items upto item no. 12 of the re-arranged list are Group 'A' Items as per A-B-C classification.

Step 5

Once you have identified the Group 'A' items, next step is to identify the Group 'B' items. For this we already know the 70% of the expenditure spent on Group 'A' items. Also as per ABC analysis, 20% of the expenditure will be on about 20-25% of the items. Hence, for the calculation we add up 70% + 20% i.e. 90% and find out the value of 90% of Rs. 25451234. If you calculate, you will find a value of Rs. 22906111. In our drug list you will find that this value is lying between item no. 33 and item no. 34, because the value calculated above is more than the cumulative amount of item no. 12 is less than the cumulative amount of item no. 13. Hence all the items from Sr. No. 13 to 33 of the drug list i.e. 21 in no. are Group 'B' Items as per A-B-C classification. Rest of the 67 items of this drug list is the Group 'C' items as per A-B-C classification.

Step 6

Hence from the above A-B-C analysis of the given drug list consisting of 100 drug items, you have seen :

Group 'A'	12% items	70% of the total expenditure
Group 'B'	21% items	20% of the total expenditure
Group 'C'	67% items	10% of the total expenditure

This is how the A-B-C analysis is done for classifying the items of any drug store into Group 'A', Group 'B', and Group 'C' items.

Steps to do V-E-D Analysis

As you have already learnt for doing the V-E-D analysis, we don't have any mathematical calculation. The V-E-D analysis is to done through discussion and arriving at a common consensus among the experts or the users of the drug items. In the given list also the same exercise is done by some of the doctors of that hospital according to their priority for each drug item. The result of the V-E-D analysis done by these doctors are given along with the drug list. But it must be remembered that this V-E-D analysis of the given drug items are not to be universally accepted by all the doctors and all the hospitals whereas the A-B-C analysis which we have already done will be universally acceptable.

4.5 LET US SUM UP

In this unit, you have learnt about the practical aspects of the Inventory Analysis. You have learnt how to classify the store items by various methods and apply the same for controlling the items as per their use. Also you have learnt how to combine more than one type of classification and apply them to control the items in the store for better management of the store items. You have also learnt how to do the mathematical calculation of store items as per the A-B-C classification.

UNIT 1 EVOLUTION AND CLASSIFICATION OF HOSPITALS

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- define a hospital;
- discuss the evolution of hospitals;
- classify the various types of hospitals; and
- describe the hospital as a system.

1.1 INTRODUCTION

You must be fully familiarised with the hospitals as you are professionally brought up in the hospital environment while undergoing graduation courses. But to become a full-fledged Hospital Administrator, you must know how the hospitals are organised and what are its expected functions. To understand these aspects you must be knowledgeable that how the hospitals evolved from early civilisation to modern era and also the classification of hospitals by various ways. In this Unit, you will learn all about the above mentioned aspects i.e. definition of hospitals, history and evolution of hospitals, classification of hospitals and hospitals as a system.

1.2 DEFINITION OF HOSPITAL

The Hospital is an organisation that mobilises the skills and efforts of widely divergent group of professionals, semi-professional and non-professional personnel to provide highly personalised services to individual patients. Like other large organisations, hospital is established and designed to pursue certain objectives through collaborative activity. The main objective of the hospital is, of course, to provide adequate care and treatment to its patients (within the limits that may be imposed by the scarce resources and by extra-organisational forces). Its principal product is medical, surgical and nursing service to the patient, and its central concern is the life and health of the patient. A hospital may, of

course, have additional objectives, including its own maintenance and survival, organisational stability and growth, financial solvency, medical and nursing education and research and various employee-related objectives. But, all these are subsidiary to the key objectives of service to the patient, which constitutes the basic principle that underlies all activities in a hospital.

Various literatures while describing the origin of hospitals stated that religious forces and institutions was the main force behind the development of hospitals rather than the development in the medical services. It is at times difficult and complex task to dissociate development of hospitals from religion as in some cases like early Roman or Greek civilisation, temples of Gods were utilised as hospitals. But in 400 BC Hippocrates made it possible to separate medicine from religion on rational grounds.

Modern hospitals are very complex socio-economic, scientific and highly labour-oriented organisations. Still they owe their origin to the sufferings and ailments of people and to the compassion and zeal amongst some philanthropers, to relieve these sufferers from agony of suffering and discomfort.

Today hospital means an institution in which sick or injured persons are treated. A hospital is different from a dispensary because hospital being primarily an institution where in-patients are received and treated while the main purpose of a dispensary is distribution of medicine and administration of out-door relief.

There are many definitions of hospital available in literature and dictionaries, but not a single definition is perfect in defining a modern hospital and its multifarious services. Even with WHO, there is no proper definition available. The WHO expert group has defined the role of hospital as:

WHO Definition of Hospital

Hospital is an integral part of a social and medical organisation, the functions of which are to provide the population, complete health care both curative and preventive with out-patient services reaches out to the family in its own environment and also to carry out training of health workers/functionaries and the bio-social research.

Other than this WHO definition, the definition given in the "Directory of Hospitals in India, 1988" is to some extent simple and short. According to this definition, "A hospital is an institution which is operated for the medical, surgical and/or obstetrical care of in-patients and which is treated as a hospital by the Central/State Government/Local Bodies or licensed by the appropriate authority".

Check Your Progress 1

1) Fill in the blanks:

   i) The term 'Hospital' is derived from the word .....

   ii) As per WHO definition a hospital is a ..... and ..... organisation.

2) Write True (T) or False (F):

   i) The main objective of the hospital is to provide adequate care and treatment to its patients. (T/F)

   ii) Modern hospitals are not labour oriented organisations. (T/F)

   iii) A hospital and a dispensary serves the same purpose. (T/F)

1.3 HISTORY OF HOSPITALS IN INDIA

The Hospitals in India have a long history in its development starting from the ancient time i.e. from the Era of Emperor Ashoka or may be much earlier than that of Vedic Era to the more recent modern hospitals. The brief accounts of the same are as follows:

1.3.1 Development of Hospitals in Ancient India

In India, the history of hospitals can be traced back to the times of Emperor Ashoka (273-232 BC), who not only built the most outstanding of the early hospitals for human beings, but also for animals with the motive and intention to spread Buddhist ideology of sympathy for the sick and every creature in his kingdom should be healthful without 'soka' (i.e. without lamentation and depression). Charaka and Sushrutha of ancient India were famous physicians. Medicines based on the Indian system (basically Ayurveda) was taught in the University of Takshilla and Nalanda, which probably contributed to the advances in Arabic medicine. The "Upakalpa-viyam Adyayam" of Charake Suthresthanam gives specifications for hospital buildings, labour rooms and children wards. The qualifications for hospital attendants and nurses as well as specifications for hospital equipment, utensils, instruments and diets have also been given. There is evidence to show that there were many hospitals in South India in the olden days, as observed in Chola and Malakapuram edicts.

The historical account of the ancient Indian medicine cannot authentically be described for want of inscription and manuscripts or other records as are available of other system of medicines such as of Egypt. But we do find from the books written by Arabian and European travellers (about 600 A.D.) that the study of medicine in India was in its bloom. Every major city had a medical school. The decline of Indian medicine started from the Mohammedan invasion in the 10th century A.D. which was a period of unrest. The zeal of the native "Vaidyas" for the investigation of the Indian flora slackened for want of encouragement. The invaders brought with them their own physicians called "Hakims" who followed Greek system of medicine generally worded as "Unani". Under imperial patronage, the "Hakims" began to prosper at the expense of "Vaidyas". The maintenance of hospitals in India declined during this period considerably but it gained impetus only in British period in the 16th century A.D.

Thus, in ancient period, roughly up to 18th century, system of medicine and practice known as "Ayurveda", "Siddha" and "Unani" were in practice. Except these practices and functions the ancient hospital did not cater to the acute and serious sickness as do the hospitals of modern times. But they were mainly concerned with the care of the sick for the balance of their lives.

The use of "Allopathic" system of medicine commenced in the 16th century with the arrival of European missionaries in South India. It was during British rule that there was once again progress in the building of hospitals. Though the first hospital in India was probably built in Goa, as mentioned in Fryer's Travel, the East India Company established its first hospital in 1664 for its soldiers and another in 1684 for civilians at Madras. The establishment of a hospital in Bombay was under discussion in 1670 but apparently it was not actually taken up till 1676. The earliest hospital in Calcutta was built in 1707-1708 and in Delhi in 1874.

During 17th and 18th centuries, there was a slow but steady progress in the growth of the modern system of medical practice in India and the indigenous system was pushed to the background. In the 19th century, modern medicine took firm root. Medical care based on this system spread all over India, mainly through the efforts of the missionaries.

The Portuguese organised hospitals of the European type at Calicut (Kerala), Goa and Santhome (Madras) through missionary organisations. They set up treatment centres and trained local men and women as dressers, nurses etc. In the early stages, missions were financed by foreign sources but later on when the people realised their value, local support and subsidies were available.

Organised medical training started in the 19th century and precisely in 1822, the East India Company established a medical school at Calcutta and in 1835 made it a medical college, followed by one in Madras. In the beginning both the modern system and Ayurvedic system were taught. Later on when the universities were started, some of the medical schools were taken over and converted into medical colleges. At the end of the 19th century, there were four medical colleges in India in addition to a number of medical schools with lower levels of instructions i.e. L.M.P. etc.

By the end of 19th century, the attitude of community towards hospital system also began to change. They started realising that hospitals are not meant for the terminal stages of disease and life, and hence the dumping place for the patients of chronically ill or at the terminal stage of the disease. As a result of this, importance was given to the hospitals and the

volume of work increased and the whole picture (i.e. structure, administration, functionary etc.) greatly changed.

In the early years of 20th century, more efforts were made to remove the stigma on the performance and a bad image of the hospitals by transferring their administration from "Public Assistance Powers of Local Administration" to the "Health Committees", and these hospitals, later were named as "Public Health Hospitals". Many hospitals and dispensaries, originally started to treat army personnel, were handed over to the civil authorities for treating the civilian population. Local governments were encouraged to start hospitals at the taluk and district levels and gradually they were taken over by the states or provincial governments and run as taluk and district hospitals. The members of the Indian Medical Service ran many of these district hospitals at the provincial headquarters. Some hospitals at the provincial headquarters were converted into teaching hospitals and attached to medical colleges.

Between the World War I and II much thought had been given to the reorganisation of hospital services by the constitution of number of Commissions of Inquiry on the subject. Further, after the wars, the civilian hospitals were encouraged to adopt the methods of "rehabilitation" or "fitness" centres as a means of restoring the lives of patients to working capacity. Thus, these centres, really and undoubtedly did valuable work, not only in surgical conditions, but in a wide range of medical treatment as well.

1.3.2 Development of Hospital Services after Independence

After attaining freedom, there was rapid industrialisation in the country; but at the same time there was continuous growth of population which caused a number of medical and health problems. On the eve of independence, there were 7,400 hospitals and dispensaries in India. There were 1,13,000 beds, giving bed population ratio of 0.2 per thousand population. There were 19 medical colleges and 19 medical schools. It was also realised that due to rapid increase in population which was unable to cope up with the limited availability of resources in all forms i.e. man, money and materials, the poverty went on increasing. Also as a consequence the various medical and health problems started cropping up in a big way for whole of India. Special efforts were, therefore, made to solve those health problems and various committees were set up from time to time with definite terms of references. These Committees as per their objectives and terms of reference, gave their recommendations about health care, medical care and hospital administration. Some of these important Committees were: Bhore Committee, Mudaliar Committee, Jain Committee, Shrivastava Committee, Sidhu Committee, Rao Committee, Bajaj Committee etc.

According to Health Information India (1995-96), as on 1st January 1996, India had 146 medical colleges, also more than 15,097 hospitals with over 6,23,819 beds admitting about 30 million patients each year (with a bed population ratio of about 0.67 beds per 1000 population) and giving treatment to an un-estimated number of out-door patients.

Out of all these hospitals and beds, there are 4621 rural hospitals with over 1,22,453 beds available. In the urban areas there are about 10,416 hospitals with the number of beds around 5,01,368. When these hospitals are divided into the Government, local bodies and private and voluntary, 4473 Government hospitals have 3,75,987 beds, 335 local bodies' hospitals have 19,677 beds and 10,289 private and voluntary hospitals have 2,28,115 beds.

Since independence, though lot of advancement has been made in the field of medical sciences in the country, still the availability of beds for the general population is far below than its actual requirements. The total number of beds available at the time of independence was roughly about 0.25 per 1000 population. Though this figure has increased to 0.75 beds per 1000 population till 1991, but again in 1995 this figure has come down to 0.67 beds per 1000 population (Refer Table 1.1). Still all these figures are far below the national target of atleast 1 bed/1000 population that was recommended by Mudaliar Committee way back in 1961. Even to maintain this current bed/population ratio with the existing trend of need population growth, require that 6000-7000 beds still need to be added every year. If this much number of beds are not added then the availability of the beds will go on decreasing and will result to over crowding and further mis-management of the existing Hospitals.

Table 1.1 : No. of Hospitals, No. of Hospital Beds and No. of Beds all types along with ratio

Years (As on 31/12/92)	No. of Hospitals	No. of Hospitals per 1000000 population	No. of Hospital Beds	
			Actual	Ratio per 1000 population
1951	2694	7	-	-
1961	3054	7	-	-
1971	3862	7	-	-
1981	6804	10	476226	68
1982	6897	10	486805	68
1983	7189	10	500628	69
1984	7369	10	514989	69
1985	7474	10	535735	71
1986	8067	10	555264	72
1987	9803	12	585889	74
1988	10840	13	598059	74
1989	11079	13	602490	74
1990	11571	13	629453	75
1991	11174	13	642103	75
1992	13692	16	596203	70
1993	14867	17	615156	69
1994	15033	17	621250	69
1995	15097	16	623819	67

* Figures are provisional

Source: Directorate of Health Services (1995-96)

Even this ratio of 1 bed/1000 population is far below than the bed/population ratio available in other developed and developing countries. The figures in some of these countries are:

US/USA/Europe	:	About 10-15 beds/1000 population
Scandanevian Countries	:	About 18 beds/1000 population
Erstwhile USSR	:	About 20 beds/1000 population
Sri Lanka	:	About 3-5 beds/1000 population
Thailand	:	About 3 beds/1000 population

Also another striking feature observed over the last one decade was that the number of hospitals/beds available with the Government set-up is decreasing considerably in comparison to the number of hospitals/beds available with private and voluntary set-up. (Refer Table 1.2)

Table 1.2 : No. of Hospitals and Beds Available with Government set-up and with Private and Voluntary Organisations in Various Years

Sl. No.	Year	No. of Hospitals and Beds in		Total
		Govt. (Including Local Bodies)	Pvt. & Vol. Organisations	
1.	1983	3879/352539	3022/134266	6901/486805
2.	1989	4504/421025	5641/177034	10145/598059
3.	1992	4757/435215	6417/206888	11174/642103
4.	1993	4579/385216	9113/210987	13692/596203
5.	1995	4808/395664	10289/228155	15097/623819

Source: Health Information India 1983, 1989, 1992, 1994 & 1995-96

To begin with more number of hospitals and their beds were available with Government set-ups. The private and voluntary organisations were not that much involved. But over the years with the change in policy of the Government the trend is gradually changing. Now, as

it is shown in Table 1.2, more number of Hospitals and their beds are available with private and voluntary organisations. Government is investing proportionately less for construction of hospitals and increasing the number of beds in its existing infrastructures. The main reasons for this may be:

i) Lack of resources and trained manpower available with Government.

ii) Recent change in policy with the Government i.e. to induct and encourage the private and particularly the voluntary and non-governmental organisations to be involved in health care delivery system and mainly in the secondary and tertiary level of health care in which hospitals are one of the important aspects.

Check Your Progress 2

1) Documented mention of Hospitals was found in which ancient period in India?

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2) What are the traditional systems of medicines present in medieval India?

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3) When did 'Allopathic' System of Medicine come in India?

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4) What is the recommended bed/population ratio in India? What is the current ratio?

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5) In which year and city of India the first hospital was established?

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1.4 CLASSIFICATION OF HOSPITALS

As you know, there is no universally accepted method for classification of hospitals available. In the year 1988 for the first time an effort was made and it was published in the Directory of hospitals in India. The Directory of Hospitals in India—1988 lists the various types of hospitals and the types of management. Based on this the hospitals can be classified in many ways. They can be classified according to their objectives or according to the type of patient treated or according to ownership and control. The various commonly accepted criteria for classification of the modern hospitals are as follows:

1.4.1 According to Directory of Hospitals

a) ***General Hospital***: All establishments permanently staffed by at least two or more medical officers, which can offer in-patient accommodation and provide active medical and nursing care for more than one category of medical discipline (e.g. general medicine, general surgery, obstetrics, paediatrics etc.).

b) ***Rural Hospital***: Hospitals located in rural areas (classified by the Registrar General of India) permanently staffed by at least one or more physicians, which offer in-patient accommodation and provide medical and nursing care for more than one category of medical discipline (e.g. general medicine, general surgery, obstetrics and paediatrics).

c) ***Specialised Hospital***: Hospitals providing medical and nursing care primarily for only one discipline or a specific disease/affection of one system (e.g. tuberculosis, ENT, eye, leprosy, orthopaedic, paediatric, cardiac, mental, cancer, infectious disease, venereal diseases, maternity, etc.). The specialised departments, administratively attached to a general hospital and sometimes located in an annexe or separate ward, may be excluded and their beds should not be considered in this category of specialised hospitals.

d) ***Teaching Hospital***: A hospital to which a college is attached for medical/dental education.

e) ***Isolation Hospital***: This is a hospital for the care of persons suffering from infectious diseases requiring isolation of the patients.

1.4.2 According to Ownership and Control

Hospitals can also be classified on the basis of ownership and control. The hospitals classified according to this are shown in Fig. 1.1. Few of these types are discussed below:

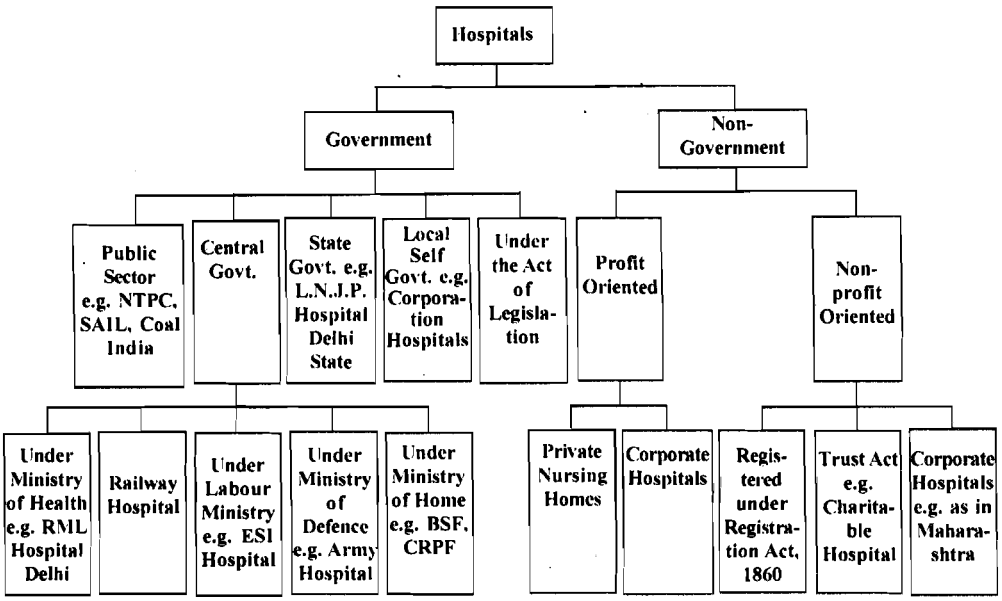

Fig. 1.1: Classification of Hospitals on Ownership Control Basis

a) ***Public Hospitals***: Public hospitals are those run by the Central Government, State Governments, Local Bodies and public sector undertakings etc. on non-commercial lines. The hospitals may be general hospitals or specialised hospitals or both. General hospitals are those that provide treatment for common diseases, whereas specialised hospitals provide treatment for specific diseases like infectious diseases, cancer, eye diseases, psychiatric ailments, etc. General hospitals can diagnose patients suffering from infectious diseases, but refer them to infectious disease hospitals for hospitalisation, as general hospitals are not fully equipped to treat infectious disease patients.

b) ***Voluntary Hospitals***: Voluntary hospitals are those which are established and incorporated under the Societies Registration Act, 1860 or Public Trust Act, 1882 or any other appropriate Acts of the Central or State Governments. They are run with public or private funds on a non-commercial basis. No part of the profit of the voluntary hospital goes to the benefit of any member, trustee or to any other individuals. Similarly, no member, trustee or any other individual is entitled to a share in the distribution of any of the corporate assets on dissolution of the registered society. A board of trustees, usually comprising prominent members of the community and retired senior officials of the government, manages such hospitals. The board appoints an administrator and a medical director to run such voluntary hospitals. These hospitals spend more on patient care than what they receive from the patients. There is, of late, a trend among voluntary hospitals to charge reasonably high fees from rich patients and very little from poor patients. Whatever they earn from the rich patients of the private wards is spent on the patients of general wards. However, the main source of their revenue are public and private donations, and grants-in-aid from the Central

Government, the State Governments, and from philanthropic organisations, both national and international. Thus, voluntary hospitals run on a 'no profit no loss' basis.

c) ***Private Nursing Homes***: Private nursing homes are generally owned by an individual doctor or a group of doctors. They accept patients suffering from infirmity, advanced age, illness, injury, chronic disability, etc. or those who are convalescing. They do not admit patients suffering from communicable diseases, drug-addiction or mental illness. There is, however, no uniform definition for nursing homes. The phrase may refer to out-of-home care facilities that offer a range of services similar to many found in a hospital. These nursing homes are run on a commercial basis. Naturally, the ordinary citizens usually cannot afford to get medical treatment there. However, these nursing homes are becoming more and more popular due to the shortage of government and voluntary hospitals. Secondly, wealthy patients do not want to get treatment at public hospitals due to long queues of patients and the shortage of medical as well as nursing staff leading to lack of medical and nursing care.

d) ***Corporate Hospitals***: The latest concept is of corporate hospitals which are public limited companies formed under the Companies Act. They are normally run on commercial lines. They can be either general or specialised or both.

Some of the other criteria for classifying the hospitals are as follows:

1.4.3 According to the Systems of Medicine

The hospitals in very broad terms may also be classified according to the system of medicine that is been practiced there. Hence the hospitals are named as "Allopathic", "Homoeopathic", "Ayurvedic", "Naturopathic", "Unani", and "Siddha" etc.

1.4.4 According to the Bed Strength

Arbitrarily the hospitals can be classified into large, medium and small, depending upon the number of beds available in that hospital. Roughly any hospital having more than 500 beds is a large hospital, one having the bed strength between 200 to 500 is a medium hospital, and a hospital having less than 200 beds is a small hospital.

1.4.5 According to Clinical Basis

A clinical classification of hospitals is another basis for classification. Some hospitals are termed as "General Hospitals" whereas others are "Specialised Hospitals" according to the speciality it is dealing with. In a general hospital, patients are treated for all kind of diseases but in a specialised hospital, patients are treated only for those diseases for which hospital has been set-up, such as heart disease, cancer, eye, maternity, gastro-enterology, neurology, psychiatry etc.

1.4.6 According to Length of Stay of Patients

Hospitals can also be classified according to the length of stay of patients. A patient may stay for a short-term in a hospital in the diseases like gastro-enteritis, fever etc. or may stay for long-term for the treatment of diseases such as tuberculosis, cancer, schizophrenia, etc. Therefore, a hospital may fall either under the category of short-term or long-term (now known as acute and chronic-care hospitals respectively) according to the period of stay in the hospital.

Check Your Progress 3

1) Enumerate types of Hospitals in India according to Directory of Hospitals in India—1988.

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2) Classify hospitals according to management and control in India.

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3) Classify hospitals according to systems of medicine in India.

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4) Classify hospitals according to bed strength in India.

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5) Classify hospitals according to clinical basis in India.

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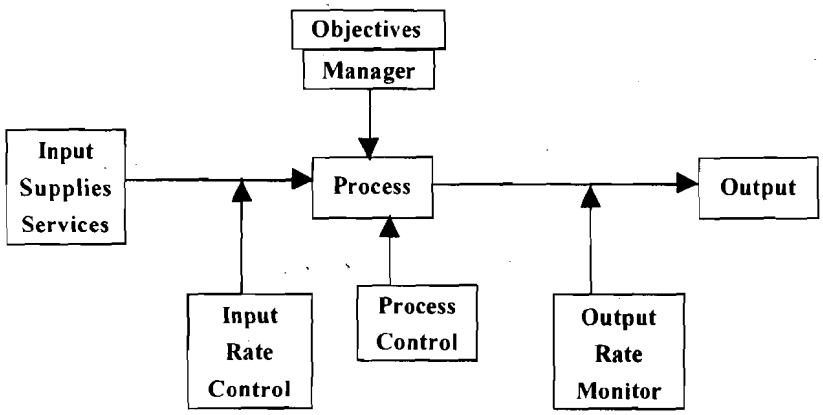
1.5 HOSPITAL AS SYSTEM

The hospital system has its external environment and linkages. Therefore, to understand the hospital system, one has to look at the hospital as an open system. A general hospital, within the immediate environment of health care organisation and the larger environment of the community are interdependent. The hospital services have to be considered as a socio-technical system within the health care system that copes with the constraints from both the internal and external environment.

Definition of System

A system has been defined in the Oxford English Dictionary as simply "a set or assemblage of things, connected, or interdependent, so as to form a complex unity; a whole composed of parts in orderly arrangement according to some scheme or plan." To be more precise a system is a hierarchical chain of systems and sub-systems, interconnected and interdependent, having clear objectives at each level of the system or subsystem, obtains enough inputs from its environment to offset its output, and operates with varying processes or methods to achieve the ultimate objective of the system. As per Katz and Khan social systems are anchored in the attitudes, perceptions, beliefs, motivations, habits and expectations of human beings.

The system as defined is illustrated below:



The above figure represents a model of a system or a subsystem, which has a clear objective, and consists of three basic elements, i.e. input, process and output. Each component of a system is controlled in a manner as to achieve the ultimate objectives of the system or subsystem.

In hospital patient is key input, but human resources, personnel of various categories and other resources like drugs and supplies, equipments, information, research findings and feedback from the output also constitute part of the total output.

In the systems approach, quality of output is an important variable that affects input in any part of the hospital. With increased concern for sick patients or beneficiaries, attention has also to be directed towards external environment outside hospital organisation. This complicates the problem because under the circumstances hospital has become the impact point because when patient enters a hospital, a great many groups get involved both inside and outside the hospital to treat him and help him to recover.

Inside, patient is concerned with admissions, diagnosis, treatment and provision of ancillary house-keeping services. Outside, he is involved with relatives, hospital rules and regulations and the community. This makes hospital a much more complicated system and the character of the hospital would much depend on the patient's flow in the hospital. Thus patient system becomes basic to the hospital system.

1.5.1 Functions of Hospital

The size of a hospital, the patient flow and the community needs also determine the nature of sub-systems required for effective functioning. The main functions of the hospitals are:

a) **Restorative or Curative**

This includes diagnosis, treatment, rehabilitation and to provide emergency medical care.

b) **Prevention of Diseases and Promotion of Health**

Supervision of MCH and family welfare includes immunisation, control of various communicable and non-communicable diseases, health education. Also hospital is a centre where the health education activity for the community can be done very effectively. As the patients and their relatives are in a right frame mind to accept and subsequently practice the preventive and health promotive measures for the diseases from which they are suffering.

c) **Surveillance Centre**

Surveillance centre for both communicable and non-communicable diseases can also generate most reliable mortality and morbidity data for the area or community to which this hospital is rendering its service.

d) **Education and Research**

Basic education, various inductions and in-service training programmes for graduate and post-graduate doctors, nurses and other paramedical staff.

e) **Professional Support**

Intellectual and professional support need to be provided to medical practitioners at stipulated cost.

f) **Early detection of epidemics**

Hospitals particularly the outpatient departments play a very important role in early detection of the epidemic along with the definite geographical mapping of that area and the population at risk. As the OPDs are the places where the first patient of the potential epidemics usually arrives well before the epidemic is actually breaking out.

g) **Primary Health Care (PHC) Programme**

To become a part of primary health care (PHC) programme, every hospital need to take some role such as:

i) To provide support to PHC.

ii) To promote community health development action.

iii) Basic and continuing education to workers engaged in PHC.

iv) Research on PHC (How to remove various socio-cultural barriers) etc.

The hospital should regard health as a value and focus on prevention, use of appropriate technology, community involvement and multi-sectoral approach. The strengthening of co-ordination through improved exchange of information collected through passive surveillance by the hospital is an important aspect. The value of information feedback with regard to referrals and communicable diseases from the field to hospital and hospital to field is essential. Moreover it is important for undertaking epidemiological measure and saving the community from lots of serious diseases.

1.5.2 Hospital Organogram

Hospital organisation is unique because of the various complexities involved therein. These complexities have been varying with increasing interest of all sections of society within the hospital. The complexity of the modern hospital results from a number of attributes:

1) There is a wide diversity of objectives and goals for different personnel and sub-system.

2) The diversity of personnel ranges from highly qualified and skilled physicians to unskilled and uneducated employees. Enabling them to work as a team is a challenge.

3) In many areas of hospital operation, there are dual lines of authority. Administrators are responsible for solving a wide variety of management problems and physicians are responsible for patient care education and research. Often, these two seemingly distinct areas of activity overlap, and, in fact, some employees may have two or more persons to whom they are responsible.

4) The problems of life and death put tremendous pressure on administration and functioning of hospitals.

5) The patient care rendered in the hospital has eluded precise measurements.

6) Simple management principles like unity of command, order, unity of objectives etc. become difficult to apply in different situations.

All these factors coupled with the special importance of hospital, make it difficult to fit it into any of the traditional organisation structures like line, line and staff or functional organisations. In view of the fact that hospital functionaries cannot avoid duality of controls at different levels and the fact that simultaneous vertical and horizontal controls are necessary for achieving the objectives of the hospitals.

In the following pages the terms of references and recommendations about health care, medical care and hospital management specifically contained in the reports of some significant committees are described briefly.

1.5.3 Role of Hospitals in Primary Health Care

Hospitals can play and should play a very important and vital role for providing primary health care to the community. Even to the extent, it can give a leading role for providing primary health care in a given area. The role of hospital in primary health care could be better understood by knowing the health systems operating in that area. It is based on the following factors:

1) The extent to which population served by that hospital is well demarcated.

2) The number and size of other hospitals available in the area.

3) The type of ownership of the hospitals and the interaction between them.

4) The level of development of hospital services in relation to community health needs and comprehensiveness of the services.

5) The level of adequacy of referral arrangements.

The situation in the country is such, that so far development of other health care sub-systems are weaker than the hospitals. This situation to some extent is universal in all health systems. The hospitals are too dominant, secondly too little attention is paid to the

links between hospitals and primary health care and its workers in the field. The institutions still lack co-ordination and clearly defined role boundaries.

The situation is further complicated because most of the hospitals in Government sectors are facing the most severe financial and manpower problems, whereas the hospitals in private sectors though by and large are not having any such problems to a great extent, still they are not committed for providing primary health care. Hence, the question, for the Government hospitals, who are the main providers for primary health care, is not how they take newer roles but rather how they can contain the cost and quality of services and survive in their present crisis.

However, the experiences of different countries of the world can provide certain insights into the possible roles which hospitals like to pursue to fulfil the goals of Health For All through primary health care. Those experiences have shown that:

1) Hospitals have played their part in health education and health promotion and their example will be of significance to health promoters.

2) Community involvement is fundamental to the primary health care and it applies to hospitals as much as to any other parts of the health system.

   But the key issues of community participation are:

   a) The kind of participation to achieve the specific goals.

   b) Who should participate from community?

   c) The type and method of participation.

   It requires radical change in the thinking of the medical professionals in the hospital and close interaction with health care providers in non-governmental and private voluntary organisations too.

3) Hospitals can play a role in planning, co-ordination and even implementation of at least such health programmes as:

   a) Mother and child at risk.

   b) Programmes requiring surgical assistance.

   c) Single disease care programmes throwing cases for hospitalisation.

   d) Referral load of cases detected during follow-up.

   e) Diagnostic back-up services.

   f) Specialist back-up services.

   g) Sentinel centre for immunisation programmes.

   h) Passive surveillance centre for many diseases.

   i) Logistic support for drugs and other equipments.

4) In developing referral system as an integral part of the district health care system, referral is a critical problem. The movement of patients between the different levels of health care is one of the aspects that effect the population most directly. The effectiveness of the system will depend on people's confidence in the hospital system and in other levels of the system and the personnel working therein.

5) Providing technological support to different levels of health care.

6) Extending specialist consultation services to out-reach areas in order to understand and prioritise community health problems and screen cases for future health camps and referral.

   Thus, hospital as an institution might benefit from being redefined as a community health-oriented institution which means that it is not only disease-oriented but has responsibilities in the field of health prevention and promotion as well as acquires skill and perspective about more developmental aspects of primary health care and its management.

Check Your Progress 4

1) Enumerate the five major functions of the hospitals.

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2) List the role of Hospitals in Primary Health Care.

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1.6 LET US SUM UP

In this unit you have learnt about the evolution and classification of the hospitals. Right from the vedic era and era of Emperor Ashoka how the hospitals have slowly and steadily developed to this era of modern medicine. Also you have seen how many types of hospitals are there and their classification according to various ways. After more than 50 years of Independence, with lot of pride we can claim that this country has made tremendous development in the field of Medical Care. Thanks mainly goes to the latest advent of technology in the field of Medical Care particularly the Tertiary level care. Also honour goes to the specialists in this field who are considered one of the finest in the world. This development also is possible for the policy decision taken by the Government regarding privatisation of the Secondary and Tertiary level of health care which is primarily taken care by the Hospitals only. With the combined effect and efforts of all these, India is becoming one of the top most country in the world, where the best quality of hospital services will be available.

You have also learnt that, even after 50 years of Independence an average Indian Hospital continues to be primitive and underdeveloped. Incidentally these are the Hospitals mainly used by majority of the common people and are run by the Government or Public Sectors. Whereas though above mentioned private hospitals are providing quality services but they are so costly hence are practically beyond the reach of a common citizen of the developing country like India. Further you have learnt about the post independence seenario of hospitals.

After independence, the medical care through the hospitals was mainly in the government sector i.e. through Central Government, State Governments or in Public Sectors. Only few hospitals were available in Non-government Sectors (mostly in voluntary organisations). With the advent of latest technology and super specialisation in medical care the cost started increasing in leaps and bounds. Also the maintenance of the super specialised/tertiary level hospitals started becoming very costly, that too when the services are to be provided free of cost. Hence, the government took a decision (National Health Policy, 1983) that by and large the government will not be having any new hospital until otherwise it is absolutely necessary. Rather the private sector and the voluntary organisations will be encouraged and given incentives to set up new hospitals. Government as and when required would buy the services from these hospitals. As a result of this decision after 1986 no new major hospitals had come up in the government sector whereas lot of hospitals are there in the Non-government sector during this period. As a result of this, now we can see the number of hospitals are more in Non-government sector (almost double the number) than in the government sector.

Towards the end of this unit you have learnt about hospital as a system, its function,

1.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) "HOSPITUM"

2) Medical, Social

3) i) T ii) F iii) F

Check Your Progress 2

1) In the era of Emperor Ashoka, i.e. 273-232 BC.

2) Basically the Ayurvedic System of Medicine along with Siddha and Unani.

3) In the 16th century through European missionaries.

4) Recommended Ratio is 1 bed/1000 population. Current ratio is 0.67 bed/1000 population.

5) In 1664 at Madras.

Check Your Progress 3

1) General Hospital, Rural Hospital, Specialised Hospital, Teaching Hospital, Isolation Hospital.

2) Central Government, State Governments, Local Bodies, Private, Autonomous Body, Voluntary organisation.

3) Allopathic, Homoeopathic, Ayurvedic, Naturopathic, Unani and Siddha.

4) Large, medium and small.

5) General Hospitals and specialised Hospitals.

Check Your Progress 4

1) Curative, preventive and promotion, education and research, professional support, surveillance centre.

2) Health Education, Specialist support, Diagnostic support, Logistic support, Referral support, Surveillance centre.

UNIT 2 HOSPITAL ORGANISATION

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- describe briefly hospital as an organisation;
- understand evolution of hospital administration;
- understand functioning of hospital;
- describe five subsystems of hospital viz. clinical nursing, diagnostic, supporting and auxiliary services; and
- describe hospital as matrix organisation.

2.1 INTRODUCTION

In this unit you will learn about hospital organisation. Hospital is made of subsystems of clinical departments, nursing services, diagnostic services, support services and auxiliary services. The best way to organise hospital is by matrix organisation.

In this unit you will learn about hospital organisation, as to how it is organised by departmentation or as matrix. The hospital is made up of a series of departments, which work together in a system to render medical, nursing and support services. You should also relate hospital as an organisation within larger spectrum of health care.

You should think hospital as complex organisation having departments of multi-discipline managed by medical, nursing, para-medical and service personnel. You as a budding hospital administrator should think of organising hospital only by departmentation which has its own merits and de-merits and also think of multiple factors like cost of medical care, the type of hospital clientele it is serving and their expectation.

You are aware of diversity of agencies owning hospital like governmental hospitals which include centre, state and local bodies, charitable organisation, private hospitals and corporate hospitals providing medical care services, hence there is no uniformity pertaining to hospital organisation. Even there is no uniformity between all government hospitals hence you would see that there is no universal model that can be applied in organising hospital. The hospital organisations of this millennium would also be effected by new techniques of tele medicine, information technology and TQM (Total Quality Management). The developing countries also have to think health care at affordable cost and thus organise their hospitals accordingly.

2.2 HOSPITAL AS AN ORGANISATION

You should try to think about hospital as a social organisation, as it is rational combination of the activities of a number of people for achievement of a common purpose or goal by

division of labour and function and through a hierarchy of authority and responsibility.

Organising is a process of grouping the necessary responsibilities and activities into workable units determining laying of authorities and communication and developing patterns of coordination, this would involve systemising of all technical and administrative activities so as to effect satisfaction to customers, employers and agencies that make it possible to organise. The organisational structure would depend on size of hospital.

You would perceive the top management is to direct and coordinate the activities of heterogeneous group of other subordinates managing various hospital services. Each of them exercise control over a unit. These departmental managers include at the upper end of the management scale the "line" managers of medical and nursing units like chief of medical/ surgical divisions, ward matrons, in charge of operation theatre etc. None of these may consider themselves as managers and they are also not formally trained for any managerial function.

The organisation process should culminate into a common goal towards which collective efforts are directed and the goal is spelt out in detail. There is a need for clear authority-responsibility relationship that power and authority factor need to be reconciled so that individual organisations are productive and goal directed and there is a clarity of organisational relationship, to reduce conflict that the unity of command must prevail and that authority must be delegated. You would also see that traditionally most hospitals have been structured according to a classical theory of organisation. The hospital organisation may be considered as it may have a structure making a pyramid organisation but functionally it would best fit into matrix organisation. This can be explained to students better by a

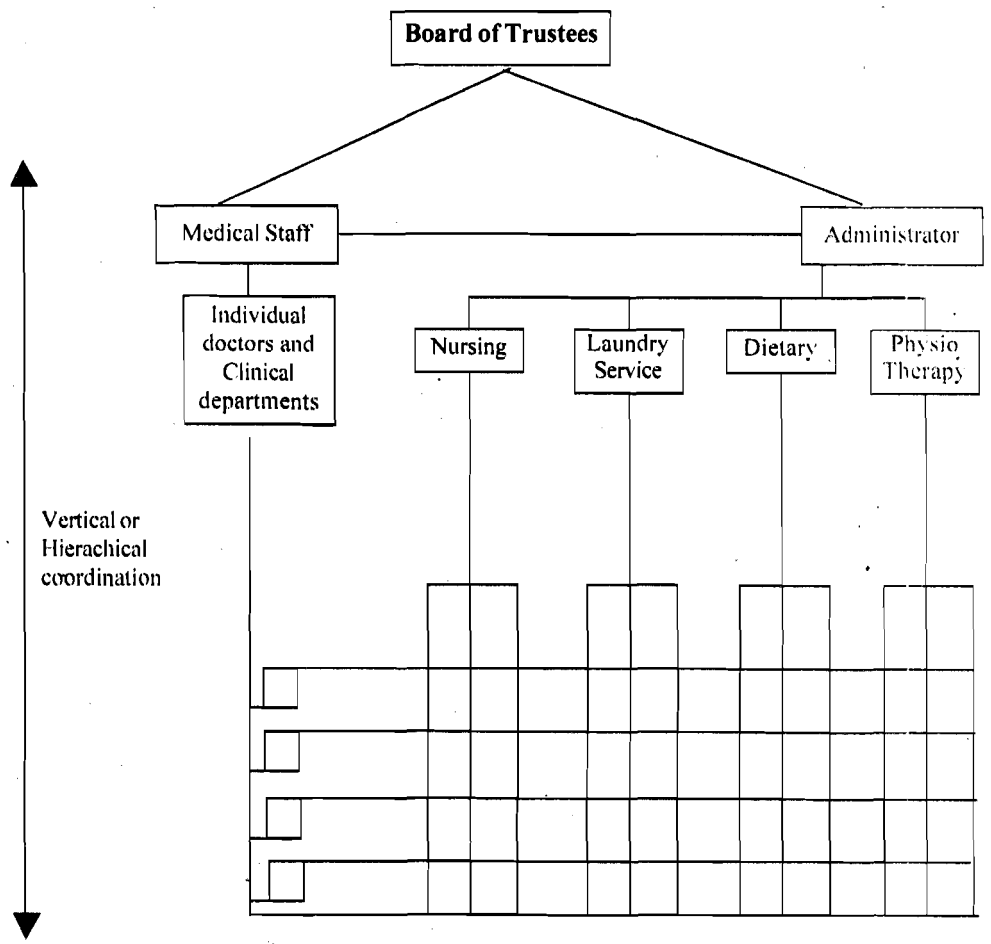

Fig. 2.1: Matrix Organisation

diagrammatic representation of matrix organisation:

The hospital organisation can be defined diagrammatically for better understanding of the students, however various hospitals depending upon their philosophy would have different organisational structure to provide patient care, the very purpose for which hospitals are created. One such organisational chart is shown in Fig. 2.2 for your understanding.

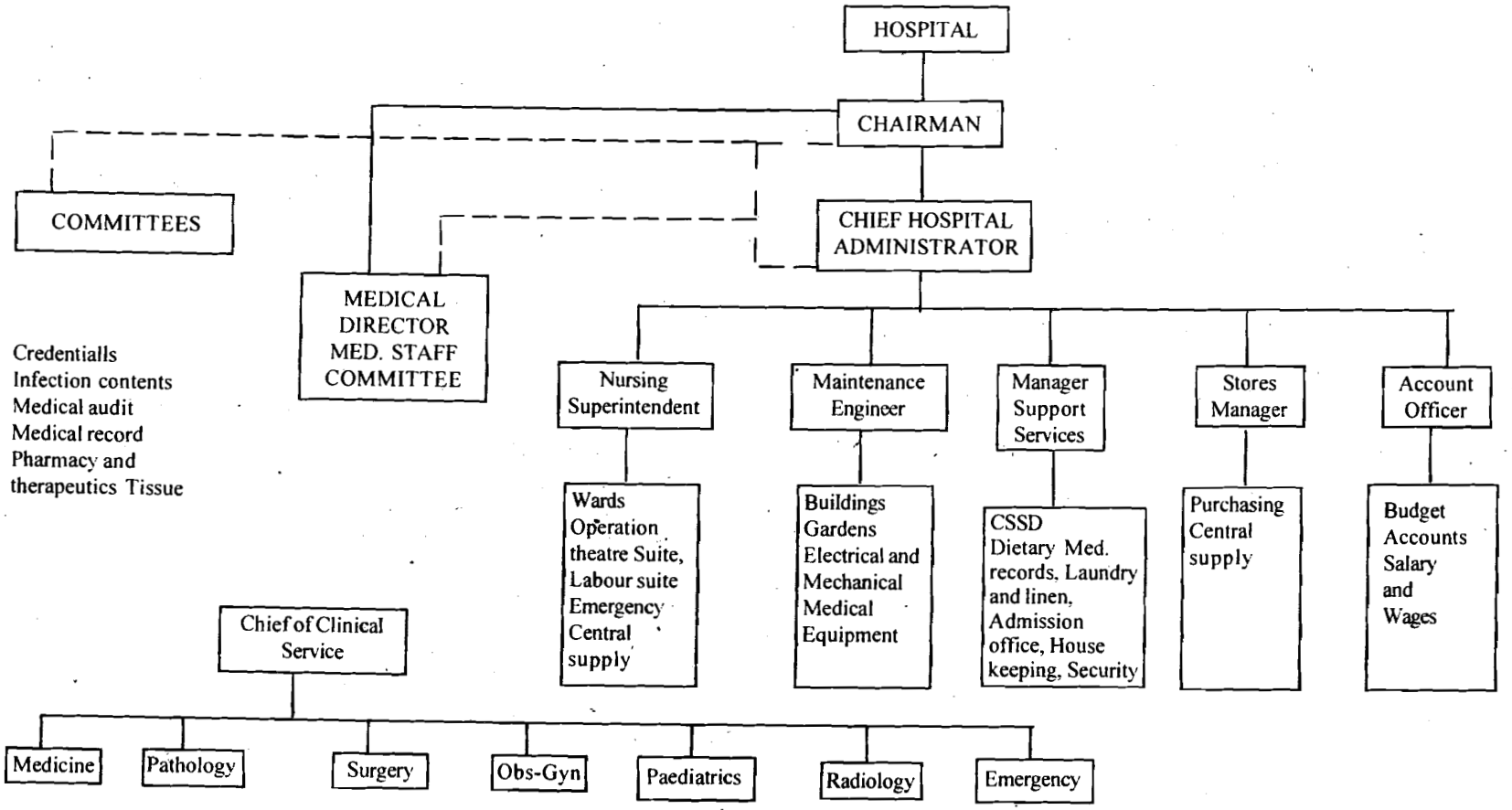

Fig. 2.2: Organisational Chart

——— **Direct Reporting**
– – – **Advisory Relationship**

2.3 EVOLUTION OF HOSPITAL ADMINISTRATION

The profession of hospital administration is unique because hospitals are complete organisation where highly qualified professionals are working in a " life and death" activity, and to manage such organisation the professionals require special skill; hence hospital administration evolved as a discipline over a period of time where very few formally trained hospital administrators are available in the developing countries, while most of the hospitals are being managed by managers who had on the job training and managing by the principle of traditional approach. Though hospitals have administrative and service functions that are common to other commercial enterprises, but it requires integrating with highly technical and clinical services with administrative and service departments like laundry and hospital engineering services functioning alongside highly technical, nursing and medical care activities. This variety and complimentary are what make hospital administration such a demanding profession.

In earlier days hospital administrators were selected from the rank of nursing service and registered nurse had been serving as hospital's head administrator. In Church hospital administrator was frequently selected from the rank of religion order.

In mid 1930 first formal university course for hospital administration was developed. The American College of Hospital Administration (ACHA) is an organisation that has influenced advancement of the profession of hospital administration. After World War II the field of hospital administration gained in status as the need for formally trained hospital administrators increased, however, the situation in developing countries including India is grim as hospital administration as a profession is still in infancy due to non availability of trained hospital administrator and pressure from clinicians to hold seat of "authority".

In 1939 American College of Hospital Administration designed a code of ethics for hospitals and health care executives, which defines as how health care executives should function within highest standard of ethical performance. The code has since undergone several revisions in order to keep pace with change in the profession.

The clinician and practicing physicians are taking greater role in hospital management and decision making process because it effects their professional lives and these clinicians are ever taking management roles as hospital's full time medical director.

The main task of hospital administrator is to coordinate hospital's resources in order to fulfil institution's medical care objective in the most efficient and effective way possible. He should manage personnel, materials, equipment and finances and is responsible for all function including medical staff functions, nursing, technical and general service activities.

The hospital administrators of 1940s and 1950s were primarily concerned with institutions' internal operation and those activities directly supporting care of hospital's patients. The hospital industry changed dramatically subsequently since many Governmental regulations came into existence. The hospital administrator has now two roles to perform, firstly managing those activities that went on in a hospital and secondly to understand and participate in community activities and assess the needs of community as these influence hospital's functioning. The hospital administrator of today is expected to show leadership within hospital and outside institution's walls. The major role of hospital administrator is also public relations and educating community about hospital matters to make hospital more acceptable by community.

2.4 HOW A HOSPITAL WORKS?

You should understand that hospital functions as 'matrix organisation'. The experts in hospital field have recognised that complex task and highly skilled professional workers call for colleageal participatory structure while semi skilled and unskilled to do repetitive nature work require hierarchical formalised structure. Thus there has to be matched physician at one end and services handled by lower expertise personnel like laundry, dietary services and housekeeping on the other end of spectrum while nurses and technical fall in between these two categories. Thus there are two schools of thought, first one is to run hospital on hierarchical basis and second to run it on cutting the vertical line horizontally and making hospital a matrix organisation. Thus matrix is a problem solving management concept where conventional philosophy or system cannot effectively function in a hospital system. Thus

matrix can be considered as contingency or situational theory of management. This process integrate them into temporary group with the objective of solving a complex problem that formal organisation and routine methods cannot solve.

The clinicians thus consume hospital services and resources for their department from hospital system and this forms lateral horizontal coordination across various services.

The hospital is organised under governing body and functions under a hospital administrator. The hospital has broadly five main components firstly clinical services where all clinicians under various departments provide medical care to the patients, secondly nursing services where all nursing personnel provide nursing care to patients, thirdly professional or diagnostic services like laboratory and radiology services, fourthly ancillary services like laundry, dietary and housekeeping services and fifthly auxiliary services like public relation department, welfare service, religious services and hospital inn etc. The students should study hospital working under these five main components and categorise various departments under these sub systems, which are covered under Courses IV and V to follow.

The hospital should organise itself with unity of command, proper span of control, delegation of authority, coordination, line and staff relationship and function as matrix organisation. These aspects are already covered under Course I.

You should understand that there is no one best way to organise a hospital. Traditionally hospitals are organised in a classical organisation mode which served them well and still does to great extent. The modern day hospitals are always seeking better ways to manage. It is clear that hospitals, that will succeed will do so by adapting to change.

Check Your Progress 1

1) Enumerate two of the important roles of Hospital Administration.

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2) What are the five main components of Hospital.

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3) When and where the code of ethics for Hospital Administration was designed for first time.

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2.5 MEDICAL STAFF AND HOSPITAL ORGANISATION

The greatest impact the medical staff has on hospital is its role in the quality of care provided by the hospital. The responsibility of governing body and hospital administrator is to monitor quality of medical care in the hospital provided by medical professionals.

The medical profession is highly trained and motivated professional group but these clinicians or medical staff vary greatly in their approach to care. In present era of knowledge explosion there are many super and sub specialities having very individualistic approach. The task of "Coordinating" the collective efforts of medical staff is a challenging one for the administration.

The medical staff functions as per rules, regulations, policies and guidelines laid down by the hospital board and administration. In India unfortunately we are not yet able to develop standards and guidelines for the hospitals like the ones developed, by joint commission of accreditation of hospitals in USA with the result each Indian hospital in his own wisdom had developed its own guidelines and standards and there is no monitoring body for assessing quality care of the hospital and accrediting hospitals.

The medical and clinical staff can be managed through management principles of Total Quality Management. They could be governed by developing its own rules, regulations and policies through various committee methods like organising utilisation committee, medical review, Infection control, medical record, tissue committee and various such committees where clinicians are told to assess their own quality of care to the patients and these committee reports are perused periodically by governing board and hospital administration. The details of these committees need to be studied by the students from various text books of hospital administration.

The monitoring of Quality Assurance is a necessary function of medical staff. The students should read details of medical audit, Quality assurance, TQM and accreditation of hospitals for better understanding of the subject.

The medical director is a member of hospital management board, he is not answerable to medical staff but to hospital administrator even though they work with clinical problem and medical staff issues. The medical director's responsibility is utilisation review, quality assurance and aiding hospital management in understanding medical staff policies. In fact new buzz word is now 'Total Resource Planning' of hospital and students should read about principles of the management philosophy.

The aim of hospital director and medical staff in organising hospital is providing quality care to the patients.

2.6 PROFESSIONAL SERVICE DEPARTMENT IN HOSPITAL ORGANISATION

The professional service departments are those departments which assist physician and medical team in diagnosing and treating the patient like Laboratory services, Radiology department, Physiotherapy department and Cardiac cath lab. However, it is Radiology and Laboratory services which invariably exist in every hospital hence students should study in detail and visit these departments in hospitals to have better understanding. These departments are revenue generating departments in private hospitals and are more complex than other hospital departments because they perform a variety of services that make great use of sophisticated equipment and technology and highly trained technical staff.

There have also been a lot of technological advancement in these departments in last two decades which student would like to know. There have been advancement in imagining by adding ultrasound, CT Scan and MRI and in laboratory services by use of semi and auto analysers and use of various kits. One could now diagnose with precision by using these diagnostic aids.

Laboratory services are part of pathology department which has shown tremendous growth and has great impact on patient care. The clinical laboratory services include bacteriology and blood banking. In 1950 virology, cytology and fluorescent studies in the hospitals were added. The primary purpose of present day hospital clinical laboratory is to assist physicians and other members of hospital's health team in diagnosis, prevention and treatment of diseases and illness by performing tests. This department has a major impact on QA programmes in a hospital. The laboratory reports are critical to come to a diagnosis of the patient and thus to provide quality treatment in hospital, QA is very necessary. The WHO has QA programme for laboratory services and in India accreditations of laboratory services have been organised in a humble way.

You while studying any department should think of space and design of department, its function, staff requirement, organisation, operation and functioning of the department, record generation, policies and procedure, equipment and material planning and its maintenance, quality assurance and total resource planning and assess department's capabilities and limitation through these indicators.

The radiology department made its beginning with invent of x-ray by professor of Physics Dr. W. Roentgen on 08 Nov., 1895 and since then there is no looking back for radiology department and entering into era of sonography, computerised tomography (CT) and magnetic resonance imaging (MRI).

Many of the procedures as in pathology department are performed on out patient and from emergency department. The department depending upon various facilities available is divided into diagnostic, therapeutic, radiology and nuclear medicine. In bigger hospitals all these three departments make independent entity while in smaller hospitals same department does all three functions. You students should see this difference by visiting radiology department of small and big hospitals.

Check Your Progress 2

1) Name the important committees required for total quality management in hospitals.

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2) Which department of the hospital has a major impact on QA programme?

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2.7 LET US SUM UP

In this unit you have learnt hospital as an organisation, its peculiarities, problems and ways and means to solve by management principles and understand hospital as a "matrix organisation".

The evolution of hospital administration and to understand the variety and complexity is what makes the hospital administration such a demanding profession.

You have learnt that hospital has five such components viz. clinical, nursing, diagnostic, ancillary and auxiliary.

You have been sensitised with various management principles applicable in the hospital field to provide cost effective medical care.

2.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) Managing those activities that went on in a hospital.

   b) To understand and participate in community activities and assess needs of community as these influence hospital's, functioning.

2) Five main components :

   a) Clinical Services

   b) Nursing Services

c) Professional or Diagnostic Services

d) Ancillary Service

e) Auxiliary Services

3) In 1939 American College of Hospital Administration designed a code of ethics for hospital and health care executives.

Check Your Progress 2

1) Various committees are: utilisation committee, medical review, infection control, medical record, tissue committee and various such committees where clinicians are told to assess their own quality of care to the patients.

2) Department of laboratory medicine or laboratory services.

UNIT 3 ROLE OF HOSPITALS

Structure

3.0 OBJECTIVES

After studying this unit, you will be able to:

- enumerate the various functions of hospitals;
- discuss role and peculiarities of hospitals and also challenging role to keep pace with rapid updation of technoloy and science;
- describe challenges hospital has to face; and
- deal with problems and select strategy for optimum functioning.

3.1 INTRODUCTION

This unit aims to familiarise you with the role and functions of hospitals within the community and futuristic challenges and changing role of Hospitals.

In the previous units of this block you have studied the process of evolution of hospitals, their classification, how hospitals are organised and functions as a system. In this unit you will learn about the role and functions of hospitals and how a hospital is related to the community it serves. You will also learn the peculiarities of hospitals which dictate the management needs, and the problems and challenges required to be handled by hospital. administration

3.2 EVOLUTION OF ROLE OF HOSPITALS

It is mentioned that early Hospitals in India were built by King Asoka (273-232 B.C.). The attendants were ordered to:

- give gentle care to sick
- furnish them with fruits and vegetables

- prepare medicines
- give massage
- keep their own person clean
- maintain confidentiality of patient

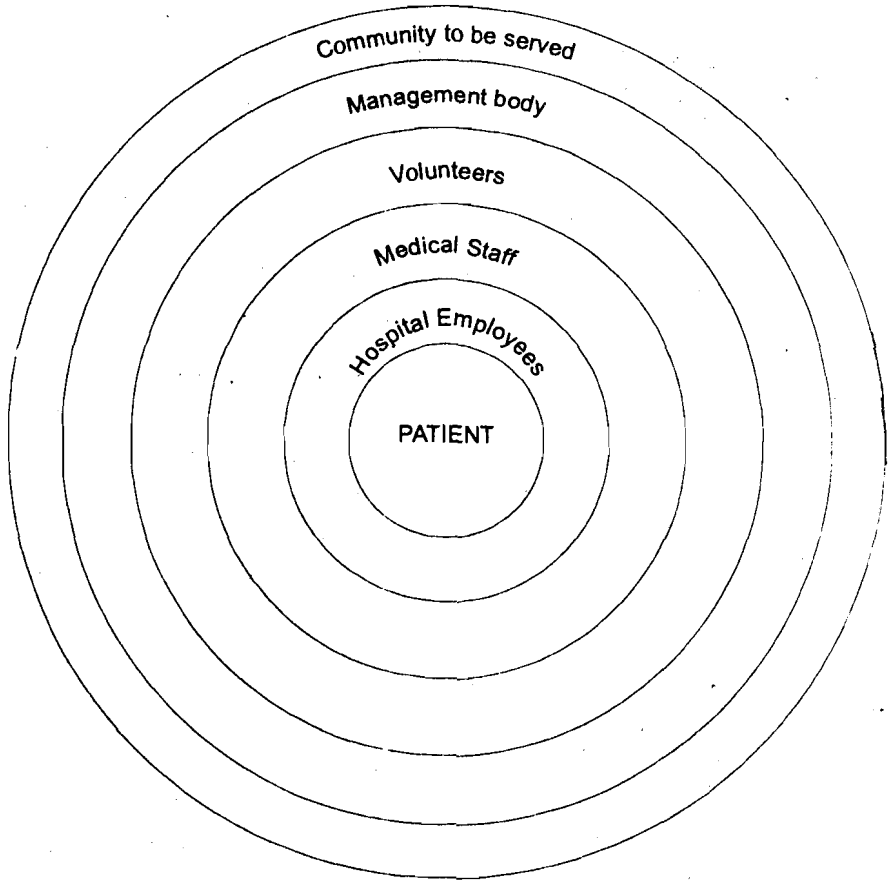
The story of the birth of hospitals is an indication of advancement of civilisation from individual to family and then to community. The word Hospital came from a common route Hospes (Latin) which means a guest and also a host. The hospital originated as a result of sympathy for sick and suffering.

The modern system of medicine was introduced in India in 16th Century. In 1943 Bed population ratio was 1.3 per 1000 and it was decided to increase this ratio up to 5.6 per 1000 in 25 years. Until 1960 there were 12000 Hospitals and 185000 beds in India and Bed Population ratio in 1960 was 0.4 per 1000 population only.

Hospital of today is the evolutionary product of long struggle. It is expression of man's right to be well and it is the formal recognition by the community or social structure of the country of its responsibility for providing the means of keeping him well. You know Health as defined by WHO is "a state of physical, mental and social well being and not merely absence of disease or infirmity". The task of hospital is to restore health of community. Therefore. Hospital is defined as "integral part of social and medical organisation the function of which is to provide complete health care viz. preventive, promotive, curative and rehabilitative and hospital is also a centre for training and research of medical and paramedical staff".

Hospital is also defined as an institution where "for the patient it is a place to receive medical care; to the physician it is a workshop in which he/she practices his profession; to medical or nursing student it is an educational institution.

Patient is at the centre of gravity in entire working of hospital as depicted in the figure.



Hospital is very complex organisation wherein patient is at the centre of gravity of entire operations. Hospitals are focal point of delivery of health care services to entire community irrespective of age, sex, cast, creed or colour. The diversity of staff contributing towards patient care from highly skilled physicians, nurses, technicians, administration and unskilled staff. Hospital has continuous operation (24 hours working) without true off makes it more

complex in nature. Hospitals deal with life and death and surprisingly in many areas of hospital operations there is dual line of authority.

Check Your Progress 1

Fill in the Blanks:

a) ..... is the centre of gravity in entire working of hospital.

b) In India in 1960 Bed Population ratio was.....

3.3 FUNCTIONS OF HOSPITALS

You know that hospital has broad responsibility of maintaining and restoring health of community. Therefore, functions of modern hospitals are:

3.3.1 To Take Care of Sick and Injured

To take care of any patient who is sick and injured is most primary function of the hospital. All other functions are subordinate and are recognized as part of the responsibility of the hospital because they contribute indirectly to the care of the sick.

The first requisite to give him proper accommodation in the hospital. Accommodation to the patient can be given according to:

- Physical condition of patient
- Social and financial status
- Availability

You are aware that patient needs to be admitted as per principles of progressive patient care. It means "right patient on right bed with right services around him". In other words patients are given accommodation according to the degree of illness and need. As far as condition of the patient is concerned may be seriously ill whose care has to be taken in Intensive Care Unit, where patient who is critically ill with potentially reversible lesions and who are unable to communicate their needs and who require extensive nursing care and needs constant observation irrespective of age, sex and economical status are admitted. From the second stand point of accommodating patients as per social and economical status hospital has special, semi special rooms and General wards for admission.

- Hospital should provide proper facilities for diagnosis and treatment with supportive services of radio-imaging, laboratory, and logistics.
- To provide efficient medical care through expert doctors, nurses and paramedical staff.
- Hospital needs to provide food services to patients. The diet of patient should be nutritious and have appropriate caloric value as per his disease requirements.

3.3.2 To Take Preventive Care and Health Promotion of Community

Other than the curative services, the hospitals required to play a very important role in hospital promotion and prevention from diseases. As the preventive medicine for many communicable diseases, hospitals are involved in various activities like, immunisation, MCH and family planning activities. Other than these, hospitals can be very effectively utilised for health education activities, as patients and their relatives are in right frame of mind to know more about the disease, which the patient is suffering from. Hence any health education activity imparted will be better accepted and practised.

3.3.3 Surveillance Centre

Hospitals may be the most important surveillance centre for non-communicable diseases other than communicable diseases as in a health care delivery system active surveillance is very minimal for non-communicable diseases.

Also O.P.D. of the hospitals can play a very crucial role in early detection of some disease out-breaks along with its geographical situation and population at risk.

3.3.4 Continuing Care of Patients

Patients are taken care after surgery till he is completely cured. It is done as a follow up measure and rehabilitation programme. There are certain diseases which are chronic in nature and need continuous follow up advise on repeated schedule of drugs, physiotherapy, and personalised care.

3.3.5 Rehabilitation

Hospitals can play a very important role in rehabilitation of the patients particularly who had some physical deformities. This is done through the development of physiotherapy unit and occupation therapy unit.

3.3.6 Education and Training of Staff

Hospital has to organise training programmes for various cadres like doctors — for their clinical/non-clinical subjects, for nurses, for paramedical (technicians) like x-ray technicians, ECG technicians and also for unskilled workers for cleanliness, maintenance, sterilization etc. other than the basic training courses for medical and nursing stafff.

3.3.7 Research

In hospital research is carried out on early diagnosis, treatment of patients. Research is carried out in relation by physical, psychological and social aspects of health and disease and also in technical and administrative aspect of hospital practices.

Check Your Progress 2

Which of the following is True/False?

a) Hospitals are not supposed to render preventive and promotive services. (T/F)

b) Research is one of the very important function of hospitals. (T/F)

c) Hospitals can be utilised as a very useful serveillance centre. (T/F)

d) Hospitals should not be used as a training centre for medical and para medical staff. (T/F)

3.4 ROLE OF HOSPITALS AND PECULIARITIES

Purpose

The purpose of Hospital Administration is provisioning of good patient care with efficiency and economy, within the resources available.

The Special Needs or the Peculiarity of a Hospital

The hospital as social institution facilitates interaction of a wide spectrum of the society from varied cultural and socio-economic stratum. The hospital is a media, through which the scientific technological innovation of Medical Sciences are put into operation and practised for healthful living of the community.

The peculiarities of a hospital as an organisation are:

a) The product of the hospital is 'service' which cannot be qualified in any economic terms and no objective criteria can be laid down to evaluate the standard of services.

b) The service in the hospital is always personalised, professional and directly rendered by the medical, nursing and other specialised personnel according to the needs and requirement of each case or client. As such the hospital service cannot be mechanised, standardized or pre-planned to meet the specific need. The hospital service is a term work rather than an individual service.

c) The hospital service is normally emergent in nature and no two situations are similar needing the same treatment. So the Hospital Administration cannot always be

preplanned in micro level implementation, with straight jacket formula. It is more often in management by crisis than management by objective.

d) The wide spectrum of people involved in the hospital activity ranges from the highly skilled professional to the man who may not have visited a school. Therefore, the management of this varied group of people calls for a balanced psychosocial approach.

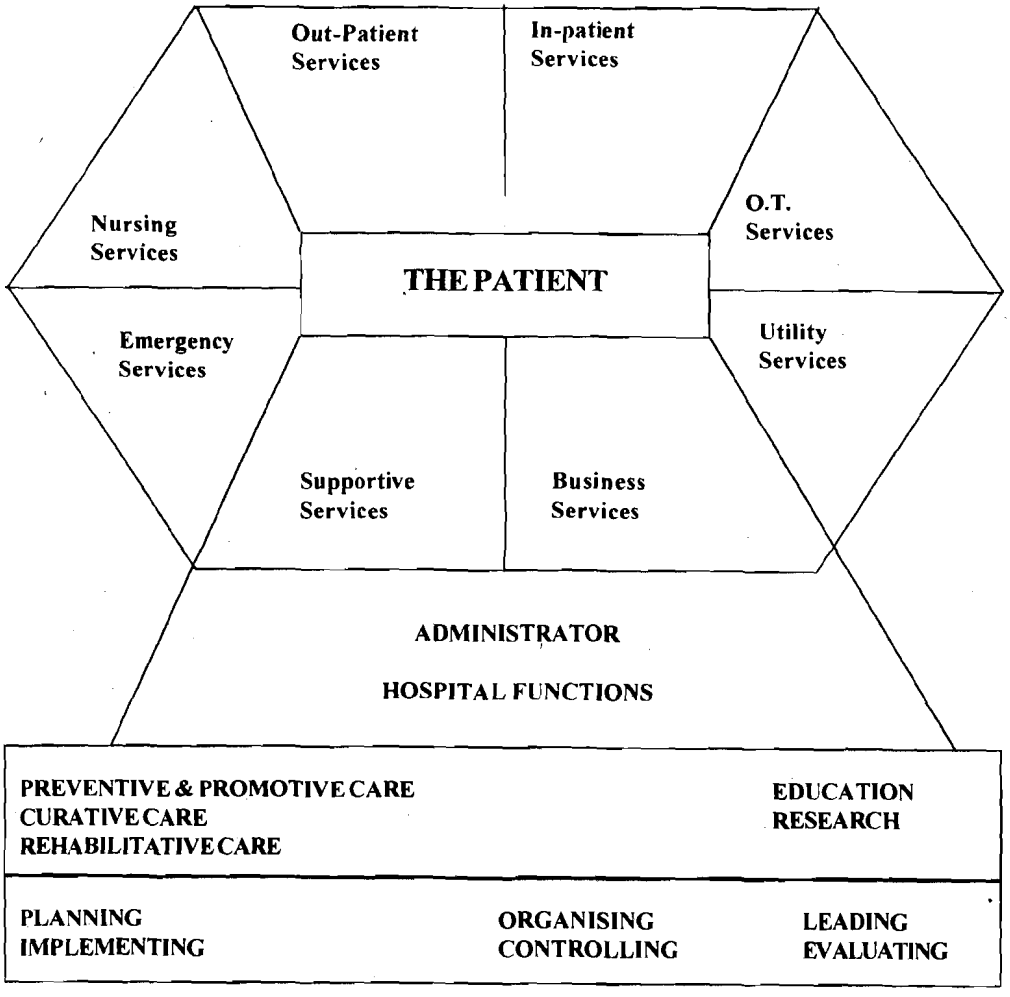
e) The dual control by way of professional authority and the executive authority in the Hospital invariably leads to management conflict which is a peculiar situation every hospital administrator has to face in the day to day operation.

f) Of late the hospital being treated as industry for profit as well for maximization of the output with minimal input has led to application of management tools and techniques for its administration.

In view of this peculiar nature the hospital administration is a multidisciplinary approach. It is an art of application of the principles of public administration, behavioural science and the modern management skill, in the milieu of scientific medicine to subserve the objectives of the hospitals.

Public Administration	For General Administration
Behavioural Science	Community and the people in the hospital
Management Science	Methodological improvement
Clinical Medicine and Community Health and *Epidemiology*	Hospital infection specialised service
Biostatistics	Planning and Forecasting

Patient Centered Activities and Services Offered by the Hospital



3.5 HOSPITAL AS A SYSTEM

From a management point of view the Hospital can be treated as an organised whole and termed as an open system. This hospital system can be grouped into four distinct sub-systems:

a) Clinical and Nursing Service — Primary Services

b) Supportive Services

c) General Administration and Business Services

d) Utility Services

Clinical and Nursing Services	Supportive Services	General Administration Including Business and Utility Services
1) Out-patient services	1) Radiological services	1) Personnnel Management
2) In-patient services	2) Laboratory Services	2) Financial Management
3) Emergency and casualty Services	3) Central Sterile Supply Services	3) House Keeping
4) Operation Theatre	4) Laundry Services	4) Material Management
	5) Blood Bank Services	5) Dietary Services
	6) Mortuary Services	6) Hospital Engineering Services
	7) Rehabilitation Services (Physical Medicine)	7) Transport
	8) Medical Records	8) Public Relations
	9) Medical Social Worker	9) Communications
	10) Pharmacy Services	10) Fire and Security

Thus, to sum up the hospital administration for the patient care services has become complex and multidimensional. It consists of coordinated activities provided by a variety of categories of health personnel, utilising a variety of precision equipment and skill and is spread over a large physical area of activity.

The Hospital Administration is responsible for synthesis of 'whole' organisation consisting of a wide skill of men and variety of materials into a functionally effective machine. The product of this machine is the 'service' or the 'medical care' provided by a hospital. This product is intangible and dependent on so many people acting individually and collectively and does not lend itself to easily definable standards or to simple units of measurement. No such ready indices are available, which can be universally applied to measure directly the quality of hospital care.

Check Your Progress 3

Which of the following is True/False?

a) Product of the Hospital service cannot be quantified in any economic term. (T/F)

b) Hospital services are usually of routine in nature. (T/F)

c) Wide specturm of people involved in hospital activity ranges. (T/F)

d) Dual control by way of professional authority and executive authority in hospital makes management easier. (T/F)

3.6 HOSPITAL AS COMMUNITY INSTITUTION

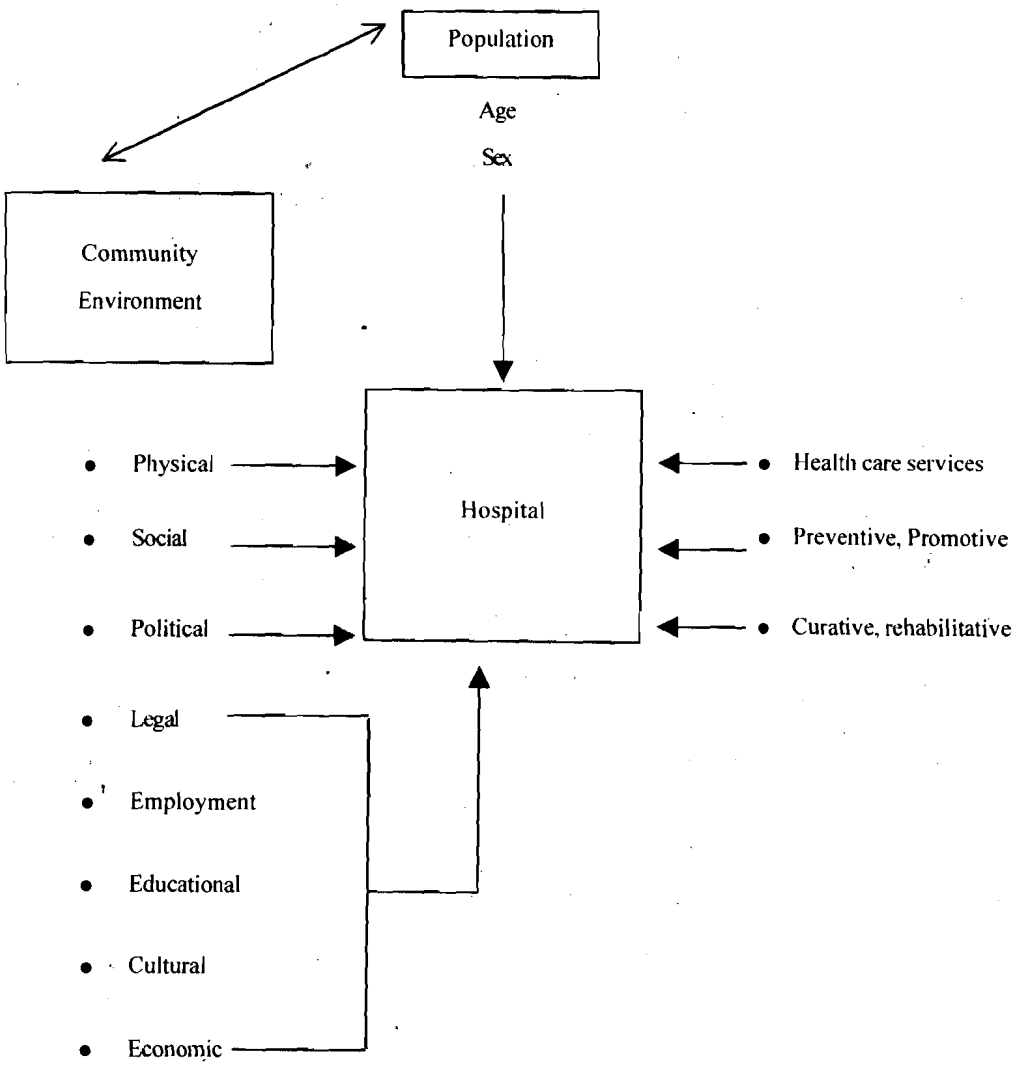
You know that a major part of health care facilities are delivered through hospitals. With changing era modern technology is also changing at a fast speed. Hospitals are delivering comprehensive health care i.e. Preventive, Promotive, Curative, Rehabilitative, Services to patient along with bio-medical research. Also education and training to various category of staff e.g. medical students, nursing, paramedical etc. Nowadays hospitals are not functioning in isolation but changing as community Institution. It is seen that participation of community for O.P.D. indoor treatment, immunization, preventive health check ups, early detection of diseases, rehabilitative programmes is ever increasing. In many places hospitals are built within a defined geographical area but do not belong to or catering local population of that area. Many a times community is not consulted hence they become foreign bodies. Facilities not meeting priority needs may lead to under utilisation of hospital. You are aware that large hospitals are overcrowded with minor or desperate cases and Rural Health Posts are bypassed.

In such cases Hospitals cannot operate because:

- Lack of Personnel
- Financial constraints
- Breakdown of Mechanical and Electrical, biomedical equipments
- Lack of Maintenance and repair facilities.

It is found that as the expectations of community is increasing with the development of medical technology, the demand is also increasing rapidly. It is not able to meet increasing demand at the same time maintain quality of patient care as staff becomes overworked and technical services overwhelmed. Reliability of health care facilities is of utmost importance. There must be a proper communication between hospital and socio-economic institutions like public works, industry, community development groups; agriculture etc.

Matrix of Health Environment and Community



Population dynamics and community environment is influencing in working of hospital as community institution.

Check Your Progress 4

1) What are the two main reasons for the overcrowding of hospitals.

.....

.....

2) Fill in the blanks:

a) Local participation of community for optimum utilisation of hospital facilities is.....

b) There must be proper communication between hospitals and.....

3.7 CHANGING ROLE OF HOSPITALS

Changing and advancing technology with commitment to professional developments has brought great changes in the organisational structure of the hospitals. To keep pace with the changing environment and purpose, the role assigned to hospital administrator has changed considerably.

Hence, the hospital administrator's role in the future will include:

- Understanding the health system operating in the country.
- Awareness of the fact that decisions on planning and programming will be taken outside the four walls of the hospital. Types of services to be provided will depend on the community and regional councils.
- Greater involvement of the public and professional experts in the hospital affairs.
- Dealing with conflicting demands of the hospital board staff, clientele, and community.
- Need for practical resilience.

Today the modern hospital administrator has to strike a balance between inside management activities and outside communicator. Maintaining a positive relationship and effective communication with hospitals clinicians is an internal duty. The administrator has to provide feedback to the management board so that they can be assured that the hospital activities are consistent with the hospital mission.

Administrators are always under pressure to keep pace with changing times. They must develop new skills and apply old skills to new situations. The administrator also has a major role in educating the community about hospital matters, this role is particularly important as consumers clamor about rising hospital costs.

The most effective administrators are visionaries. Modern hospital administrators time and activities have changed greatly. Marketing public relations, medical staff relations and strategic planning are some of the key activities in which they are now involved.

Some areas in which hospital effectiveness is being questioned and the influence of administrator in these areas include:

1) Costs and financing of operations
2) Sharing of power for decision making
3) Organisational structure
4) Manpower utilisation
5) Patient care

Manpower Utilisation

Through job analysis, the skills, jobs and the knowledge required to perform existing tasks can be identified. This can result in a clustering of tasks into related skill and knowledge

activities. Job pathways can then be designed so that changes in output and technology can be handled by re-arranging job structures and selecting appropriate job specifications for assignment of new or different functions.

Patient Care

The responsiveness of hospital employees can be increased by establishment of units in which patient complaints are recorded and chronic offenders identified by confronting employees and their supervisors with written transcripts concerning unresponsiveness, or by confronting them with complainants and their representatives, the administrator may influence the behaviour of the employees. Continued motivation and training of employees will have favourable influence on their role performance.

Costs and Financing Operations

The administrator's influence on cost control is, at least potentially, most importantly exercised in the budgeting process. The administrator has greater influence over expenditures for new programmes and facilities. Substantial cost savings or increased efficiency, however, can probably be realised through real location of existing budgets, and better correlation of budgets to unit performance and not merely to historical cost levels. Performance budgeting assumes some quantifiable output at some given level of quality.

Cost control is seen as a legitimate administrative function by medical staff. As a representative of the organisation as a whole, the administrator is seen a likely mediator between conflicting demands and interests.

Sharing of Power

The problems of the administrator increases with the number of bargaining units and the number of the unions in any one hospital. Negotiating with unions on an inter hospital basis may result in individual hospitals securing the most expert representatives and is not being "whipsawed" by unions.

Organisational Structure

Structure refers to the organisation of tasks or task groups in units, of units in the organisation as a whole. The administrator can influence the development and implementation of formal programme of coordination.

Because of increased specialization, changing technology, and increased expectation of consumers and employees the hospitals require increased coordination and organisational adaptability. The administrator's expertise is that of a integrator structuring the perceptions among producers, and between producers and consumers, so that chain can be effected without destroying organisational integration. The administrator requires authority appropriate to this responsibility.

Check Your Progress 5

1) Discuss how hospital role is changing.

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2) Describe changing role of hospital administrator.

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3.8 CHALLENGES AND STRATEGIES

3.8.1 The Problem

Hospital has become a highly scientific and complex medical institution as against age-old concept of a poor house where people left their incurable and dying patients.

Frequently a personal visit to a hospital will produce superficial impression of sick, quality of care, standards of hygiene and decoration, physical relationships of departments and many other things, but it will almost certainly not reveal anything about the hospital as a viable concern, and the way in which it is functioning, whether it is able to give its best to the community it serves by optimum utilisation of its resources.

The community is demanding more and better care at minimum cost in the hospital. A patient will no more tolerate the indifferent and impersonal treatment offered in our hospitals. An outpatient cannot tolerate forever, long waiting in queues for registration, consultation, X-ray, laboratory examination, or for a few tablets in the pharmacy-counter. A patient now not only demands professional care of sufficiently high standards; he also seeks more elaborate comforts and cleaner surroundings. An out-of-order equipment or non-availability of essential drugs and supplies is also resented upon by hospital patients. A trace of rude behaviour on the part of hospital staff may set off a chain of complaints and allegations. This is a challenge from the consumers of medical care.

Again, there are many problems within the hospital connected with management of human and material resources. A hospital social system constitutes a network of interpersonal relationship with varying degree of complexity. There are a great number of variables and any attempt to alter any one of them is likely to start a sort of chain reaction. Orders and policies, no matter how plainly stated, will be subject to interpretation in the light of psychological set of those who transmit them or carry them out, the environment in which they find themselves, and the conflicting pressures which they are subject to. Further, the interaction of the patient with other patients and their relations, as well as with hospital staff gets structured into a network of interpersonal relationship, constituting thereby, the human relation as an important element within the hospital social system. In order to deal with these social and technological forces it is necessary to use sound business judgement, based on knowledge of human behaviour and experience of actual operating systems.

The organisation and management of material resources in a hospital still presents a greater problem. Certain services are generated in all the service areas of hospital through provision of certain facilities in terms of physical facilities, manpower, equipment, furniture, suppliers, such as medicines, food staff, chemicals and so on. It has been common experience that a lot of costly equipment are purchased for use in hospitals without prior assessment of their expected output, availability of technical competence and facilities for maintenance and repair. Utilisation of these facilities in an optimum manner, has been presenting another challenge to the management of hospitals.

All these problems can be attended to well if the administrative machinery is effective. Here again, there are certain drawbacks in our administrative process itself which fails to achieve the ultimate objective. The major concern of administration is with the art of getting things done. A decision which does not result in action is meaningless, and yet, more and more attention in administration today is devoted to the problems and processes of planning and decision making, and less and less attention given to effective follow through. Consequently, those charged with follow through action find themselves unguided, unled and confused, and, therefore, fail to achieve the desired level of results. Thus, the weakness in the administrative structures and systems in a hospital add to the management problems.

In a modern hospital a team of doctors, nursing staff, para-medical personnel, social workers, catering officers, engineers and administrative staff having specialised training in various branches are working together to achieve the final objectives of the total hospital system. Many problems are no longer confined to a single hospital department. A choice of catering system may involve a catering officer, the engineer, the bacteriologist, the work study team and the cost accountant. Therefore, in order to appreciate the dimension of a problem it is necessary to examine, analyse and evaluate the system involved in its totality.

3.8.2 Land Marks of Efficiency of Hospital

The service (output) of a health centre is the outcome of the operation (functioning) of the various facilities of the health centre. 'Efficiency' of medical care applies to the work of the

service as a whole not the end itself but the way the end was achieved. It is rather concerned with the systematic efficiency of various facilities which put together contributes towards "quality of medical care" offered by hospital. "Adequacy" on the other hand, is concerned with the results achieved, in relation to the stated objectives. The outcome of health centre operation, which is service (medical care) can be evaluated in terms of:

a) The amount of work done — is it optimal, minimal or maximal;

b) The quality of work performed — how good is the service;

c) The cost of care of the patient and the cost of hospital operation;

d) The extent to which the patient is satisfied with the type of attention he had received.

A hospital presents most of the administrative problems of a factory, a hotel, as well as a college and social service. Administration of such a complex organisation is just not an art it has become a science which has to be learnt both by active formal study and experience. With formal training a good doctor can be very good administrator or a doctor. He cannot be both. It is difficult to play dual role. Therefore, knowledge of basic principles and techniques of management can have a tremendous impact upon its practice, clarifying and improving it.

During the recent years there has been a greater emphasis on organisational development, systems and procedures. Underlying this new approach is the idea that the internal functioning organisations must be consistent with the demand of organisation task, technology, people, structure, and the power regulating the course of action. Basically, this approach seems to be leading to the development of a 'contingency' theory of organisation. Management theory and science do not advocate the best way to do things in the light of every situation. Of course internal states and processes of the organisation are contingent upon external requirements and member needs. Therefore, effective management is always contingency or situational management.

Our aim in management of health centre is optimum utilisation of inputs for better output at minimum cost to the maximum satisfaction of consumers of facilities. How can we achieve this? This calls for introduction of "quality management system" in hospital, which includes study of organisational structure, responsibilities, procedures, activities, capabilities and resources that together aim to ensure that products, processes or services will satisfy stated or implied needs of the organisation. This in turn needs development of norms and standards of quality and quantity of medical care services. For planning purposes, it is necessary to establish the following norms:

a) The requirement of the community for medical care, covering out-patient care, supervision of follow up centres (the number of attendance per person per year), hospital care (the percentage of patients hospitalised).

b) Norms for attendance for treatment, the percentage of emergency admission, hospitalisation rate per person, number of patients treated per bed in a year.

c) Productivity norms, such as, the workload per hour of physicians in establishments of various types, the ratio of pathological requests per discharge, the specialist consultation rates, requests for X-ray examinations per patient or out patient and so on.

d) Norms of requirement of drugs and dressings.

In contrast "standards" are fixed arbitrarily. It covers indices relating to the resources required to meet the needs specified by the norms, i.e. indices relating to the availability of facilities for medical care, such as, standards of staffing, provision of beds and equipment. We may however, develop standards for average length of stay of patients, average bed occupancy, financial standards for various budgetary grants and so on. Therefore, for effective total quality management it is essential to develop norms and standards, an efficient management information system and a system of quality assurance in medical care.

Check Your Progress 6

1) Which of the following is True/False?

   a) Hospitals can sustain economically with updation of technology. (T/F)

   b) Community is demanding more and better care at minimum cost. (T/F)

c) Organisation and management of material resources in a hospital is no more a problem. (T/F)

d) Main aim of Hospital and Health Management is optimum utilisation of inputs for better output at minimum cost to the maximum satisfaction of consumers. (T/F)

3.9 LET US SUM UP

In this unit you have learnt about evolution of various roles of a hospital. You have also learnt about the various functions of hospital. Further you learnt about the changing role of hospital in present day scenario including hospital as a system and as community institution. Towards the end you have learnt about the challenges being faced by the hospitals to keep pace with updation of technology, resource and ever increasing expectations of the community.

3.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) Patient

b) 0.4 beds/1000 population

Check Your Progress 2

a) True

b) True

c) True

d) False

Check Your Progress 3

a) True

b) False

c) True

d) False

Check Your Progress 4

1) Hospitals are overcrowded with minor cases or cases which are desperate.

2) a) Increasing

b) Socio economic Institutions

Check Your Progress 5

1) Changing and advancing technology with commitment to professional developments has brought great changes in the organisational structure of the hospitals.

2) • Understanding the health system operating in the country.

• Awareness of the fact that decisions on planning and programming will be taken outside the four walls of the hospital. Types of services to be provided will depend on the community and regional councils.

• Greater involvement of the public and professional experts in the hospital affairs.

• Dealing with conflicting demands of the hospital board staff, clientele, and community.

- Need for practical resilience.

Check Your Progress 6

1) a) False

b) True

c) False

d) True.

3.11 FURTHER READINGS

Rakish, J. S. (1985), *Managing Health Services Organisations*, U.S.A.

Srinivasan, S. (1982), *Management Process in Health Care*, New Delhi.

Thompson, John D. (1977), *Applied Health Services Research*, Canada.

UNIT 4 ROLE OF HOSPITAL ADMINISTRATION

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the complexities and ambit of the roles of hospital administrator;
- list the various functions that a hospital administration performs in relation to the community;
- define the role of the hospital administrator that he performs for the hospital;
- explain the responsibilities of a hospital administrator towards the patients; and
- identify the attributes, qualities and skills required for a hospital administrator.

4.1 INTRODUCTION

In the previous units of this block you have learnt about the evolution and classification of the hospitals, hospital organisation and the role of hospitals. In this unit you shall learn about the role of hospital administrator.

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If you have visited any hospital either as a patient or as a visitor you might have come across the various functionaries like the doctors, the nurses, the various paramedical personnel, house keeping staff and the like going about their assigned work in a hurried and professional manner. But rarely, if ever, you might have met a hospital administrator unless, of course, you specifically made it a point to meet him either to solve some of your problems or to seek certain information.

The hospital administrator basically works at the background to make things happen and to ensure that the hospital runs effectively and efficiently. At this point you must not go away with the impression that there is only one person as the hospital administrator managing the entire hospital all alone. In fact in a typical moderately large hospital there is a top administrator who is assisted by several assistants functioning at different levels in the hospital organisation. The role of the hospital administrator will vary depending upon the nature and complexity of the hospital. In this unit you will learn about the functions of a hospital administrator obtainable in most of the hospitals.

For a better understanding of these functions we shall subdivide the roles of a hospital administrator as role towards the patients, role towards the organisation, role towards the community and finally the attributes, quality and skill requirements of a hospital administrator.

4.2 ROLE TOWARDS PATIENTS

You have already learnt that a hospital performs promotive, preventive, curative and rehabilitative functions to a varying extent in relation to the health care delivery to the community, yet the primary reason for the hospital's existence is for the curative care. The patients are the sole reason for a hospital's establishment. A hospital, therefore, has to design its entire operational system centering round the patient. The hospital administration has to ensure that this objective of a hospital is achieved in its entirety.

4.2.1 Profile of a Hospital Patient

A patient is a person and a member of the society in need of medical care. He is not an object and not a disease entity. When he comes to the hospital he brings along with him all his emotions, all his need for individuality and his need of independence. A hospitalized patient is under great stress. The reasons for this stress are unfamiliarity with the hospital surroundings, loss of independence, separation from the family, financial problems, isolation from the people, lack of information, fear of death and, anxiety with the treatment modalities and the attitude of care givers.

Though it is expected that a nurse will give equal care to all patients and will not allow personal liking or disliking interfering with their professional duties but in actual practice this does not happen always. Patients who grumble or complain or demand more attention from the nurses usually become unpopular. Patients with physical defects, obesity, of foreign nationality and those patients who stay longer are also unpopular with the nurses.

The hospital administrator has a great responsibility to understand and appreciate these behavioural aspects of patient care and take appropriate measures to negate these dysfunctional aspects.

The hospital administrator also has to understand the specific needs of certain special group of patients so that those needs can be met. These groups are patients in wheel chair, elderly patients, paediatric patients, newborn babies and patients in intensive care units.

4.2.2 Creation of a Friendly Environment

In the previous sections we have tried to emphasize that a hospital is meant for the patients. Therefore, it is necessary that hospital administration must endeavour to make a patient feel welcome. The hospital surroundings and the environment are unfamiliar to the patients. Hospitals usually have imposing buildings, strict rules and procedures and expected norms of behaviour from the patients. The formidable and intimidating looking gadgets and usually glum faced non-communicative functionaries further enhance the alienation of the patients. Hospital administration has to recognize these and all necessary measures to make the hospital as friendly to the patients as possible.

4.2.3 Patient's Physical Needs

A hospitalized patient has very little control over his environment. Moreover, the disease process might have made him dependent on others for his physical needs. The needs which must be looked after by the hospital administration include physical comfort with proper and comfortable beds and environmental control with proper temperature, humidity and lighting, bathing, feeding, sanitation, mobility and so on. Control of noise and excessive glare from lighting needs to be looked into. Besides the physical comforts, needs for privacy and security also have to be given due importance. The needs of the individual patients vary and hospital administration should device the system in a manner that these needs of the individual patients are met.

4.2.4 Patient's Emotional Needs

A patient is usually under great emotional stress in hospital. Sadness, loneliness, uncertainty, fear, helplessness, despair all contribute to emotional stress of the patients. It is the duty of the hospital administration to recognize these aspects and do whatever is possible to reduce these stresses. All may not be controllable but at least their effects can be minimized by appropriate measures, policies and procedures, behaviour modification of functionaries, longer visiting hours and facilities of communication with their near and dear ones.

4.2.5 Patient's Clinical Needs

The primary reason of hospitalization of a patient is to get treated or to get certain diagnostic tests performed. The patients will always like to get these things done at the earliest without any delay. The hospital administration has to design the system in such a manner that this aspect of patients' needs is fulfilled. Procedures for admission, investigation, consultation, treatment and discharge must be streamlined in order to achieve this objective. Hospital bottlenecks which can interfere with quick disposal of patients needs to be identified and removed. Stock out of drugs and supplies needs to be controlled.

4.2.6 Patient's Satisfaction

You must be remembering that we have emphasized several times earlier that the very purpose of hospital's existence is for the patients. If there is no patient there will be no hospital. Therefore, it is in the interest of the hospital that the administrator must take all possible measures to obtain the greatest degree of patient satisfaction. For this purpose the hospital administrator has to identify various dissatisfies in the total service components delivered to the patient. The dissatisfies may be in the dietary services, may be in the behaviour of nurses or may be in the environmental condition of the hospital. Removal of the dissatisfiers may not immediately improve the satisfaction level of the patients. For this purpose the hospital administrator has to identify the items of services that positively improves the satisfaction level of the clientele. Patient satisfaction is an important indicator of quality of care being given to the patients. This is also necessary for survival and prosperity of the hospital.

4.2.7 Patient Education

The patients are usually lay persons. They are ignorant about the high technicalities of modern day medical science. They need to be educated regarding various aspects of the medical care given to them. This is necessary for better patient's compliance. Patient can participate better in the treatment process if they know why and how of the care being given to them. The hospital administration has to device means to seize all opportunities to educate the patients. For example a diabetic patient may need education regarding his diet, his way of life, necessity of regular checkups and so on. A young mother may have to be advised regarding the desirability and methods of breast-feeding. Hospital administrator has to provide facilities and take appropriate measures for training and motivation of hospital functionaries for achieving this objective. The hospital policy manual and medical staff bylaws also must incorporate these aspects.

Check Your Progress 1

1) List the role of hospital administration towards patients.

a) .....

b) .....

c) .....

d) .....

e) .....

f) .....

2) List three probable causes of patient dissatisfaction.

a) .....

b) .....

c) .....

3) What a patient will want in terms of his physical needs?

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4) List the causes of stress of a hospitalized patient.

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4.3 ROLE TOWARDS ORGANISATION

The primary duty of hospital administration is to manage the hospital effectively and efficiently by utilization of resources placed under its command to achieve the hospital's objective. If you study the hospital organisational structure, the realization will immediately dawn upon you that the hospital is an extremely complex organisation. This complexity arises from the facts that there are a large number of professional groups functioning in a hospital with diversity of objectives. These groups take part in patient care, house keeping, maintenance services for building and equipment, dietary services, security, electronic data processing, hotel type of accommodation and varieties of investigations and procedures on patients. Because of diversity of objectives, there is a potential fertile ground for conflict. Effective coordination, clear enunciation of policies and procedures, delineation of functional boundaries and so on are necessary by the hospital administration. Unlike other organisation, a hospital deals with life and death situation and functions continuously round the clock with personnel whose skill and education levels vary widely. The hospital administration has to bring in unity among this diversity. A paradox in hospital

organisational structure is its duality of command in its many aspects. This is again a potential conflict situation that a hospital administrator is frequently called upon to resolve.

4.3.1 Strategic Planning and Management of the Hospital

During the last several years, the provisioning of health care delivery in India, is gradually shifting from the government sector to the private sector. This was necessitated by the forces of globalization, rapid technological changes, increasing customer expectation, demand for high quality care and increasing purchasing powers of certain sections of the clientele. More and more corporate houses are joining the fray of hospital business. As a result the competition is becoming intense and sometimes the survival of the hospital is also at stake. Thus, in response to this pressure, the hospital administration is becoming gradually professionalized. Strategic planning and management has become a necessity to circumvent the effects of the changes in the external environment of the hospital.

Strategy is the explicit, pro-active, long-range programme to achieve the hospital's objectives and thus accomplishing its mission. The strategic planning is concerned with laying down the objectives after situational appraisal of both external and internal environments, programme implementation, allocation of resources and control.

The top hospital administrative echelon is responsible for the strategic planning and its implementation in a hospital. The hospital administration has to identify the weaknesses, opportunities, threats and strengths of the hospital. This will lead to choice of a strategy, formulation and reformulation of objectives and orientation of hospital's resources to achieve them.

The steps that the hospital administration must take for strategic planning and implementation are as under:

- Formulation of objectives of the hospital
- Defining of present objectives and strategy
- Environmental appraisal to determine strengths and weaknesses of the hospital
- Finding out opportunities and threats
- Modifying the present strategy to bring it up to the desired level
- Implementation of the strategy
- Monitoring and control

4.3.2 Relating the Hospital to the External Environment

From your learning in the previous section you must have understood the importance of the influence of the external environment on strategic planning and management of a hospital. But what is external environment after all?

You may be able to appreciate that no organisation can work in a watertight compartment. It has to depend for many things on outside agencies. The role of any organisation is to obtain inputs from outside, process them and convert them into an output. The outputs can be either services or goods. The produce of the hospital is again utilized by the outside elements. The external environment, then, consists of those elements which directly or indirectly influences the functioning of the hospital.

The elements can be listed as under:

- Material supplies
- Manpower supplies
- Supply of finance
- Consumers
- Regulatory agencies
- Political groups
- Other similar organisations

- Press and other media
- Environmental Protection Activist
- Technology change
- Economic environment
- Social and cultural milieu
- Political, legal and ethical environment
- International environment

Some of these elements influence the organisation directly and some interact with the organisation in an indirect manner. The hospital administration has to take all these elements into account for their managerial activities of planning, organising, staffing and controlling. Any change in the external environment will have a direct or indirect bearing on the functioning of the hospital. The hospital administration might have to formulate their objectives and planning taking all these factors into account. To be effective, a hospital administrator has to anticipate the changes in the external environment by monitoring them on a day-to-day basis. He has to take pro-active action to circumvent negative impact of these changes and seize the opportunities offered by these changes. The hospital administrators can use the various forecasting techniques available to anticipate these changes. If the hospital administrator fails to respond to the changes in the external environment as they occur, their hospital may lose the ground to their competitors and may not remain viable.

4.3.3 Operational Management of the Hospital

The hospital administration has to run the hospital on a day to day basis to render patient care, which is the primary objective of the hospital, with the personnel, finance, accounts, technical and supportive services. In order to do this the hospital administration has to create a functional organisation that will be effective and efficient in order to achieve the hospital objective. The structure of the hospital need not follow any stereotyped fashion but must be responsive to the needs and demands of the situation. Expectation of the society, concepts, philosophies, accepted and time-tested principles must be taken into consideration and adapted to the prevailing environmental conditions to determine the organisational structure of the hospital. The organisational structure must also take into account the ethical aspects and standards that is expected of the hospital.

Many of the hospital's functions are repetitive in nature. The hospital administration must lay down certain directives to guide the various functionaries regarding the activities to be carried out by them. When to deal with a situation an employee must know, what he should do, how he should do it and what he ought to do or ought not to do. The hospital administrator has to carry out his day to day activities efficiently and effectively managing the hospital by laying down the policies, procedures and rules. We shall be explaining these terminology as under:

Policies : Everyone has to make some decisions big or small regarding his areas of activities. When faced with such a situation no body can sit down to undertake various steps necessary for a formal decision making. Policies are formulated to take care of such situations. Policies are general guidelines for decision making. In an organisation policy determines the perimeters within which the employees have to take their decision. It is the duty of top management to lay down the organisational policies. Policies contribute to effectiveness of the organisation. It can also help to avoid conflict situation.

Procedures: Procedures are customary way of doing things in an organisation. It guides the future activities. When some kind of functions occur repeatedly, it tells them how that activity will be performed. Sometimes this is also called standard operating procedures. It helps new employees to perform a particular function without much external assistance. This will also avoid variability in performance of a function and all functionaries can perform a particular job in a consistent manner. Essentially a procedure lays down the chronological sequence of an action.

Rules: This lays down the actions that must be done or must not be done in a given situation. When a rule is applied to a particular situation, there is no scope for discretion. Rules are usually very rigid in its interpretation and application. This absolves a lower level

employee from the burden of decision making and the consequences of a decision provided, of course, the rules are applied correctly to that particular situation. Rules are part of operational plan made by top level of hospital administration. It ensures conformity and accountability for the actions of the subordinate staff. The rules must be framed in a most explicit manner so that there is no ambiguity in its understanding.

4.3.4 Managing Hospital Staff

You might be impressed when you visit a modern hospital by its imposing buildings and the plethora of gadgets. But in spite of the highly technical environment of the hospital, human element still remains the sheet anchor of success of any hospital. A hospital employs a large number of people of different categories with widely varying educational and technical background. Some of them are highly skilled professionals while some others are of moderate education and without possession of any specific skill. This calls for a very efficient degree of personnel management.

Personnel management in essence involves the following elements of function by the hospital administration. You have already read about these in Course 1, Block 2 in detail. But are being mentioned here in brief for highlighting the role of hospital administration in there function.

a) **Manpower planning:** A hospital in order to grow and function effectively needs a supply of well-qualified and efficient employees in adequate numbers. Advance planning and actions are necessary for this purpose.

b) **Recruitment:** In order to have adequate supply of trained manpower, the hospital has to acquire these personnel through a process of recruitment. The hospital may not face any difficulty in recruiting highly trained people if its image is positive.

c) **Selection:** The process of selection involves mutual decision making on the part of the hospital as well as the candidate. This is not always an easy task. The hospital administration will always want to hire the best people. The process begins with an application form from the candidate. If there are a large number of applicants for a particular job, an initial screening interview may be held to short list the prospective candidates. Testing follows this. In this process the hospital administration tries to evaluate the candidates' skill level to determine whether these matches with the job specification. This will be followed by background investigation to check the genuineness of the applicant. Thereafter in-depth selection interview may be held or may be omitted. If the candidate is found suitable at this stage then he is subjected to a physical examination and finally if everything is alright, a job offer is made.

d) **Training:** The hospital is a knowledge-based organisation. A new recruit needs to be given induction training in which he is introduced to the job. Training is required to learn new techniques and concepts. Remedial training is most often necessary, if the employees are found to commit mistakes and the quality of their output is not up to the desired standard. Some retraining may have to be organized by the hospital administration, if some of the employees are displaced to another job so that they can be gainfully employed. For developing and employee and for his advancement, training has to be imparted.

e) **Performance Appraisal:** You will appreciate that in the interest of the hospital, the hospital administration will always like to know how well an employee is performing in his current job. The process of performance appraisal can determine this. The information obtained through performance appraisal can be utilized for determining the level of compensation, placement of the employee to a suitable job or for his advancement, or, in case he is performing poorly, for his discharge. Performance appraisal may also indicate the need for training and development. The hospital administration must very carefully determine the procedure of performance appraisal, because quite often it is a starting point of employee dissatisfaction. The methods used should be, as far as practicable, objective and without any bias.

f) **Grievance Procedure:** You shall agree that in any organisation employees will have occasionally some grievances. These usually have a snowballing effect and may degenerate into a major conflict situation between the management and the employees. It is, therefore, imperative that the hospital administration must install an appropriate, functional and active grievance procedure through which the employees can seek

redress of their grievances. Grievance procedure is a formal method mutually agreed upon by the management and the union. It is a step-by-step procedure that specifies the persons to whom the grievances can be referred and also the time limit for solving the referred grievance. It also indicates the way the grievance should be submitted to different stages of its handling.

g) **Discipline:** The hospital administration while recruiting people will try their best to recruit people who will be well disciplined. Yet there will be occasions when there will be a need to discipline employees. Self-discipline is the best discipline and it is an attitude of mind. The hospital administration should lay down rules and regulations that the employees can perceive as just and reasonable. In such cases the employees will usually follow them unhesitatingly. Though it is always best to avoid in discipline, yet some times it will be unavoidable. The penalties imposed should be commensurate with the degree of indiscipline. It is preferable to have increasingly severe awards of punishments each time a person is successively disciplined. The penalties can take the forms of oral warnings, written warnings, stoppage of increment in salary, withholding promotion if due, disciplinary layoff, demotion and finally discharge. The hospital administration must be very cautious while disciplining an employee. It should be immediate, with warning, consistent and impersonal.

h) **Wage and Salary Administration:** Hospital administration must make special endeavour for wage and salary administration. With a proper salary administration, the hospital will be able to recruit satisfactory employees. It is a motivational tool and it can reduce the incidence of personnel grievances. The hospital administration has to take appropriate measures for salary and wage administration, as it is the largest item of hospital cost. There are four closely related items of wage and salary administration. These are, wage and salary survey which will indicate the general pay level in similar organisations, job evaluation which will relate wages and jobs within the organisation, merit rating in which new employees start at a base salary and gradually progress to higher scales through merit rating and, lastly, incentives in which for a normal level of productivity the employees get a base level of salary and if the productivity is higher, the employees will get an incentive bonus. In corporate hospitals, most of the consultants are paid a percentage of the earnings from the patients treated by them. This is also an incentive scheme that motivates the consultants for higher productivity.

i) **Collective bargaining:** Hospital administration has to sit many times at the negotiating table with the representatives of the workers' union. Collective bargaining is an important process in industrial relation where the management and the union directly negotiate the terms and conditions of employment or working environment or any other issues affecting the employees. Collective bargaining is an important means of maintaining industrial peace. The management must recognize the rights of the union to negotiate and both the parties must have trust and confidence for each other. In this regard attitude of the management and the union towards each other is important.

4.3.5 Managing Hospital Materials

Materials cost almost fifty per cent of hospital budget. There are two types of cost: cost of materials and cost on materials. It is necessary for the hospital administration to reduce these costs. The scientific materials management techniques can address these aspects. Materials management involves as a single responsibility the systematic flow and control of materials from identification of need through customer delivery. Objective of materials management in a hospital is to render better service to the patients and improve profitability by reducing costs. Stock out of a vital drug may cost the life of a patient. This cost cannot be measured in monetary terms. The hospital administration, therefore, has an added responsibility in comparison to other organisations for efficient management of materials in a hospital. The materials management functions include:

a) Developing specification for materials

b) Materials planning and programming

c) Procuring materials through centralized purchasing

d) Receiving

e) Distribution

f) Inventory control

g) Storage and preservation

h) Transportation

i) Materials handling

j) Disposal of scrap and obsolete materials, equipment and surplus material.

The hospital administration has to lay down various policies and procedures for purchasing, distribution and disposal. Prevention of theft and loss of material are important managerial functions. The hospital administration must take measures to reduce these menaces. Thefts can be in the form of manipulating various records. Laying down appropriate policies and procedures can reduce these.

4.3.6 Managing Hospital Finance

Hospital financial management is an important area of functioning of hospital administration. For this purpose various tools and techniques are available to the hospital administration. The first step in the financial control process is the programming. Programming is the process of deciding on the nature and size of the programme that are to be undertaken in order to achieve the hospital's goal. The most widely known programming system in non-profit organisation is PPBS – Planning – Programming – Budgeting System. The tool that can be used to evaluate a programme is Benefit/Cost Analysis. The other tools that are used for financial management are various kinds of budgets – Capital Budget, Cash Budget, Operating Budget etc.

The financial management control process involves two further activities: control of operations and measurement of output. In the activity of control of operations, control is exercised on spending, on adding personnel or spending on material. The financial control is to see that the organisation achieves its stated objectives. In the output measure, three aspects are seen. These are results measure that is a measure of output expressed in terms that are related to the hospital's objectives, productivity measure and social indicators.

The hospital administrator should be able to understand various financial statements like a balance sheet, profit and loss account and so on. The hospital must constantly monitor the financial health of the hospital in order to ensure its survivability. For this purpose various tools are used which are basically determination of ratios. Some of these are: Operating margin (price level adjusted) ratio, Non-operating revenue ratio, Return on equity, Liquidity ratio, Long-term debt to equity, Total asset turnover, Days in patient account receivable and so on.

4.3.7 Managing Hospital Information

Information is an essential ingredient of decision making. Information is necessary at various levels to function effectively. Hospital administration has to design an information system that can deliver quality information which is timely and accurate. The essential functions to be included in the hospital information system are Medical functions, Administrative functions and Financial functions.

These three broad functional areas can further be subdivided into several levels. These are:

a) Transaction Processing. Examples are: order entry of drugs, diet, linen, census, patient billing, inventory control, treatment scheduling for operation theatre, physiotherapy, special procedures and so on.

b) Control Function. Examples are: medical care evaluation, occupancy and patient mix, surveillance of hospital infection, cost control

c) Operational Planning. These may include: staff education, patient care planning, discharge planning, purchase plans, budgeting.

d) Strategic Planning. Examples are: services to be offered, levels and sophistication of patient care to be planned, hospital image improvement plan.

In the management of information one of the most important aspect to be looked into by the hospital administration is the medical records department. This is the most important source of hospital information.

4.3.8 Maintaining Relationship with the Medical Staff

The hospital administration has to maintain a cordial relationship with the medical staff. The objective of both the groups is that of rendering better patient care. The medical staff directly delivers the patient care whereas the hospital administration provides the facilities and resources for this purpose. Both the groups must work within an environment of mutual trust respect and confidence.

However, occasionally, some problem does arise. These are mainly due to misunderstanding due primarily to poor communication. The hospital administration has to keep the medical staff informed about the organisational policies and changes whenever these occur. The situation in which both the groups function has a potential for conflict. The medical staff is concerned for the patients and for their own economic interest. The administration is concerned for the entire hospital, the employees and the economic health of the hospital. However, the medical staff who understands the reasons for the policy changes will be more appreciative of the constraints of the hospital administration and will be more supportive. The hospital administration, therefore, must freely and frankly communicate with the medical staff, listen to their problems patiently and sincerely try to solve them. If there is no apparent solution immediately available, then that fact must be explained to the medical staff. The medical staff regards the administration as problem solver, as provider of resources, as catalytic agents, as facilitators and holds them responsible and accountable for any deficiency in these functions. You will appreciate that as the medical staff is the agency through which the medical care is delivered a harmonious relationship has to be maintained with them by the hospital administration.

4.3.9 Maintaining Relationship with the Public

A hospital is a community institution. For its survival it needs support from the community. It is necessary for the hospital administration to know the needs, demands and aspiration of the public. Hospital also has to constantly endeavour to inform the public that what it is doing for them and they should expect from the hospital. Essentially, management of relationship with the public has four primary aspects. These are:

a) To know about public desires and aspirations

b) Educating the public about what it should desire

c) Arranging satisfactory contact between public and the hospital and

d) Informing the public about what the hospital is doing

The top hospital administration has to take it upon themselves, the public relation activities as one of their primary responsibilities. It should be undertaken as a planned process and as an on going activity.

4.3.10 Risk Management of the Hospital

If you open a newspaper in the morning, quite often you may come across news item pertaining to hospital. These may be consisting of reports regarding death of a patient due to negligence on the part of the hospital, damage to the hospital property due to vandalism by the public, hospital having been asked to pay huge compensation to a patient by a consumer forum. There may be other kind of damage to the hospital property by fire or flood or any by other natural calamity.

Like any other organisation a hospital is also exposed to many kinds of risks. In a hospital there is an added element of patients. Due to increased awareness of the public, the hospitals many times find themselves in an embarrassing situation due to certain faults in their functioning. Hospital administration, therefore, must take all measures, firstly, to avoid risk and then to minimize the effects of the risks. The hospital administration must have a very positive outlook towards the risk management. This positive attitude will percolate to the supervisory staff and down to the lower level employees. Security and safety consciousness then can be ensured.

4.3.11 Managing Ethics and Code of Conduct

Ethical behaviour is necessary throughout the medical practice. Though most of the tenets of ethical practice are outside the preview of law, the guiding principle is welfare of the patients. It is basically a self-imposed responsibility of the medical profession. The hospital

administration has to maintain an ethical environment in the hospital so that patient's interests are served. The hospital administration has to lay down appropriate rules, regulations, policies and procedures for every one to follow. The broad areas that need to be looked into are: Consent of the patient to disclose information, Right to information of patients, Ethical relation of a doctor with other doctors and so on. All doctors know the source of medical ethics originated in the Hippocratic oath. Besides these, ethical codes govern the experiment and research involving human subjects. Helsinki declaration, in which most of the nations including India are signatory, lays down the conditions and procedure to conduct such research.

4.3.12 Managing Legal and Statutory Responsibilities

Since independence various legislations have been enacted by the parliament in India to govern the functioning of the health care institutions. Even before independence many such legislations were in force. These legislations cover a wide range of topics including health, manpower, disease control, family health, reproduction, mental health, food safety, control, manufacture and safety of drugs, transplantation of human organ, pollution control and disposal of biomedical waste. The sources of these controlling legislations are as under:

a) Constitution of India (1950)

b) Indian Penal Code (1860)

c) Medical Council Act (1956)

d) Consumer Protection Act (1986)

e) Transplantation of Human Organ Act (1994)

f) Biomedical Wastes (Management & Handling) Rules (1998)

It is mandatory that the hospitals function within the boundaries of these acts. Hospital administration has a duty to lay down the provisions of this legislation in the policy and procedure manual of the hospital. In addition, hospital administration has to train the functionaries about these laws so that no violation occurs. Moreover, they have to install a monitoring mechanism to watch for any probable breach and take remedial measures before they occur.

4.3.13 Managing Marketing Responsibilities

Marketing means that a party receives something of value from another party in exchange of something of value. In health services a patient receives medical care for which he pays a charge. This payment may be paid directly by him or indirectly by another agency.

Today's hospital function in a competitive environment. Competition has a positive impact on health care delivery system. It helps in reducing cost; services will be more efficient and provides some impetus to improve quality.

You might recall that in an earlier section we have discussed strategic planning and management of hospitals to achieve hospitals mission. Marketing audit helps the hospital administration in diagnosing the external environment and then formulating objectives for implementation.

The marketing responsibility though may be entrusted to the marketing department manned by personnel with marketing background or the responsibility may be given to an outside consultant, yet the top management has the responsibility for planning, development and implementation of marketing activities.

Marketing involves management of four factors essential to the delivery of health care. These are:

a) Product: The range, variety, sophistication and level of services to be offered is the product.

b) Place: How and where the services will be offered – hours, outpatient, inpatient or domiciliary services.

c) Price: This includes the price paid by the patient either directly or indirectly or this may include other intangible costs the patients incur.

d) Promotion: This is the mechanism of making the patient aware of the services offered by the hospital and also involves aspects to create an interest in him to use the services whenever needed by him or by his friends.

Thus effective marketing strategy will ensure proper utilization of the hospital's facilities and maintain its competitiveness.

4.3.14 Quality Management of the Hospital Services

Hospital administration is duty bound to provide high quality services to their clientele. This can be achieved through a programme of total quality management and continuous quality improvement. This is an all-pervading function involving employees, their training, development, and motivation. Customer focus is the prime requirement for this quality management programme. Leadership and commitment of the top hospital management to this cause is essential for this programme to succeed. The hospital administration has to take an active part in and be a driving force for the programme. The quality management is a planned and continuous activity for an organisation. The top management must fully support actively the quality management programme. It should not degenerate into a lip service and genuine interest, active support and participation by the top management of the hospital will be necessary.

Check Your Progress 2

1) List the seven steps for strategic planning.

a) .....

b) .....

c) .....

d) .....

e) .....

f) .....

g) .....

2) What are the different aspects that hospital administration looks into for managing hospital employees.

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3) Enumerate the different management responsibilities for operational management of the hospital.

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4) List the four factors that need to be considered for health care marketing.

a) .....

b) .....

c) .....

d) .....

4.4 ROLE TOWARDS COMMUNITY

If you recall the definition of a hospital as provided by the World Health Organisation, it will be immediately clear to you that a hospital besides being a medical organisation is also a social institution. A hospital is meant to serve the health needs of the community in which it is located. A hospital is a part of total health care delivery system providing comprehensive health care. A large number of people and their families get directly or indirectly involved with the hospital physically, emotionally and financially either as a patient, as a supplier of goods and services or simply may be as visitors. A hospital must be able to fulfil the needs and aspiration of people. The hospital administration has to fulfil this obligation and responsibility in shaping the hospital as a truly community hospital by orienting its services towards that end.

4.4.1 Obtaining Community Participation

In order to fulfil its role effectively full community participation is essential. Without active support from the community no hospital can survive. The hospital needs moral and financial support from the community to be able to discharge its duties properly. The hospital administration has to inform the community about this need. The hospital administration has to take a positive interest in the improvement of the community pertaining to health related issues. His support and leadership towards this cause is quite necessary.

4.4.2 Integrating the Hospital with other Health Care Institutions

Health of the community cannot be viewed as fragmented efforts being undertaken by the various agencies. Health care delivery is a continuum in which hospital occupies a very prominent and most visible part. In a community there will be other health care institutions, public health laboratories, private practitioners and others. A hospital occupies a pivotal position and has a leadership role to perform. It is the responsibility of the hospital administration to integrate the services of these isolated agencies and coordinate their efforts for providing a comprehensive and need based health care with universal coverage, accessibility and affordability.

4.4.3 Supporting Primary Care

Primary care is the method by which health need of the community can be met to a large extent. Primary care is basically provided mostly by the community based health care institutions other than the hospital. But without the active support of the hospital primary care cannot succeed. Hospital is a repository of all state of the art medical knowledge. Hospital can provide necessary expertise to the other care providing organisations. Hospital can also guide and direct these institutions regarding the best way to deliver medical care. The hospital administration, apart from providing the technical expertise, can also support primary care activity of other institutions by looking after their need of manpower, equipment and supplies.

4.4.4 Providing Extramural Services

We may again recall the role of hospital as enunciated by the World Health Organisation in which the world body while defining the hospital has mentioned that the services of the hospital reach out to the community in their home environment. In fulfilling this commitment the hospitals do hold various kinds of medical camps. Eye camps organised by the hospitals are common examples. In addition to these medical camps, the hospital can organise domiciliary care, immunization camps and the like. The hospital must have a positive outlook towards these extramural services so that necessary resources can be provided for these purposes.

Check Your Progress 3

1) How hospital administration fulfils its role towards community.

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2) What hospital administration can do to support primary care.

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4.5 ATTRIBUTES, QUALITY AND SKILLS OF A HOSPITAL ADMINISTRATOR

Hospital administration is a challenging profession. By now you must have appreciated the formidable and diverse functions that a hospital administrator is called upon to perform. A typical hospital administrator in India is a medical graduate with a postgraduate degree in hospital administration. Currently about six medical institutions are offering doctoral courses, which is at par with any other postgraduate medical qualification and is recognized by the Medical Council of India. In addition, many management and other institutions are also offering postgraduate courses for graduates from all other streams. The All India Council of Technical Education recognizes these courses. In some countries, particularly in USA, a hospital administrator is typically a non-medical person. According to Dr. J. R. McGibony, Hospital Consultant, this was due primarily to the shortage of doctors. The training involves inclusion of subject matters like social-behavioural and management sciences, public health, principles of medical care and application of administrative concepts and skills in health care organisations. Whatever be the feeder channel for the profession of hospital administration, certain attributes are necessary for efficient performance of their job. These are: a successful past record of efficient and effective management, ability to direct the subordinates to achieve the organisational objectives, a high degree of conceptual skills, mental robustness, plenty of tact and ability to withstand adverse criticism. The most important skills are summarized as under:

a) **Leadership skills:** A hospital administrator must have leadership skill. He should be able to influence people to act with zeal and enthusiasm to achieve organisational goal.

b) **Interpersonal skills:** Hospital is a labour-intensive organisation. A congenial environment is conducive of productivity, satisfaction and happiness. A hospital administrator must have good interpersonal skill to create such an environment. At the core of interpersonal relationship is communication and empathy.

c) **Conflict management skills:** In an organisation like a hospital where diversity of objectives is the norms, quite often conflict situation arises. It is argued that a certain level of conflict is essential for any organisation to remain vibrant, dynamic and responsive. This is functional conflict and can be utilized by managers to the benefit of the organisation. A hospital administrator must be able to manage conflict well and should not allow it to become dysfunctional.

d) **Negotiating skill:** A hospital administrator is called upon to negotiate quite often on various matters pertaining to his organisation. Negotiation means a process in which two or more parties exchange goods or services and to arrive at a common meeting point. It has to be carried out in an atmosphere of cordiality and at the end both the parties must have a feeling of winning. In a hospital negotiation is required to be done with the suppliers of various materials. A collective bargaining is also a form of negotiation between the management and the workers union.

Check Your Progress 4

1) What are the attributes to be a successful hospital administrator?

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2) List the four important skills for a hospital administrator.

a) .....

b) .....

c) .....

d) .....

4.6 LET US SUM UP

In this unit you have learnt about the role of a hospital administrator and his attributes, qualities and skill requirement.

You have learnt that in his role towards patient the hospital administrator should have a better understanding of the patients. He should create a friendly atmosphere where patients feel welcome. His role towards patient also includes looking after the physical, emotional and clinical needs of the patients.

You have also learnt about the role of hospital administration towards the organisation. He has to lead the hospital towards the future long-term goal of the hospital to serve its mission and ensure its survival and competitiveness. This is done through strategic management techniques.

In the day-to-day operational management of the hospital, he has to manage the resources of the hospital to produce a high quality medical care service. The resource the hospital administrator has to manage includes personnel, materials, finance and information.

His other routine job includes public relation activities, maintaining relationship with medical staff, risk management, marketing management and maintaining an ethical environment. He also has to abide by the various statutory and legal provisions for functioning of the hospital. Total quality management and continuous quality improvement calls for a commitment from the top level of hospital administration on an on going basis.

You have also learnt that hospital is a community organisation and a hospital administrator has to ensure community participation that is necessary for moral and financial support of the hospital. In his role towards community, supporting primary care and provisioning of extramural services calls for a positive attitude on his part.

Towards the end you have learnt that a hospital administrator has to have attributes of a highly skilled professional qualification and good past track record. The major skills required are leadership skill, interpersonal skill, conflict resolution skill and negotiating skill.

4.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) Creation of a friendly environment

b) Looking after patients' physical needs.

c) Looking after patients' emotional needs

d) Looking after patients' clinical needs

e) Obtaining patient satisfaction

f) Patient education

2) a) Dietary services

b) Behaviour of nurses

c) Environmental condition of the hospital

3) Physical comfort with proper and comfortable beds, environmental control with temperature, humidity and lighting. Other physical needs include arrangement for bathing, feeding and sanitation.

4) a) Unfamiliarity with hospital surroundings

b) Loss of independence

c) Separation from family

d) Financial problems

e) Isolation from the people

f) Lack of information

g) Fear of death and

h) Anxiety with the treatment modalities and attitude of the care givers.

Check Your Progress 2

1) a) Formulation of objectives

b) Defining present objectives and strategy

c) Environmental appraisal to determine strengths and weaknesses of the hospital

d) Finding out opportunities and threats

e) Modifying the present strategy to bring it up to the desired level

f) Implementation of the strategy

g) Monitoring and control

2) a) Manpower planning

b) Recruitment

c) Selection

d) Training

e) Performance appraisal

f) Grievance procedure

g) Discipline

h) Salary and wage administration

i) Collective bargaining

3) a) Managing hospital employees

b) Managing hospital's materials

c) Managing hospital finance

d) Managing hospital information

e) Maintaining relationship with the medical staff

f) Maintaining relationship with public

g) Hospital risk management

h) Managing ethics and code of conduct

i) Managing legal and statutory responsibilities

j) Managing marketing responsibilities

k) Quality management of the hospital services

4) a) Product

b) Place

c) Price

d) Promotion

Check Your Progress 3

1) The hospital orients its services keeping the community need, demand and aspiration in mind. A positive interest towards improvement of community health on the part of the hospital administrator helps achieving community participation. Integration of services of all the other heath institutions providing health care of only some aspects of total health care of the community is essential. The hospital needs to support the primary care activities. Lastly, the hospital provides various extramural services.

2) The hospital supports primary care activities by providing leadership, expertise, material and personnel resources.

Check Your Progress 4

1) Hospital administrator should be a man of experience with a post graduate degree or diploma in hospital administration. The hospital administrator should possess a high degree of conceptual skill, mental robustness, tact and ability to withstand frequent adverse criticism.

2) a) Leadership skills

b) Interpersonal skill

c) Conflict resolution skills

d) Negotiating Skills

UNIT 1 PRESENT HOSPITAL SCENARIO: MANAGEMENT ORIENTATION

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- make an assessment of the overall status of hospitals in India;
- identify the problem areas in hospitals;
- list the cause and effect relationship of the problem; and
- identify the remedial measures as a manager.

1.1 INTRODUCTION

In Block 1 of this course you have been acquainted with the overview of hospital system which dealt with evolution of hospitals, hospital organisation and its role, and the role of hospital administration.

During the course of your studies you must have learnt about the classification of hospitals, the roles of present day hospitals and the roles played by the administration. You must have also observed that the hospitals are a highly complex social, economic and scientific organisations whose main function is to provide comprehensive health care to the society and to act as a referral system within the infrastructure of the hospital system in the locality or region.

With the increase in the awareness in the technological advancement pertaining to diagnostic and therapeutic aspects of medical care there is an increasing demand and expectation of the people for better, comprehensive and quality medical care. The question arises as to how the different types of hospitals are functioning and to what extent they are able to meet the expectations of the people? What problems and challenges the hospitals are facing to provide medical care at optimum cost and how best the challenges could be met to provide optimum quality care at optimum cost to the maximum number of people?

In this unit you will learn about the present hospital scenario as perceived by the

consumers of medical care. Further you will learn about the challenges perceived by the administrators and the factors responsible for the present status of various health establishments. You will also learn about the steps required to be taken to improve the quality of care at optimum cost to the best satisfaction of people.

1.2 PRESENT HOSPITAL SCENARIO

1.2.1 Resources Available

While studying the evolution of hospitals in our country you have learnt that after independence in 1951 there were 2014 hospitals with 106,478 beds in the country. The bed: population ratio was 0.30 per 1000. Subsequently more and more hospitals were created and present bed:population ratio is about 0.7 per 1000. But majority of the facilities were created in urban areas. Presently there are 15037 hospitals with almost 6.24 lakh beds, out of which 4621 hospitals are in rural areas and 10,416 in urban areas (CBHI, 1996). It is clear from above that 70 per cent of the hospitals are available for 30 per cent of urban population while 70 per cent of rural population has to manage with 30 per cent of hospital facilities. The ownership status of medical institutions as on 1.1.1996 is given below:

Ownership	Hospitals	
	Number	Beds
Government	4473	375987
Local Bodies	335	19677
Voluntary and Private	10289	228155
Total	15097	623819*

* As on 1.1.96 information collected from states.

It will be seen that government owns 29.6% of the hospitals with 60.4 per cent beds. The local bodies have 3.1 per cent beds, the voluntary and private bodies constitute 68.1 per cent of the hospital but the number of beds is 36.5 per cent only.

1.2.2 Present Status of Medical Care

Even after 50 years of independence, we find that our social sector has miserably failed to meet the peoples growing expectations for the services. Although there has been substantial manifold increase in the number of primary health centres, community health centres, hospitals and the hospital beds during the successive plan periods of 50 years, one still finds that all these achievements have been neutralised due to population explosion on the one hand and the increase in awareness and demand for quality care by the population on the other.

Voluntary and private bodies have been encouraged by the government to augment the facilities. In addition, industries provide health care services to their employees individually and through employees state insurance scheme. However, 70 per cent of hospital beds provided by Government, Voluntary Organisation and Private bodies are located in urban areas. It has created regional imbalance not only in the setting of hospital services but also in the distribution and availability of trained medical manpower in the rural as well as urban areas.

In spite of appreciating the gap in demand and supply of medical care facilities the government and medical fraternity have hardly made any attempt to consolidate the gains in resources, over the years, by judicial use of existing facilities; as a result the people are disillusioned and discontented leading to numerous complaints through press and consumers forums of the country.

Check Your Progress 1

1) Fill in the blanks:

   a) Present bed population ratio is .....

   b) 70 per cent of hospitals are available for.....and 30 per cent hospital facilities are available for.....

2) What is the ownership status of hospital beds for government, voluntary and private bodies.

   .....

   .....

3) What are the causes of discontentment of people in respect of medical care?

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1.3 THE MALADIES: CAUSE AND EFFECT RELATIONSHIP

1.3.1 The Maladies

Over the last decade there has been increasing number of press reports highlighting the deplorable state of public and private hospitals and nursing homes. Extracts of some of those are mentioned below:

- Public hospitals turn into illness factories. For millions of Indians, going to a hospital remains a nightmarish experience; big crowds, long queues, confusing maze—like layout, incomprehensible instructions, tedious procedures, casual diagnosis, rough handling by sullen staff, rude physicians, bribe-taking by touts, complete absence of accountability and unjustified delays. Such a state of affairs personify just one aspect—negligence, callousness, incompetence and lack of care—a state of crisis prevailing in the health care system of the country. It further states that the public hospitals are themselves victims of policies which give low priority to health, starve the medical system of funds, place low emphasis on primary health as opposed to specialized care, keep the system grossly understaffed by poorly paid junior doctors and nurses, neglect maintenance, create extreme overcrowding and ensure that the whole system goes to seed.

- As regards the private hospitals and nursing homes another press report mentions in the headline, "Shrine to Mammon Private Hospitals offer no Solution". Referring to a committee report of health experts (1992) appointed by Municipal Corporation of Greater Bombay on city's nursing homes, the survey found the following deficiencies:

  As per survey reports on nursing homes in other cities like Delhi, Calcutta, Patna, Lucknow, Bangalore the findings were generally the same with some variations. In Delhi for instance it has been reported that out of estimated 2000 private nursing homes, over 1500 are unlicensed.

- The rural health infrastructure consisting of about 2622 community health centres and more than 22000 primary health centres (1997-98 report) also suffer from various maladies like, lack of suitable accommodation, inadequate staff, insufficient diagnostic and therapeutic facilities like equipment, drug etc. In some cases laboratory, X-ray and OT facilities although available are not utilised due to lack of manpower. As a result there is constant flow of patients from periphery towards district and city hospitals.

- Even in city like Delhi the peripheral zonal hospitals are either understaffed or ill-equipped—resulting in flow of patients towards larger hospitals leaving the small hospital under utilised.

- In recent times the blood bank services came under scrutiny. A.F. Ferguson and Co., a management consultancy firm made startling revelations in its report (1995).
  - — Out of 1010 blood banks then existing in the country 616 were unlicensed.
  - — One-forth of the blood used in various hospitals was drawn from the licensed commercial blood banks.
  - — The donors, mostly undernourished poor people, were not medically examined before bleeding. Around 4000 to 5000 regular professional donors were accepted for donation in as many as 20 cities.
  - — Existence of middlemen and the nexus between doctors and the blood banks was established.
  - — The statutory AID Surveillance centres were not in operation and up to 85% of blood collected was not screened for the HIV virus.
  - — Lack of storage facilities and the blood banks were in most unhygienic environment.
- Majority substandard, most of them being housed in tiny flat lets (e.g. 200 sq. feet).
- A seventh of them in sheds or lofts in slums.
- 77 per cent do not have scrubbing rooms.
- Less than third has qualified nurses.
- Some have operation theatres as small as 48 sq.feet.
- Some do not disinfect the OT more than once a week, some once in 3 days.
- Non incinerate infectious waste material, instead dump it in municipal bins, from where scavenger pick out needles, syringes for recycling.
- Some claim to be maternity homes but only a third have labour room.
- 37.5 per cent of all wards and 50 per cent of beds are dirty, most are poorly lit.
- The heaviest costs are incurred in unnecessary investigations.
- Large number of high priced private hospitals and nursing homes do not have intensive care units or facilities for critical care in emergencies

These press reports will give you a fair idea of the prevailing maladies in the existing system.

1.3.2 Cause and Effect Relationship

Hospital is a composite medical and social organisation providing medical care services while acting and interacting with several variables like task, technology, structure, people and power. These five variables are interdependent and any change in one of these variables will cause or effect change in the other variables. The 'People' is considered as the most important and vital variable in the organisation. The hospital system constantly interacts with people in the process of delivery of medical care, such as, patients and community, medical staff, para medical and nursing staff, and the higher authorities. To appreciate the problem it is necessary to examine the roles played by the 'people' in the hospital system.

Patients

While medical care services and technology are advancing the public awareness is also increasing to generate demands for benefits of new technologies. Patient is vitally interested not only in the availability of care but in its quality and low cost as well. He demands personalised care, and free access to information concerning their illness and likely progress, and emotional support. He assumes the hospital authority is responsible for providing quality medical and nursing care, safety and comfort to the patients.

Providers of Care

The hospital administration has to create a working environment providing suitable structural facilities, like building space, staff, beds, equipment, services within the reach of all categories of staff in time and space. Staff should be suitably motivated and trained, and adequate policy, rules and procedures should be available for conflict resolution, industrial harmony and well co-ordinated activities.

Organisers of Care

The owner has moral and legal responsibility to ensure that the interest of each patient is protected and appropriate measures are taken to monitor and improve quality of care and patient safety. In the process he is also interested to maintain productivity by optimizing cost of care.

1.3.3 Problems and Constraints

After highlighting the above roles of the people in hospital system an attempt is being made to examine the cause and effect relationship of the maladies prevailing at macro-level and micro-level.

Health is a State Subject

Health being a state subject, every state has its own pattern of delivery of medical care and there is no uniformity in policies and programmes.

Hierarchy of Need

Health has always been allotted a low priority. It occupies sixth place in the order of priority for budgetary allocation. Thus the monetary resources are and have always been a constraint in the health sector.

Health is Treated as Expenditure and Not an Investment

Unlike the Railways, Commerce or Industry where the allocation of funds is regarded as an investment because they are revenue generating sectors, the medical services are considered to be an expenditure, since no profit motive is involved. However, it should be realised that healthy people means a healthy nation. Fifty per cent of the population is devoid of even minimum required health facilities, because of this negative approach towards health.

Lack of Intersectoral Approach

Good health of community depends upon various factors like basic sanitation, safe drinking water, balanced diet and health education. These require a well co-ordinated and integrated approach amongst the various sectors. Lack of co-ordination at various levels has resulted in high mortality and morbidity rates in the country leading to uncontrolled situation prevailing in hospitals.

Lack of Leadership in Health Field

With the introduction of newer medical technologies in diagnostic and therapeutic services the cost of medical care has become very expensive, and has created an imbalance in demand and supply. In order to meet this challenge there is a need for dynamic leadership. One of the causes of malfunctioning of hospital services is the lack of appropriate leadership not only at the apex levels but also at the middle levels.

Lack of Norms and Standards

Countrywide public and private sector medical establishments are organised without proper

planning considerations as there are no nationally accepted norms and standards. There is no uniform guidelines for construction of buildings, organisation structure, staffing, equipping or standards for performance. Except certain hospitals in organised sectors like Railways, Defence and some newly construct corporate sector, none of the hospitals meet the modern management needs for medical care.

Philosophy of Mammon

Certain industrialists and rich people have found hospital as a profitable industry, and therefore there is mushroom growth of private hospitals, nursing homes, polyclinics in all urban and semi-urban areas. These establishment are purely profit oriented, and are not guided by any state/national norms and standards for performance and they are thriving in spite of glaring inadequacies in facilities provided by them.

Consumer Awareness

The patients and the community are generally aware that the health care is a basic human need and right. They have right to good medical care. The enlightened urban and semi urban population are also aware that medical practitioners, like other professionals, were liable under the Consumer Protection Act (CPA) 1986. This will definitely solve glaring cases of neglect and callousness. However, simultaneously the community should be aware of the genuine limitations of the medical care facilities available, to avoid frivolous and vexatious complaints.

At microlevel there are many extra-mural and intra-mural factors which are directly or indirectly responsible for the maladies in the hospital system.

Extra-mural Factors

- Inadequate and irrational allocation of funds
- Failure of the policy of regionalisation system of medical care forcing patients to crowd in larger hospitals leaving smaller hospitals underutilised.
- Political and bureaucratic apathy and at times interference in hospital management.
- Absence of norms and standards and regulatory mechanism for establishment and functioning of all types of hospitals/nursing homes.
- Lack of professional training as no system of compulsory training for upgrading/update for medical, technical and administrative staff exists.

Intra-mural Factors

- Inadequate manpower, material and financial resources, leading to gap in demand and supply.
- Poor utilisation of resources available due to inefficient professional and administrative staff – Lack of motivation, misuse and pilferage of materials.
- Costs and financing of operation: Poor budgetary planning and control.
- Sharing of power, unionism, conflict between administrative and medical staff.
- Inefficient machinery for handling grievances, patient complains and staff conflicts.
- Inadequate inservice/on the job training for technical and paramedical staff causing inefficiency and lack of involvement.
- Inadequate policy, rules, standing procedures for activities, and non-existence of regulatory mechanism.

Check Your Progress 2

1) Why private hospitals and nursing homes are labelled as "Shrine to Mammon"?

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2) Enumerate five main reasons at macro-level for poor performance of health system.

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3) Enumerate five intra-mural factors for deterioration of standards of medical care.

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1.4 MANAGEMENT OF HOSPITALS: CHALLENGES AND STRATEGIES

1.4.1 Management Dimensions

While studying the role of administrator in the previous block you must have noted that hospital administrator is the executive leader required to manage an organised group of people from different educational background, engaged in a specific task of providing medical care in a hospital. His function demands interaction with the:

- patients
- medical staff
- paramedical and other personnel
- higher authorities
- community, i.e., the dependent population who utilise the hospital, other hospitals and medical institutions in the area, the political leaders and so on.

Today the modern hospital administrator has to strike a balance between internal operational activities and outside activities. Administrators are always under pressure to keep up with changing times. They must develop new skills and apply old skills to new situations. In present situation an administrator has to give more emphasis on organisational planning and development, efficient operation, cost containment, increase in productivity and marketing. To discharge these functions efficiently and effectively he needs the following :

- Well **motivated** adequately **trained manpower** in a suitably **structured organisation,** with **empowerment**.
- Hospital system design specifications and procedures for efficient delivery of medical care services.
- Budget planning, monitoring and control, towards cost containment.
- Optimum utilisation of resources to increase productivity.
- Community education on hospital matters affecting them.

The above activities in turn will improve and maintain public image of the hospital.

1.4.2 Challenges and Strategies

Some areas in which hospital effectiveness is being questioned and the role of administrator is under stress, include:

a) Organisation structure
b) Technology management
c) Manpower utilisation
d) Sharing of power in decision-making
e) Patient care—quality management
f) Cost and financing of operations
g) Leadership and motivation
h) Information technology
i) Marketing of hospital services

Hospital Organisation

No two hospitals are alike—this will be reflected in the organisational structure. The ideas and outlook of management, the type of services, and the relative skill of personnel, will all have a bearing on the structure of the organisation.

Due to various factors in a government department the organisation structure tends to become unrelated to the goals of the organisation and the administrators freedom to organise is seriously curtailed. Organisation structure is expected to provide a sound framework for management, however, the present structure is identified as a stumbling block and it has become necessary to reorganise to achieve clarity of responsibility, and accountability.

There is centralisation of authority, generally remote from the point where tasks are performed. Authority is vested to a position without clear accountability. For example, the administrators have little control over staffing, and in the selection of people who constitute their work group.

Due to increased specialisation, changing technology, and increased expectations of consumers and employees the hospitals require better co-ordination and organisational adaptability. The administrator's expertise is that of an integrator structuring the perceptions among producers, and between producers and consumers, so that change can be effected without destroying organisational integration.

Therefore, there is a need for an organisational structure and a system for performance of various activities, which can be regulated through process control methods.

Technology Management

Technology management is posing a great challenge to hospital management. The continuous process of technological advancement, particularly in the field of diagnostic and therapeutic services, often lead to conflicting situations between the health care providers and the expectations of the community. The cost benefit analysis of technology by the hospital management in terms of hospital size, location, morbidity status of population, budget, mission and management of the technology in terms of quality improvement is critical to the hospital's success. Hospitals desire to update technology to be competitive among the health care organisations should always be weighed with the benefit to the organisation and the improvement of quality of care for the community.

Manpower Utilisation

Hospital is a labour-intensive organisation. Human resources with adequate level of

education and skill when properly motivated to work with zeal and confidence can only achieve good results. The reasons for poor capacity utilisation are:

- Outdated recruitment rules, specifying education and experience standards not commensurate with present day requirement.
- Lack of organised on the job training and inservice training for growth and development.
- Departmental policy, rules and procedures, and the duties and responsibilities for each grade are not specified resulting in overlapping of functions.
- Poor motivation due to poor managerial leadership.
- Unsuitable organisation climate conflicts, no grievance procedure, lack of facilities, reward or punishment.

Therefore, there is a need for a good executive leadership to attend to personnel management for optimum capacity utilisation and to prevent frequent turnover of trained manpower.

Sharing of Power

There are multiple line of authorities in the complex, modern hospital. A delicate balance of power exists which is frequently shifting. Authority lines can be considered as checks and balances within the organisation. Power is synonymous with exercising influence and control over a situation; it is that force when used causes a change.

Hospital governing body is responsible for monitoring the quality of care rendered in the hospital by the medical staff. The medical staff has the overall responsibility for the quality of medical care provided to patients. The hospital administrator has to ensure availability of resources required for medical care and efficient operation of different departments directly or indirectly providing medical care services. Hospital is, therefore a functional organisation with three lines of authority. The administrator should empower his subordinates through the following methods:

a) Delegation of authority to take decisions
b) Involvement of employees at all levels of decision making process
c) Provide resources —men, materials, finance, system design, rules and procedures
d) Provide developmental opportunities
e) Trust employees
f) Sharing information
g) Recognition and rewards
h) Empowerment of teams.

The need for empowerment for willing co-operation and performance of tasks cannot be over emphasized. This will help in process control and in determining causes of success or failure.

Patient Care

The quality of care refers to the degree of excellence of the medical care delivered—whether it meets or exceeds the accepted standards. However, the criteria necessarily changes with improved efficiency related to technological advancement. It is a moral as well as legal responsibility of the owner of the hospital to ensure that the interest of the patient is safeguarded and appropriate measures are taken to monitor and improve quality and patient safety at reasonable cost to the satisfaction of the patient.

The measurement of quality of service poses many problems, as it is not possible to establish accurate standards of judgement. Yet we need to have some means of evaluating the service, for, only then the efficiency of performance and in turn the community benefit, can be assessed.

The medical care service quality evaluation programme should be so designed that the adequacy of the structure, the process of medical care delivery and the impact on the beneficiaries can be assessed in quantitative and qualitative terms and correlated with cost of care.

Cost and Financing Operations

In our hospitals there is a perpetual problem of scarcity of resources. The cost of manpower and material resources, and the cost of operation of facilities have increased manifold. Therefore, it is essential that all those who are engaged in hospital activities and not only in hospital management must be made responsible for reducing/controlling cost of operation of activities. Responsibility of such nature cannot be imposed, but it has to be introduced in a manner acceptable to the people.

Therefore, working out an acceptable cost containment strategy for hospitals is a problem requiring urgent attention.

Leadership and Motivation

The administration of modern hospital has become a demanding profession because of increasing complexity. There is an urgent need for high quality management of our hospitals as in any other industry. A fully trained hospital administrator can only ensure optimum and economic utilisation of resources, prevent underuse/overuse of facilities, standardise hospital rules and procedures, collect data for evaluation of performance. The hospital administrator should pursue the twin aims of efficiency and effectiveness.

The deficiency of trained administrators particularly for larger hospital is posing a problem in management of hospital.

Information Technology

Scientific management is recognised as the key to the success of an enterprise. By now you know that the management is the effective use of human, financial and material resources to achieve the organisational objective through the managerial functions of planning, organising, staffing, leading and controlling. Information system is the most vital for performing all managerial functions as it provides required information to each level of management, at the right time, in the right form and the right place, so that decisions are made efficiently and effectively.

The framework of hospital information system should be so organised that there is a rapid and regular feedback of information. A vast amount of information is available in the hospital to enable an objective assessment of the hospital service and to compare the performance of one hospital with that of another. The main problem is the collection, compilation and presentation of the basic statistical facts in a more acceptable and digestible form.

Therefore, the system of collection and presentation of "Hospital Operational Statistics" and "Hospital Morbidity Statistics" should be standardised.

Marketing of Hospital Services

Marketing has since been recognised as one of the core activities in the hospital management, particularly in private hospitals. Hospitals which concentrate on treatment of diseases are gradually under going a change to health management. Marketing should not only stop at bringing in patients but also be extended to develop a permanent image within the minds of people by building lasting relationship.

With the health insurance gaining importance and the recent proposal by the government to privatise health insurance a new challenge is faced in marketing hospital service.

The hospital administrator should now be familiar with health insurance policies, diseases covered, cost of adopting the scheme, reimbursement policies and attracting potential customers, and also to take care of a patient within the stipulated period and cost.

Check Your Progress 3

1) In hospital management what are the main thrust areas?

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2) Enumerate six areas where challenges are faced by administrators in effective management.

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3) What are the factors responsible for poor manpower utilisation?

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1.5 REMEDIAL MEASURES

The causes of malady as enumerated above are multidimensional and therefore, remedy depends on situational analysis and problem identification followed by appropriate steps for selection of best solutions out of the alternatives. However, broadly the general remedial measures are mentioned below:

- Reduce overcrowding in district/city/referral hospitals by enforcing regionalisation system. Simultaneously improve the functioning e.g. PHCs, CHCs and other small and medium size hospitals by providing adequate staff and facilities, and adequate supervision and control.
- Introduce norms and standards for provision of resources, and for performance through strict quality control procedures to ensure accountability.
- Development of all categories of staff through organised training and motivation, and provide suitable organisational structure and climate for efficient functioning, and provide incentives to highly skilled and efficient staff to prevent turnover.
- Introduction of information technology for hospital performance statistics which can benefit management of hospitals in periodical evaluation of activities, both professional and administrative, to ensure optimum quality and quantity of care provided at reasonable cost. Information technology can be used for cost containment programmes and comparing performance of similar hospitals.
- Government should lay more emphasis on:

  —people below poverty line

  —rural and semi-urban population health needs

  —people covered under insurance schemes

  —aging population

  —emergency care

  —comprehensive therapeutic system of medicine by integrating allopathic and Indian systems of medicine at all levels.

- Encourage private sector to establish hospitals and function under suitable regulation to provide optimum care at low cost.
- Appointment of trained hospital administrators, particularly for medium or large size hospitals, to act as an executive leader in management of complex modern hospitals of today.

Check Your Progress 4

How information technology can benefit management of hospitals?

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1.6 LET US SUM UP

In this unit you have learnt that our hospitals all over the country present a dismal picture as reflected in various press reports and complaints received by consumer forums and also the maladies are all pervading from PHC level to the tertiary city hospitals. The gap between demand and supply is increasing with introduction of new technology and rising cost of medical care.

You have also learnt about the cause and effect relationship of the prevailing maladies at macro-level, micro-level and some general remedial measures.

It has been however, emphasised that the challenge has to be met by judicial and economic use of resources, by training and motivation of staff, cost containment programmes, introduction of norms and standards for resources and performance, and above all, enforcing a regulatory mechanism through concurrent performance evaluation, to ensure that failures or success is made accountable.

Present day hospital is a very complex organisation. The quality of service provided to the patient by hospital employees is the foundation of good hospital community relations. There are many constraints and challenges in the management of hospitals and in today's scenario the administrator is under tremendous pressure.

1.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) 0.7 per 1000.

   b) urban areas, rural areas.

2) Government 60.4%

   Voluntary + Private bodies 36.5%

3) a) Growing awareness and expectations

   b) In equity in distribution of medical facilities

   c) In accessibility and rising cost of medical care

Check Your Progress 2

1) "Mammon" is known as God of reaches. Private hospitals and nursing homes are purely profit oriented.

2) a) Low priority for health

b) Consumer awareness

c) Lack of inter-sectoral approach

d) Lack of leadership in health field

e) Lack of norms and standards

3) a) Inadequate manpower, material and financial resources

b) Poor utilisation of existing resources

c) Poor budgetary planning

d) Inadequate training

e) Inadequate policy, rules, procedures.

Check Your Progress 3

1) a) Organisational planning and development

b) Efficient operation

c) Cost containment

d) Increase productivity

e) Information technology

f) Marketing

2) a) Organisation structure

b) Technology management

c) Patient care quality of care

d) Cost and financing operations.

e) Manpower utilisation

f) Marketing of hospital services

3) a) Outdated Recruitment Rules

b) Lack of organised training for growth and development

c) Inadequate policy, rules and procedures for efficient functioning

d) Poor managerial leadership and motivation

e) Unsuitable organisational climate for functioning.

Check Your Progress 4

- Periodical evaluation of activities—both professional and administrative to ensure optimum quantity and quality of medical care.
- Cost containment programme.
- Compare performance of similar hospitals.

UNIT 2 PUBLIC RELATION AND IMAGE OF HOSPITAL

Structure

2.0 OBJECTIVES

After studying this unit, you would be able to:

- describe the concept of public relation;
- identify the factors affecting public relation;
- able to set up a Public Relation Department; and
- recognise the different types of conflict and describe how decisions are made or prescribe how the conflicts should be resolved in the capacity of a manager.

2.1 INTRODUCTION

You will agree that public relation is a part of every day life. The fact that you have taken up the course of hospital management or have opted for medical graduation indicates that you are going to interact with people whom you do not know, but you would like to impress them and help them. This activity is public relation.

Very often when we discuss about some successful persons, we say that he is impressive and has good public relations. As a person has his own public relation, so is true of an organisation which has its own public relation. In today's world of globalization and the paradigm shift of people's opinion and expectation, with the rise in competition, the role of public relation has become all the more important. In this unit you will learn the factors influencing public relations and the principles of PR in hospitals. You will also learn about the factors responsible for patient satisfaction, courses of conflict in hospitals and how to resolve them.

2.2 CONCEPT OF PUBLIC RELATION

Think about your family and try to make out who in your family is doing the job of public relation (though unconsciously) for your family. You will agree to that the best example of public relation in a family is mother who alone can maintain the mutual understanding between the father and children. It is she who maintains or conveys each other's requirements or feelings and thus helps to keep the family united. She has the full and detailed knowledge about the neighbours, their family members, from where they belong and even their likes or dislikes. Whenever a guest is to visit the family, she only decorates the home and serves the guest so as to create a good impression of the family. In a similar way the public relation department projects the hospital or organisation and maintains good relation with the society.

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The term is often used interchangeably with information, communication, public affairs, propaganda, adversity. It is used as noun e.g. how is your public relations; and as a verb — the situation was public relation or as a modification, it was public relation's accomplishment.

Prof. E.J. Robinson of Boston University has described public relation as an applied social and behavioural science. It is that function, which measures, evaluates and interprets the attitudes of various relevant publics. The fundamental purpose of public relations' practice is to establish a two-way flow of communication for mutual understanding, based on truth, knowledge and full information.

Public Relation as per dictionary means presenting a good image of an organisation to the public especially by distributing information.

Public Relation is a combination of science and art. It uses various scientific principles and methods to deal with the public, to use statistical and other methods to conduct survey and to assess the opinion of individual or groups and then arrive at a particular decision. Public relation has a close association with anthropology, psychology, sociology and economics. Anthropology helps in studying mankind, taking into consideration their origins, beliefs, customs, etc. For a good public relation, one must have a thorough knowledge of psychology so that he could deal successfully while dealing with mass, as people's behaviour is closely related to his/her psycho. If one could not feel or measure this process of mind, particularly of a group, the situation would become chaotic and of utter confusion. Even for motivation, one needs to understand the basic psychology. By now you are aware that hospital is a social organisation. You will also appreciate that institutions like hospital exists only because of society and is judged only by its contribution to society as viewed by the society. Sociology the study of human interaction and interrelations, their conditions and consequences, helps to understand the view and needs of the society and therefore modify its policies and services in accordance to social needs. There are several factors, which affect public relations and are being described here for your understanding.

1) **Attitude**

   It is the way of thinking or behaving. Attitude is the emotional feeling towards something. In other words it is the public opinion (opinion is an expression of an attitude). One's self interest determines his/her attitude. It may be inherited or acquired from the society to which one belongs. For example people of French origin would have some common attitude. On the other hand the same French people living in a different community/society for a long time would have a little different attitude. It is very important for persons dealing with public relation to understand the attitude of people with whom they are dealing.

2) **Education**

   The education of the public is a very important factor. The more educated a person is, the more self-respect he would have, and he would like to be treated more as an individual rather than a group. He would never tolerate authoritarianism. The mode of tools to be adopted would depend very much upon the education of the public.

3) **Socio-economy**

   The expectation and satisfaction of peoples is influenced to a great degree by their socio-economic status. For the same treatment facility, people from different societies would have different expectations. For example a person from government sector who knows that delays occur everywhere would tolerate long queues, whereas a person from a multinational firm, having a busy schedule will not tolerate long waiting time and instead would seek prior appointment even if he has to pay a little more.

Besides the application of the sciences, the public relation is an art. Unlike factory, where one feeds the input and recovers the output, all in a straight-line process; public relation has to tune according to the needs of the people. Although the aim of successful PR is to satisfy customers, but the type of customer with whom they are dealing matters much, more so when a person is in a diseased state or accompanying a diseased person who may not behave like a gentle man makes one to think about the strategy of PR. When a person fall ill, most of the time, it is not he who decides, but it is the family members or even neighbour

who decide and affects the choice of hospital. Even when the patient has arrived in the hospital, the satisfaction of patient as well as of attendants are important for good public relation. Thus, you would appreciate that successful PR is based on scientific theory followed artfully.

2.3 PRINCIPLES OF PUBLIC RELATION IN HOSPITALS

You shall acknowledge that the ways to attract 'a' customer for goods e.g. a cosmetic soap is different than the ways to attract a patient for the hospital. The strategy to be adopted for PR in a hospital has to be based on the following principles:

1) The most important requisite for a good public relation is efficient and good hospital service meeting the expectations of the patient and the attendants as well as those of visitors coming to the hospital.
2) The hospital services should adapt its services according to the needs of the population it is serving. The needs of the patients could be determined by periodically surveying patients' opinion, expectations and analysing them through scientific means and accordingly tailoring the services.
3) The members of the governing body or top decision-makers should be alert, sensitive and responsive to the needs of their clients.
4) All hospital works should be interpreted in such a way that it appeals to the public and are informed on logical and rational grounds.
5) These rational appeals should be given a thrust accommodating the emotional and personal needs of the people involved.
6) The attitude should be such that criticism and rational resistance are not suppressed nor attempts are made to overpower them. Rather they should be welcomed and answered honestly.
7) Hospital publicity and promotional methods should be planned according to the internal developments and constraints, both in terms of resources and functioning of the hospital.
8) All publicity should be honest, dignified, factual and entirely applicable. They should not be exaggerated and should not have adverse effect on other similar institutions.
9) Public relation programmes should keep in mind the vision or aim of the hospital and also realising that it is the public who are paying the bills of the hospital and therefore their interests should always be protected.
10) Hospital functions should always be updated of the recent trends in public and adopt or publish accordingly. For example if the talk of the town is about health insurance, then the public relation department should publicize more about their policy towards insurance rather than speak about national programmes.

Activity 1

You had been assigned to visit public sector company say NTPC and had been assigned to make a presentation to the various categories of employees in their auditorium. Describe what would be the information that you would like to have and how would you make the presentation. Again your hospital is asked to make a presentation at a primary school. In what way your presentation would be different from that you had earlier made at the said PSU.

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2.4 PUBLIC RELATION DEPARTMENT

By this time you must defend that it is the people who matters most and they must be made to fully understand the hospital, the vision of hospital, the services available and the results of these services. People who do not understand these cannot be expected to appreciate them, nor can they be expected to take full advantage of the services being provided unless they know that they are available. Here comes the role of the public relation. On the other hand, the administrators should also be aware of the need and expectations of the public as per the feed back of the public relation department and accordingly take policy decisions.

Stages for the Development of PR Programmes

There are three stages for development of PR programmes for an organisation:

1) First is to define the objectives for increasing public understanding and acceptance of the organisation products, plans, policies and personnel.
2) Second is to equate these objectives with the interest, need and expectations of various relevant public groups.
3) Third is to develop, execute and evaluate a programmes to earn public understanding and acceptance.

Therefore, public relation programmes is a two-way communication system between hospital and public with inputs and acceptance leading to action from both the sides.

The Responsibility and Functions of Public Relation Officer (PRO) of a Hospital

There should ideally be a separate PR Department headed by a full time public relation officer with MBA qualification or advanced diploma in public relation or journalism with an experience a PR. He/She is to have a team of 3-4 PRO's and few social worker/guide and a secretarial staff with an independent office. In smaller hospital, they are amalgamated with personnel department or marketing department. The department should report to the Hospital Administrator. Their works would involve the following:

1) To understand the vision and objective of the institution, and to have it documented in a way that it can be presented to the public.
2) Working with other departmental heads — both clinical and support, to maintain good relation between the hospital and public and contribute to mutual understanding.
3) To conduct opinion surveys among present and former patients and thus be aware of the current state of opinion and their experiences of the hospital and constantly alerting the administrator of the outcome of such surveys.
4) Attending to the complaints and comments from the patients, visitors and relatives, trying to sort out the problems, and whenever their wish cannot be met or are unjustified, explaining the complainant the reasons thereof.

5) Maintaining close contact with various prominent community members who have interest in hospital and have the capacity to alter public view.

6) Maintaining close liaison with other hospitals particularly those who are referring the patients. To inform them about the patients as soon as they are admitted, and keeping good contact with community welfare organisations like Lions Club, Rotary Club, Blood Bank etc.

7) Maintaining close contact with peoples concerned with mass media like press, radio, television etc. To prepare press release or announcements for the administrator or spokesperson. To assist reporters by providing relevant and accurate information.

8) To make sure that all suggestions and complaints sent by post are duly acknowledged and to send an acknowledgement letter or action taken, signed by Chief PRO or hospital administrator.

9) To answer queries by persons or companies related to treatment, diagnosis insurance bills etc.

10) To supervise all the departments which are important from PR point of view, like that of reception and enquiry, registration, OPDs during peak hours, OT waiting area, ICU waiting area etc.

11) To arrange various meetings, conferences or workshops. To attend to visiting dignitaries, team visits to hospital and preparing materials to be delivered by eminent physician or surgeon for some important public presentation.

12) To arrange exhibition where the main objective is to educate the public of the progress in medical care and diagnostic methods and to motivate the people to use the updated facilities available in the hospital. These exhibitions are tailored keeping in view the people to whom they are addressed. For example, exhibition in an industry would stress more on screening workers for early diagnosis of silicosis, cancer etc. and availability of health check up facility whereas for a low socio-economic group, the stress would be more on communicable diseases and dietary advises.

13) To arrange for pamphlets, booklets, manuals etc. for the patients. These booklets are in general of two types:

   a) Booklets to be distributed among the patients which welcomes new visitors to the hospital preferably having an introduction by the administrator. It contains all the relevant information, regulations specialties and diagnostic or screening facilities available, the charges of various facilities e.g. room rents, package deals etc. and rules/regulations of the hospital like visiting hours, meal timings etc.

   b) Booklets or manuals for the in-house staff about the various procedures, job description of staff, facilities to staff, do's and don'ts, whom to contact in particular situations etc.

14) To publish house journals which address to all sections of staff and help create common identity among staff members from senior most to down the line staff. It normally includes:

   a) News which are national, regional and local.

   b) Feature articles by the staff member and includes medical as well as non-medical articles like case studies and essays etc.

   c) News related to personnel e.g on newcomers, retirements, promotions, awardees etc.

   d) Information from management to staff.

   e) Letter from readers, patients, companies etc.

   f) Job vacancies, advertisements, and future plans/events. News pertaining to staff association and trade unions.

The house journals serve a very important role to augment coordination, and offer an excellent opportunity to clear any doubts or stop grapevine communication. It also serves to let off steam before it explodes.

The PRO has to make arrangements so that each and every staff members receive a copy of the magazine/journal. It may also be sent by post to various organisations on

panel, to patients who are frequently visiting the hospital so that they also feel a sense of belongingness to the hospital.

Check Your Progress 1

1) You are the CEO of a big hospital and you require a person to head the PRO department. What would be the basic qualification and experience you would look for ?

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2) You are going to publish a house journal. The introduction of the journal should start with which one of the following :

   a) Future plans of hospitals

   b) Existing facilities available and staff distribution

   c) Vision/mission of the hospital

   d) Recent accomplishment of the hospital

3) You have received a suggestion by post from one of your valued patient. What would be your immediate reaction?

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2.5 PATIENT'S EXPECTATION AND SATISFACTION

In a study of psychological aspects of patients visiting a hospital, Ernest Diehter revealed that a patient while entering into a health care system becomes emotionally like a child. He adopts the hospital as a step family, but is usually opposed by the hospital's attitudes and practices. In general he avoids obligations which may exaggerate his physical illness, but also accepts the idea that he needs help, he desires to get well and need technical competent help in getting well.

Patient in general expects the followings in any hospital:

- The services being provided should be efficient without much waiting time for registration, consultation, investigations, treatment and discharge.
- Patients try to avoid crowds, and would prefer appointment system rather than standing in a long queue.
- They want no discrimination to be made between individuals of different social status or between patient and hospital staff.
- They always expect someone to guide them while they are waiting for the hospital facilities e.g. at registration, OPD block, investigations etc.
- They expect comfortable environment with proper sitting arrangements, clean toilets, room to be ready to receive in-patients and other physical facilities like canteen, drinking water supply etc.
- Every type of consultation, investigation and other services to be available under the same roof in an organised way so that there is little confusion and less movement or delay.

Role of Other Staff in PR

Besides the public relation department other staff also plays an important role for building up of the image of hospital. A patient who has undergone some treatment in a hospital, projects the hospital to his peer group and evolves an image of the hospital in the society. In a study conducted in a tertiary care hospital to find out the source of awareness of the

hospital among the patients, it was found that more than half of the patients selected that particular hospital as per the advise of their peer groups who themselves or their relatives at some point of time in the past, had the good experience of the hospital. Therefore, it is the patient who creates the image of the hospital, both good and bad. It is said that a satisfied patient would bring in ten more patients but a dissatisfied one would prevent double the number from visiting a hospital.

Therefore, the responsibility of building up the image of the hospital falls on the satisfied patient, which is turn, depends on their experiences when they are availing some of the services of the hospital. The quality of experience would depend upon all the staff members with whom he/she had an interaction and the procedural system through which they had to undergo while receiving medical care. However the Public Relation Department organises and facilitates the process so as to deviate the impression in favour of the hospital. However, the aim of everyone in the hospital is a satisfied patient. The role of various staff members in the context of public relation and the image of the hospital are as under:

Doctor

It is the doctor who matters the most to the patient. If the patient is satisfied with the doctor, he tends to forget and forgive all the bad experiences. Traditionally medical profession has had the image of active medical personnel and passive patient. Medical professionals prefer to deal impersonally with problems rather than people because of the prestige of the medical profession and its high esteem. In general, the role behaviour of doctors in ward settings is divided into four types—the humanitarian, the professionals, the bureaucrats and misfits. In an American Hospital Study, it was found that most patients expect kindness, understanding, sympathy, interest and encouragement from the doctors rather than intelligence, knowledge, skill and training of the doctor.

There are three basic models of the doctor-patient relationship:

a) **Active-passive:** In this model, the doctor is active and the patient is passive, as seen in an emergency situation, serious injuries, coma etc. The patient behaves like an infant who is helpless and the doctor behaves like a parent. The patient cannot ask any question and he has to abide by the doctor's wishes.

b) **Guidance-cooperation:** In this model as is seen in acute disorders, the patient is aware of what is going on, can reply to the questions of the doctor and is capable of following the guidance as given by the doctor. The patient behaves like an adolescent and the doctor like parent.

c) **Mutual Participation:** In this case the doctor helps the patient to help himself as in chronic disorders or an ambulatory patient. The understanding and judgement of the patient is as important as of the doctor.

Nurse

Nursing care is probably the second most important factor, if not the first for which a patient comes to the hospital, particularly for the inpatients, and thus contributes in a major way for better public relations in hospital. However, as against earlier days, when nurses were seen as an angel of mercy, the image is being replaced by less angelic and considerably more mercyful. As in the case of doctors, with increasing technical skill and more demands, they also have become more supervising and less sensitive to the suffering with more mechanical approach. This shift of attitude can be demonstrated by the fact that still today, most students enter nursing profession because of traditional concept of tender loving care to individual patients, but over the course of their nursing education in the present system their attitude changes. Even unionism, which was never thought of to affect the nursing services, are nowadays very common in this profession also. A patient most often expects affection and caring from the nurses. As discussed earlier, a person when he becomes ill, behaves like a child and for him the nurse is like a mother or own sister. However, it is not uncommon for the attendants of patients more often, the young males passing indecent comments on the nurses, this may be one of the reason for the change of attitude. In a study it was revealed that nurse patient interaction was the highest (about 60%) of total staff patient interaction. However, about half of the patients reported that nurses were unkind to them. Even nurses confessed that whenever the patients or attendants annoyed them, they used to snub them. They find disciplining patients is more easier and less time consuming than calm discussion.

In spite of the constraints and recent trends, in a study conducted at a premier institute revealed that more than three-fourth of patients were satisfied with the performance of the nurses. The PR department can arrange crash courses or workshops to help the nurses develop their interpersonal and communication skills and help them to understand how their behaviour can affect the impression of the hospital on a patient. They should be made to understand that it is the nurses with whom the patients most often interacts and therefore whatever impression they gather by the nurses' response are carried away with them and dissipated to the public.

Para and Non-medical Personnel

This group encompasses all those except doctor and nurses working in the hospital. Thus, it includes technicians, administrative personnel, ambulance drivers, nursing aides, sanitary and engineering workers etc. Most of them, except nursing aide and sanitary workers, are not required frequently to interact with patients.

However, one study found that more than half of this category of employees used harsh words whenever patients or his relatives did anything knowingly or unknowingly against their wishes. Their influence usually are more on rural illiterate patients who are from adjoining areas and who consider this group of employees to be superior to them. On the other hand, inspite of these people's more closeness to illiterate rural people; they pay more attention and attend to services more frequently to such patients who tipped them and those who are urban and literate.

Sensitive Areas of a Hospital in the Perspective of Public Relations and Image of the Hospital

i) **Reception and Enquiry Office:** The central reception area is the first point of contact of the patient with the hospital. The reputation of the hospital could be made or marred by response of this important department. Persons working here should be courteous, showing concern for the visitors and should have full knowledge of the routine procedures of the hospital. They are to be trained to remain cool and tactfully answer all the queries of the patient. During the peak hours additional staff may be posted and are to be supervised personally by the Chief PRO. Every effort to be made to attend to waiting patients and no patients should be allowed to wait for want of someone's help, as a waiting sick patient who is confused at the central lobby of the hospital creates a bad impression to other patients. The areas to be equipped with adequate number of telephones sets, on line computer and have an attractive and appealing environment.

ii) **Registration and Billing Counter:** These are basically located in the central lobby adjacent to Reception and Enquiry Office. The staff should be prompt, courteous, cheerful and efficient wearing the official uniform. As with other staff, they should display their identity cards or name plates. It has been observed that the practice of displaying the identity of the staff makes them alert of their behaviour to avoid any complaints specific to them. It is the first point of contact for such patients who have determined to avoid the services of the hospital and therefore to be treated in a more cautious way?

iii) **Emergency Service Department:** Public relation is very important in this department as the patients visiting here are serious or consider themselves serious and demands prompt attention. Other attendants, who are emotionally charged, usually accompany them. Even a minor incidence of delay or misbehaviour could flare up the situation. Therefore, persons manning the station should be mature enough with good organising capability so as to initiate prompt, courteous treatment as well as explaining the accompanying persons.

iv) **Out Patient Department:** OPDs are also known as the shop windows of the hospital. More than two-third of all patients attending the hospital avail the OPD services. About three-fourth of all admissions and investigations are through OPD. Therefore the manner is which the services are provided goes a long way in creating the image of the hospital. The staff posted at OPD should be courteous, prompt and disciplined and more so punctual. Waiting in the OPD for consultation is very frequent and most hated, but is unavoidable. Therefore mechanisms to distract them and make the waiting period comfortable should be made like provision of good sitting arrangements, tea or coffee vendor near the area, closed circuit TV showing interested but educating film or soft music background. If feasible, appointment system may be incorporated. Adequate

number of trolleys and wheelchairs with attendants are to be provided. The major source of revenue collection depends on the OPD services, from consultation, investigation or even admission. Therefore, in addition to image of hospital from the economics point of view too, this area is very important for the hospital.

v) Other areas like lift, staircase, ICU waiting areas and the nursing counter are also very important from the point of view of public relation.

Activity 2

1) You would like to start an orientation programme for the staff for better PR of hospital. Which category of staff would you choose to begin with?

   a) Doctors

   b) Nurses

   c) Para medical staff

2) What are the issues you would like to stress more upon while preparing a protocol for patients in emergency, which would be different from ambulatory patients. (Please include protocols to be followed by doctors, nurses, reception and billing department with emphasis on zero waiting time.)

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Hospital and Press

The following are the ways by which information can be communicated to the press.

a) **Person to Person Contact:** In this case, the Chief PRO or Hospital Administrator is acquainted to a particular reporter or person from press. Because of their long association or they may be the patient of a renowned doctor who is also an administrator, the press gets the information from the person at a one to one meeting and publishes their regular columns in newspaper.

b) **Press Conference:** Press conference is organised by the PR department like any other meeting. Journalists from different agencies are called and made comfortable to receive some announcements followed by handouts in the form of news release. Due preparations are needed before calling press conference. The presence of director and concerned physician and patients is required. As journalists are very busy people, it is always wise to give precise information and be ready for any probing question from the journalists.

c) **Press Reception:** This is very similar to social parties where after the reception and initial refreshments, there is a brief meeting followed by final refreshments.

d) **Meet the Press:** As against press conference and press briefings where all the

arrangements are made by the hospital in meet the press programmes the arrangement are made by associations like Press Clubs, and the distinguished guest from the organisation is called on. This is usually done for some dignitary who happens to represent the hospital for some renowned or breakthrough works.

The following is advisable for the PR person who is maintaining the relation with press:

1) The matters, which are more of public interest and not the organisation, should be given due regard and to be more stressed.

2) Present with confidence, supported by factual data.

3) If the PRO does not want something to be quoted, he/she should avoid talking off the record or in personal terms to the journalists. Otherwise the unwanted information may be published without revealing the source and thus causing more damage to the image of the hospital.

4) The information should be precise and true even if it hurts the administrator.

5) Start with the most important facts.

6) Never argue with reporters even if they are hurting the PRO. The reporter may try to probe a particular incident on his own assumption, and the PRO should be ready to answer the entire probable questions supported by facts and figures.

Managing a PR Programme

As in any programme the basic principles of management viz. Planning, Organising, Implementing and Evaluating may be applied for public relation also.

1) **Planning Programme**: A PR programme has to be planned in detail, so that it serves the basic purpose of making something to happen. It aims to take the full advantage of a situation. The process starts on the following line:

   a) Specifying a problem or set an objective.

   b) Chalking out the various options available to achieve the objectives.

   c) Selecting the best option, taking into consideration the cost involved and the magnitude of return.

   d) Selection of suitable media.

   e) Application of the programme which should be continuous and target specific.

2) **Organising**: Before implementing the programme all available resources in terms of money, manpower and media (3 M's of PR) to be taken into account. The PR department has to decide in association with the administrator, whether the plan could be implemented through the organisations own department or external agencies are to be involved. If other agencies were to be involved, they would need proper briefing with clear understanding of the objectives.

3) **Implementation**: The task of implementing a programme, more so if it is to be communicated to the vast population is a Herculean task. One can never expect to influence all people at the same time, no matter how extensive their resources are. It is therefore important that at one time, a particular segment of the population can be made the target and in a phasewise, but in a continuous process, the programme can be implemented.

4) **Evaluation**: It is very difficult to measure the PR activities in quantitative terms as no mathematical formula can be applied. Here number of press releases, number of advertisements, exhibitions or meetings arranged, may be the mode of PR, but the achievement has to be determined by the degree of impact a given message has produced on the target population and their reactions to it. However, some indirect assessments may also be done, e.g. by evaluating the increase in number of patients related to the programme excluding the other factors, number of companies/ organisations empanelled etc.

However, the patient is the best judge and evaluator of the service and would provide the actual information, and about the image of the hospital as is seen by them. To obtain their

perception, opinion polls or surveys may be carried out by questionnaire or interview. It is recommended to approach the patient according to their convenience and not vice-versa. Patients may not express their view while still availing the services of the hospital because of the fear that if they reveal something against any one directly related to their medical care, it may be taken very seriously by the staff to whom it is directed and they may even retaliate. It is therefore advisable to carry out the interview when the patient is about to leave the hospital. There are many advantages of the procedure—popularly known as exit interview viz.

- The patients are free to express their opinion, complaints or suggestions at the time of exit from the hospital.
- At the time of leaving they have passed through all the procedures or regulations and thus have a better idea of the hospital and therefore can judge the services in a wider perspective.

2.6 CONFLICTS

You will agree to that the most difficult task for a public relation department or any person in the managerial capacity is to face conflict and to resolve it. However newcomers in the managerial positions fear it most. Therefore, it is imperative for you to have a brief idea of conflict.

You will agree to that conflict is an inevitable part of life, be it in personal life or organisational life. At times the manager or administrator has to take decisions which may not be favourable to all people, and the people within the organisation may stand against the decision and create a conflict like situation. In a hospital like organisation which are engaged with public dealings, conflicts are not infrequent.

Nature of Conflict

It is very difficult to classify conflict, as depending on the situation, they differ from each other, whereas to some extent, they have certain things is common. However, there are two extremes of the spectrum of conflict:

1) **Competitive Conflict**: These types of conflicts are of competitive in nature and may be made use of as a good opportunity. Here two parties are involved who strive to achieve a single goal. The emphasis of both the parties is to win the situation rather that to defeat each other. At the end of the competition, there is an obvious result and one party wins. The example of such type of conflict may be seen when two departments or two teams of the same department are given certain set goals, e.g. to perform certain number of operations per day by a certain deadline. Now, both the parties follow the set rules and procedures and strive to achieve the goal, with occasional conflict between them, which are brought to the administrator. Not much exercise is required to solve these problems, but both parties know that for the administrator, it is the given target that is important. However at the end, one party wins, but both party improves and none is defeated.

2) **Disruptive Conflict**: Here the parties involved does not follow any set rules or behaviour (which was followed in competitive type) and the aim is to defeat or reduce the other party. The most common example of such type of conflict is the complaint of attendant of a patient about the misbehaviour of a staff. One would try to put allegations against other and would try to defeat each other. If the matter is not solved at the early stage, they would keep on shouting on the top of their voice and would try to disrupt the normal functioning of the hospital. In the late stage, the conflict ends with separation or some sort of assertions and ultimately no one wins. Therefore, in this type of conflict, there is always a negative attitude, and the end result is not clear.

It would be worth to mention that by nature no conflicts, including the above examples are specifically of one type or other. Usually all conflicts fall somewhere in between the two extremes.

Types of Conflict

Now you will learn about various types of conflicts and how to resolve them.

1) **Intra Personal Conflict:** It is a conflict that a person has to face with himself. The situation is common with everyone and one has to face it at different situations in day to day life, e.g. when one has to make a choice between different goals or means to achieve the goal through different ways. Even when one has to do certain jobs against his will, but under some compulsion, one is in conflict with self. As the conflict is arising from within, the person has to solve it himself. However the best way is to discuss with someone who is a close friend or individual with whom one can confide and trust and then take a decision.

2) **Interpersonal Conflict:** It is the conflict between two individuals. When a person does not like the other one, due to reason whatsoever may be, they are in conflict with each other.

   To resolve such conflicts, one has to identify the reason or source and has to deal with it. There may be various sources of such conflict, some of which are as under:

   a) Different attitude, nature and style of individuals which are mismatch to each other.

   b) There may be a competition among the individuals that may be obvious or virtual.

   c) Members sharing the same goal thus prompting unhealthy competition among the members.

      An example of such type of conflict is when a Chief Medical Officer (CMO) retired and there is a scope that one of the four Deputy CMOs would be promoted. This situation would lead to competition among the Dy. CMOs , and one may try to supress other or start complaining against another to the Director.

   d). Sometimes there is an exploitation tendency on some part of individual, particularly seniors who try to exploit the subordinate or the newcomers, who in turn may try to obey but after a certain limit, when they are overstretched, are in conflict with the senior. Even in a group, one group member may try to exploit others to get some undue advantage or create a situation where one has to work less and bank on the other members of the group to work for them.

   e) Reward System: In a competitive environment, it may be the custom that everytime a person gives more quantitative output he is rewarded, although other members of the group has also contributed to the end result. In such a reward system, the other members develop a prejudice against the rewardee and in turn may become hostile to the person that in itself would prevent the organisation in achieving its ultimate goal.

   Interpersonal conflicts as mentioned above are very common in any organisation and the managers should not be too bothered about them, as they do not lead to any tense situation and are controllable.

   An opportunity to work together helps to reduce such interpersonal conflicts. For this it is the responsibility of the top management with the help of public relation department to create a team spirit among the staff members and a closely-knit environment. One of the common source of such interpersonal conflict is the stereotyping, when people who had been working in the organisation for a long time are resistant to the entry of a new manager, more so, when the newcomer has some additional qualification. In such circumstances, both the parties would try to maintain a distance from each other and would try to evaluate each other. This would prevent meaningful interaction among them. However, to solve such a situation an environment is created by the superior, e.g., giving them a task, where there is no option, but everyone has to interact with each other, a bridge is created, and after some time it would be noticed that all are in harmonious relation with each other. Therefore, the reader would comprehend that both the parties who were eye to eye with each other and were in conflict, but after they have worked with each other and shared their view points has become friends.

3) **Intergroup Conflict** : These conflicts are between different groups or different departments of the same organisation. In any organisation there are many departments or subunits, and all of them has to work with each other in order to achieve the organisational goal. For example in a hospital, the administrator is dependant on clinicians and nursing staff who are a directly related for patient care. On the other hand he has to depend on other departments also like on materials department for purchase of

medicine and equipment, on marketing department for empanelling various organisations to increase patient input, on engineering department for maintenance and new constructions in the hospital. These departments in turn are interdependent on each other.

It is these interdependence, that result in conflict, the reasons of which may be one of the following:

a) **Status differences:** Some departments may have inferiority complex because they are informally seen and ranked as low, in comparison to other departments. For example the finance department may have the feeling that they are not recognised by the other staff because of their no direct involvement with patient care. This low feeling may be shown by demonstrating their power and creating disruption or problematic situations, like delaying payment of salary or issuing of cheques etc. Similarly the personnel department may show their authority by not recruiting resident doctors, to replace for one who has resigned, and insisting on proper procedure for selection that are to be followed, thus causing delay in deployment or putting some objections. It is not uncommon for audit people to harass some department just to show their higher status and authority.

b) **Overload on some department:** It is not uncommon in any organisation that some of the departments have more workload than other. Continuous overload of work may lead to members demanding some incentives or reward to compensate for their extra work. This would lead to conflict and has to be dealt with in an intelligent way. If some incentive were granted to such department, the same demand would be raised by other departments, which in turn would pose a new problem.

4) **Role Ambiguity:** Lack of job description or role of different departments may quite often lead to ambiguous situation and absence of some mechanism to sort them out would lead to conflict between various departments. Even in old and grown up institutions, the functioning style and attitude keeps on changing according to the demand of the situation. New departments are created with new roles or part of job of some department, which may lead to confusion and ambiguities. Whenever such changes are made, it is always desirable to involve all persons who would be affected. Such continuous interactions between individuals of different departments goes a long way in preventing conflicts, e.g. weekly coordination meetings between various departmental heads, chaired by the Director helps to sort out the differences, doubts about responsibility and thus helps in reducing conflicts.

5) **Lack of Knowledge about Other Department:** In today's world of complex environment, members of some department may be totally unaware of the job of other department, more so, if they are distantly related. Therefore one department may have the feeling that the other department has no work and are a parasite on the organisation. For example in a hospital, the medical residents could never digest the fact that the accounts department, which comprise of 8-10 staff members are overworked. For them, the job of account department is only to make salary statements that too once in a month. However, they would never realize the other jobs that accounts section has to do like preparing balance sheet, auditing etc. To combat such a situation interdepartmental contact or exposure programmes like financial management for non-financial department helps in promoting mutuality and collaboration. These programmes would help in appreciating functioning of other departments.

6) **Differential Reward System:** This is another source of interdepartmental conflict. The departments, which are overloaded, if they are provided some reward like special allowance or overtime, would lead to envious feeling among other departments. Proper staffing and withdrawing persons from lesser workload area to higher workload area after proper training, and proper and uniform reward system are to be establisehd to prevent interdependental conflict.

Managing Intergroup Conflicts

1) **Avoidance:** To use all mechanisms not to face conflict by avoiding the situation or showing indifference to the situation till the parties who were emotionally charged, cools down, and it helps as a good escape strategy. The problem is investigated after some time, when the strong emotion has settled down and then taking a decision. But this avoidance strategy also sends out a wrong signal, particularly when leadership

positions are involved as they would be seen as lacking courage or not having decision taking capability and in turn would provide an opportunity to subordinates by perpetually creating such conflict like situation in order to weaken the leader. Moreover, any such issue, which once is avoided, may resurface again with a more complicated face.

2) **Diffusion:** The strategy involves listening to the problem, but not taking any concerete decision, instead aims to diffuse the situation, by taking some ad hoc decision or giving assurances, e.g., immediately comprising an expert committee or negotiation committee to probe the matter and wait for the committee's recommendations. This strategy does helps in avoiding the acute problem, but in turn would leave anxiety and dissatisfaction among the staff member. Moreover the recommendations as suggested by the committee may in future put the administration in a more difficult situation, particularly when the recommendation could not be implemented or new issues may crop up with the recommendation.

3) **Confrontation:** Confrontation involves negotiation and use of authority. The administration develops a one-point programmes till a decision is taken and all other issues of lesser importance are ignored or are sidelined. This strategy is applied when the conflict has taken a large dimension and there is a likelihood of disruption of the functioning of the organisation. The authority has to take a policy decision, or he may have to decide in favour of one party or even have to reprimand somebody and punish him other party. For this the authority has to take a bold decision and no ambiguity is left in order to solve the conflict for once and for all.

Activity 3

1) One fine morning just after you have entered your CMO office you face many of your old staff who are agitated and are complaining of their new boss whom they are yet to meet face to face, but has received a strict guideline from him about the guidelines to be followed while in the department. How would you tackle the issue as a CMO?

2) There is a sudden notice of intimation of strike from next day following an incident when a sanitary supervisor has slapped a sanitary worker. What would be your action?

3) There is an incident when a patient who happened to be the people's representative to the assembly died at midnight while in ICU due to some post operative complication following a surgery in the hospital. The patient has an outstanding bill of several thousand rupess and a crowd has gathered to receive the body while the night supervisor has denied to hand over the body till payment are made and dues are cleared. After taking charge, how would you proceed to tackle the issue?

   a) Reinforce the night supervisors stand.

   b) Call the Police in anticipation of violence.

   c) Wait for the Chief Administrator who is out of town and is expected to arrive in the evening, and then start negotiation.

   d) Hand over the body after brief negotiation.

   e) Would carry on negotiation till evening, and let the Chief Administrator to take decision.

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2.7 LET US SUM UP

In this unit you have learnt that image of any organisation does not develops on its own but much strategic planning is required with amalgamation of science and art. You have also learnt that for any hospital, the patient and their satisfaction is important, as it is the satisfied patient who acts as virtual PRO for the organisation and creates the image of hospital among the society. Further you have learnt that in a large hospital, a department as a whole is required for public relation that also carries out many other functions. Each and every person under the roof including administrator, staff, patient and attendants can help in building up of the image of the hospital. The job is not so smooth sailing as it seems to be, but many a times has to bear the brunt of hurricanes in the form of conflict. Towards the end of the unit, you have learnt about the conflicts, nature and types of conflicts and how to resolve the conflicts.

2.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) MBA or PG Diploma – Public relation or Journalism should have handled similar position in other organisation.

2) c) Vision/mission of the hospital.

3) To send an acknowledgement, preferably signed by the hospital administrator.

UNIT 3 LEGAL ASPECTS AND CONSUMER PROTECTION ACT

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- enumerate the medico-legal duties and responsibilities of doctors;
- explain the implications of Consumer Protection Act for hospitals; and
- describe the importance of medical records in hospitals.

3.1 INTRODUCTION

In this unit you will learn about the medico-legal aspects of clinical practice, implications of the Consumer Protection Act and its application in hospitals, and the importance of medical records.

In this unit you will also learn about the medico-legal duties and responsibilities of doctors, the types of consent used in clinical practice. With the advent of the Consumer Protection Act in 1986, the number of litigations against doctors has increased. The literate and fully aware patient has started asking for rights; and the recent judgement of Supreme Court has brought a number of government hospitals under the ambit of this Act. This unit also

describes implications of the act for health care professionals, and gives an overview of professional indemnity schemes.

Importance of proper medical records cannot be over looked in such a scenario; and in this unit you will learn about the importance of maintaining proper medical records.

3.2 MEDICO-LEGAL ASPECTS OF CLINICAL PRACTICE

3.2.1 Definitions

A medico-legal case is defined as one, "where an attending doctor, after taking the history and examination of the patient, thinks that some investigations by the law enforcing agencies are required so as to fix responsibility regarding the case in accordance with the law of the land."

3.2.2 Duties and Responsibilities of Doctors

As the basic objective of medical profession is to provide service to humanity, medical practitioners have certain obligations to the state. The duties or responsibilities can be broadly categorised into the following:

Compulsory Duties

These include:

i) Compulsory notification of births, deaths and various notifable diseases.
ii) Responding to call for emergency military service.
iii) Reporting of cases of homicidal poisoning.
iv) Reporting of all un-natural deaths.
v) Reporting of cases covered under privileged communications.

Voluntary Duties

These comprise:

i) Responsibility to continue to treat patients with reasonable skill and care. Keep professional secrets inviolate (except under privileged communications) and take special precautions whenever needed.
ii) To conduct medical examinations after obtaining due consent.
iii) To conduct operations after taking informed consent and observing the necessary precautions for safety of patients.
iv) To issue certificates with regard to illness, death, fitness, vaccination, insurance etc. after taking due care.
v) To conduct post-mortem examination in medico-legal cases after proper authorisation.
vi) To inspect prisons and reformatories after obtaining authorisation.
vii) To attend to accidents as a moral duty.
viii) To conduct medico-legal examinations and issue relevant certificates.

It is purely the responsibility of the attending doctor to register the medico-legal case at the earliest. It is important to remember that request of the patient or attendants (relatives, friends) for not registering the case as medico-legal should not be entertained. Doctors working in hospitals run or aided by government cannot refuse medico-legal cases; and are perforce bound to accept such cases. Private practitioners have the choice to select patients. The main duty of the doctor in such cases is to observe and record findings carefully and correctly. In case the patient is to be referred to another hospital the referral slip should be attached to the medico-legal report form. Duplicate copy should be preserved.

3.2.3 Professional Secrets and Priveleged Communication

It is to be noted that the relationship between a doctor and patient is in the nature of an "implied contract" ; which although not written; is none the less legally effective. This is so

because the circumstances surrounding the transaction make it a reasonable or necessary assumption that a contract existed between the parties by tacit understanding. As a result of this; default on the part of either party renders that party liable to have damages assessed against it. However, this implied contract is not established during the following cases:

- When doctor renders first aid during emergency.
- When doctor makes pre-employment medical examination for prospective employer.
- When doctor performs an examination for life insurance purposes.
- When doctor is appointed by the court to examine accused.
- When doctor examines on the request of an attorney in law suits.

A professional secret is "one which a doctor comes to know in his professional capacity while dealing with patients." It should be understood that the doctor should not divulge anything which he/she has come to know in confidence from his patient, either while taking history or during examination or while treating. This is not only a moral obligation; but also a legal one; and the practitioner is liable for damages.

A **privileged communication** is defined as a "communication made by a doctor to a proper authority who has corresponding legal, social and moral duties to protect the public." In these cases the doctor is justified in disclosing bonafide information regarding his patients, e.g.:

- As a witness in a court of law when directed by the judge to do so.
- When the doctor has a moral or social duty to perform.
- When the doctor has to safeguard his own interest.
- When the doctor's duty as a citizen to assist in apprehension of a person who has committed a serious crime outweighs his obligation to his patients.
- When servant is sent by master for medical examination and asks for the results.

3.2.4 Consent

According to section 13 of the Indian Contract Act, "two or more persons are said to consent when they agree upon the same thing in the same sense." Simply stated it means voluntary agreement, compliance or permission. Consent can be broadly classified into two categories as mentioned under:

i) **Implied Consent:** As mentioned in the earlier sub-section, this refers to consent which is not written, that is its existence is not expressly asserted; but none the less it is legally effective. It is evident from the demeanour of the patient i.e. attending the OPD, buying a card, doing registration and waiting outside the room of doctor; and is one of the most common varieties. It does not, however, provide consent to undertake procedures more complex than inspection, palpation, percussion and auscultation.

ii) **Express Consent:** This is one where the terms are stated in distinct and explicit language. It may be oral or written; but oral consent should be taken only for minor procedures, preferably in the presence of a disinterested third party, whose testimony could be relied upon. If taken properly, oral consent is as legally valid as written consent; but the latter has the advantage of easy proof and permanent form. In this era of increased litigation, it is always better to take informed written consent, where the risks associated with the procedure or treatment have been explained to the patient.

Hence it must be noted that the doctor has an imperative duty to inform the patient about the diagnosis, the nature of treatment or procedure, the risks involved, the prospects of success, the prognosis if the procedure is not carried out and other alternative methods of treatment.

Other guidelines with regard to consent are as follows:

- The legal age in India to give consent for medical examination and treatment is 12

years. Hence in patients less than 12 years, consent has to be obtained from parents/ guardian.

- Consent is not required when the patient is unconscious and so gravely ill, that any delay could be dangerous.
- In medico-legal cases brought by the police; consent is implied under section 53(1) of Criminal Procedure Code; hence examination can be carried out even without consent.
- Even after consent has been obtained, the examination should, wherever possible, be made in the presence of a third person (preferably a nurse); especially while examining female patients by doctor of opposite sex.
- In procedures affecting rights of spouse e.g. sterilisation, artificial insemination etc. informed consent must be obtained from spouse.
- Although the consent should be broad enough to cover everything contemplated as likely to be required; the so called "blanket" consent should be avoided.

3.3 CONSUMER PROTECTION ACT

Our country is a democracy where laws are made for the betterment of the society, and its effectiveness has to be gauged by the extent of its utility to the person for whom it is made. It is a welfare state and thus has to fulfil the constitutional goals of looking after health and safety of citizen. The Consumer Protection Act (CPA) was introduced on 19th December 1986 and passed on 21st December 1986 in the Lok Sabha. It came into force on 15th August 1987, and is considered as a dynamic and radical piece of legislation enacted by the Parliament. It has four chapters and thirty-one sections.

This Act aims to provide better protection to the interests of the consumers; to make provision for the establishment of consumer councils and other authorities to provide speedy and cheap remedy to the consumers. It safeguards the following rights of consumers viz. the right to safety, the right to be informed, the right to choose, the right to be heard, the right to redress and the right to consumer education.

3.3.1 Definitions

It is important for us to know and understand the definitions of the terms and terminology in order to interpret the rules and conditions of the Act properly and correctly.

Complaint: An allegation shall constitute a complaint where the goods or services mentioned in the complaint suffer from deficiency in any regard.

Complainant: Any consumer(s) or voluntary consumer association registered under the Companies Act, 1956; or under any other law for the time being in force; the Central or State Government who makes (files) a complaint.

Consumer: Any person who buys any goods or avails of any service, for a consideration which has been paid or promised to be paid; either fully, or partially or in some form of deferred payment.

Consideration: Refers to fees or payment paid to the doctor/hospital. This may be paid; either by the patient or guardian or any other person on behalf of the patient; and in case of death of a patient; his legal heir becomes the consumer.

Service: "Means service of any description which is made available to potential users, and includes the provisions of facilities in connection with banking, financing, insurance, transport, processing, supply of electrical or other energy, board or lodging, entertainment, amusement or purveying of news or other information; but does not include the rendering of any service free of charge or under contract of personal service."

Deficiency: Any fault, imperfection, shortcoming or inadequacy in the quality, nature and manner of performance which is required to be maintained by or under any law for the time being in force; or has been undertaken to be performed by a person in pursuance of a contract.

Consumer Dispute: A dispute where a person against whom a complaint has been made denies the allegation.

Medical Negligence: Medical is falling short of reasonable medical care.

Defect: Any fault, imperfection or shortcoming in the quality, quantity, potency, purity or standard which is required to be maintained by or under any law for the time being in force.

3.3.2 Consumer Protection Councils

Under the Act, Consumer Protection Councils have been established at Central and State level with the objective of protecting and promoting the various rights of consumers:

i) Central Consumer Protection Council consists of about 150 members, is chaired by the Minister in charge of Food and Civil Supplies in Centre, and must meet at least thrice in a year; at such time and place as the Chairman may think fit.

ii) State Consumer Protection Council is chaired by the Minister incharge of Consumer Affairs or Food and Civil Supplies. The number of members in the State Council varies from state to state; and it meets at least twice in a year.

3.3.3 Consumer Disputes Redressal Agencies

Under Section 9, the Act envisages setting up a three tier quasi-judicial redressal mechanism which is as follows:

i) **District Forum:** This is established by State Govt. with at least one forum in each district. Each forum consists of 3 members: (a) A person who has been, or is qualified to be a District Judge as the President; (b) A person of eminence in field of education, trade or commerce; (c) A lady social worker, each of whom hold office for a term of five years or up to 65 years of age, whichever is earlier.

The pecuniary jurisdiction of this is up to Rs. 5 lakhs. Its territorial jurisdiction extends throughout the local limits of the district. Any person aggrieved by an order passed by district forum may appeal to State Commission within 30 days from date of issue of order.

ii) **State Commission:** It is at the level of state and comprises of the following members: (a) a person who is or has been a judge of a High Court shall be the president; (b) two other members who shall be persons of ability, integrity and standing, and have adequate knowledge, or experience of, or have shown capacity in dealing with problems relating to economics, law, commerce, accountancy, industry, public affairs or administration; one of whom has to be a woman.

- State Commission has jurisdiction to entertain complaints where value of goods/ services exceeds 5 lakhs rupees but is less than Rs. 20 lakhs.
- Appeals against the orders of any District Forum in the state.
- To call for case records of district forum and pass appropriate orders in any consumer dispute pending before or decided by District Forum.
- Any person aggrieved by an order made by State Commission may appeal to National Commission within 30 days.

iii) **National Commission:** It is situated at New Delhi and consists of 5 members as follows:

a) a person who is or has been a judge of Supreme Court shall be the President.

b) four other members who shall be persons of ability, integrity and standing and have knowledge or experience of, or have shown capacity in dealing with problems relating to economics, law, commerce, accountancy, industry, public affairs or administration, of which one has to be a woman.

Jurisdiction is to entertain complaints where the value of goods/services and the compensation claimed is more than 20 lakhs. Appeals against the orders of any state commission; to call for case records and pass appropriate orders in any consumer dispute which is pending/has been decided by any state commission.

Any person aggrieved by an order made by National Commission may appeal to Supreme Court within 30 days of date of order.

3.3.4 Other Salient Features

Limitation Period: The various redressal agencies shall not admit a complaint, unless it is filed within two years from the date on which the cause of action has arisen. It can be entertained even after two years provided there is sufficient cause for the same.

Appeals: Appeals will be entertained by both State and National Commission and also Supreme Court even after the expiry of thirty days, if it is satisfied that there was sufficient cause for not filing within that period.

Dismissal of Frivolous or Vexatious Complaints: Where a complaint before any of the fora/ commission is found to be frivolous ; it shall dismiss the complaint (reason to be recorded in writing) and pass an order that complainant shall pay to opposite party such cost, not exceeding an amount of Rs. 10,000.

Penalties: A party or person failing to comply with any order made by District Forum, State or National Commission, shall be punishable (i) with imprisonment for a term more than one month up to three years, (ii) with fine not less Rs. 2,000 to Rs. 10,000.

Enforcement of Orders: Every order made by these three agencies may be enforced by these as the case may be, in the same manner as if it were a decree by the corresponding civil court. In the event of its inability to execute its own orders, it should send such order to the corresponding court within the local limits of jurisdiction. Thereafter, the civil court shall execute the order, as if it was a decree or order sent for execution.

Check Your Progress 1

1) Define a medico-legal case and enumerate the various duties and responsibilities of doctors.

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2) What is the importance of consent in medical practice ?

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3) Define the terms 'consumer', 'service' and 'deficiency' as per the CPA.

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4) What are the consumer dispute redressal **fora** under CPA?

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5) Indicate **True** or **False.**

i) National commission has three members. (T/F)

ii) Oral consent is as good as written consent. (T/F)

iii) Appeals can be heard in the next higher court if they are filed within two years. (T/F)

iv) District Forum can entertain cases up to Rs. 5 lakhs. (T/F)

v) Limitation period under CPA is 2 years. (T/F)

3.4 APPLICATION OF CONSUMER PROTECTION ACT IN HOSPITALS

3.4.1 Historical Perspective

In the earlier section you have learnt about the Consumer Protection Act as applicable to goods and services. As far as hospitals are concerned, the private hospitals or nursing homes or polyclinics which charge for the services provided, have been included under the ambit of the Act, since its inception. However, by and large the government run or aided hospitals have been exempted; as they do not charge the patients for services provided.

3.4.2 Recent Judgement of Supreme Court

A landmark judgement was delivered by the Hon'ble Supreme Court in 1996, in the case of *Indian Medical Association* v. *V.P. Shanta and others* (Civil Appeal No. 688 of 1993), wherein the following decisions were taken:

- Service rendered to a patient by a medical practitioner (except where the doctor gives service, free of charge to every patient) by way of consultation, diagnosis or treatment (both medical and surgical) will fall within the ambit of service.
- The fact that medical practitioners belong to a profession and are regulated by Medical Council of India, does not exclude them from this Act.
- Service rendered at a non-government hospital/nursing home where no charges are taken from any person availing the same and all patients (both rich and poor) are

treated free; will be outside the purview of service. Payment of a "token" amount for registration purpose only will not alter the position.

- Service rendered at a non-government hospital/nursing home where charges are paid by those persons who are availing the facilities and are able to pay; and other poor patients are treated free of cost shall also treated as 'service'. Recipient of "free" service would also be a consumer.
- As regards government hospitals; those hospitals where no charge whatsoever is taken from any patient; rich or poor–falls outside the purview of Act. Charging of a "token" amount for registration purposes only will not alter the position. However, services rendered at government hospitals/dispensaries where some payment is taken from patients who can pay, and poor patients are treated free would also fall within the purview of the Act.
- Service rendered by a medical practitioner or hospital or nursing home cannot be regarded as free of charge, if the person availing service has taken an insurance policy for medical care, where the charges for consultation, diagnosis and treatment are borne by Insurance Company.
- In those cases where as a part of the conditions of service, the employer bears the expenses of medical treatment of an employee and his/her dependent members; this would constitute "service" as per the act, and could not be considered as being free of charge.

3.4.3 Implications for Health Professionals

In the beginning of this unit you have learnt that the doctor-patient relationship is a "contract" under which the doctor must continue to provide "reasonable" care as long as the patient is being treated by him/her. There are some areas of high risk which need caution viz.,

Failure to attend to patients: Especially children with acute conditions, which have rapid down-hill course.

Retention of objects in operation sites: Swabs, packs, instruments can be left behind if proper counting and retrieval is not done.

Amputation of wrong limb or digit, extraction of wrong eye or tooth: The reasons are carelessness in hospital notes, errors in pre-operative skin marking, and failure to check the name of the patient in O.T.

Therapeutic hazards: These can be avoided by administration of the right drug in the right dosage, via the right route; and informing patient/attendants of potential risk of treatment.

Medical case records: It is extremely important to fill up the case sheets carefully and properly; as these can be produced in courts as evidence. In complicated cases, negative findings should be mentioned. Special caution should be taken in medico-legal cases.

Consultations and referrals: These should be done in writing wherever required.

Channels of Communication: It has often been found that lack of improper communication regarding patients health/illness; leads to litigations. Hence, it is important that patient or attendants should be informed about the diagnosis, treatment and prognosis in simple understandable language.

Prescription of Non-specific/Ayurvedic Preparation: It is advisable not to prescibe non specific or Ayurvedic preparation; as the knowledge regarding constituents is not known.

3.4.4 Professional Indemnity Schemes

This refers to the tertiary level protection against the outcome of litigation which is in operation in several parts of the country. In this, the policy will indemnify any act committed by the medical professional (doctor) and his/her qualified attendant for the period of insurance. During this period, any legal liability will be taken care of by the third party. A number of companies are offering these indemnity insurance schemes where in the medical

practitioners are classified into various categories. The premium charged depends upon the threat or risk perception in that particular category.

3.5 MEDICAL RECORDS

Medical records is a chronicle of the historical evolution of medical and scientific progress through the ages. Good medical records maintained in a hospital are essential for the safe and efficient care of the patient.

McGibony defines medical records as "a clinical, scientific, administrative and legal document relating to patients care, in which are recorded sufficient data written in the sequence of events to justify the diagnosis and warrant the treatment and results." It should be understood that medical records indicate whether the treatment provided to the patient are in accordance with the existing knowledge and expectation of present day scientific medicine or not.

In simple terms medical records deal with the whom, what, why, where and when of patient care in the hospital.

3.5.1 Importance of Medical Records

The importance of medical records can be described under the following heads:

For the Patient

- Document of patient related activities.
- Legal evidence.
- Avoid ommission/repetition/duplication of diagnostic and treatment measures.
- Assists in the continuity of care.
- Ready information for life and health insurance.
- Assists in fixing diability entitlements.

For the Physician/Doctor

- Assurance of quality, adequacy of treatment measures/medical care.
- Helps evaluation of medical care.
- Legal protection.

For the Hospital

- Documentary evidence for evaluation of medical care, proficiency of doctors (Medical audit).
- Assists in planning and justification of resources.
- Legal protection of hospital.

For Public Health

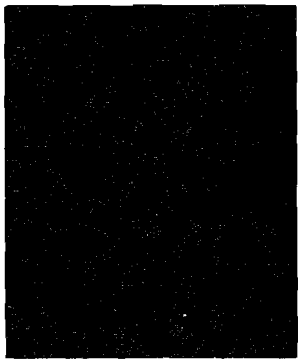
- Reliable information regarding : Mortality, Morbidity profile of dependent population.
- Assists in planning preventive and social measures.
- Early warning of incidence of communicable disease.

For Medical Education and Research

- Assists in deriving conclusions or investigating them.
- Aids in informal education of students and physicians.
- Forms basis of clinical research.
- Reliable source of material for advancement in medical science.

3.5.3 Storage and Custody of Medical Records

The hospital is the actual owner of medical records and safe custody and storage of medical



records is the prime responsibility of the hospital. Ideally all records should be preserved for infinite period, but practically it is not possible. Hence, each hospital should evolve its own policy for storage of records. In general, records should be kept for minimum of two years as cases can be filed under Consumer Protection Act within that period. It is a practical solution to keep OPD records for five years; and indoor patient records for 10 years. Medico-legal records in litigation cases should be kept for 25 years or till the case is decided.

Check Your Progress 2

1) What is the most important implication of the Supreme Court Judgement on Consumer Protection Act?

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2) Define medical record. How it is useful for the doctor to maintain proper records?

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3) Indicate **True** or **False**.

i) Payment of 'token' amount for registration purpose will fall under ambit of CPA. (T/F)

ii) Amputation of wrong digit is liable for punishment under CPA. (T/F)

iii) Medical records show the progress of medicine. (T/F)

iv) Professional indemnity schemes are valid for one year. (T/F)

v) Medical records are admissible as evidence in court of law. (T/F)

3.6 LET US SUM UP

In this unit you have learnt that just as it is important to know about the duties and responsibilities of doctors, it is equally important to keep pace with the time and be aware of the various provisions of the Consumer Protection Act. You have also learnt about the importance of taking proper consent before performing procedures, and the important areas where caution has to be exercised while dealing with patient. You have learnt about various professional indemnity schemes and also about the importance of medical records and the safe custody of medical records.

3.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) A medico-legal case is defined as one, "where an attending doctor, after taking the history and examination of the patient, thinks that some investigation by the law

enforcing agencies are required so as to fix responsibility regarding the case in accordance with the law of the land."

The duties or responsibilities of doctors can be broadly categorised into the following :

Compulsory Duties

i) Compulsory notification of births, deaths and various notifable diseases.
ii) Responding to call for emergency military service.
iii) Reporting of cases of homicidal poisoning.
iv) Reporting of all un-natural deaths.
v) Reporting of cases covered under privileged communications.

Voluntary Duties

i) Responsibility to continue to treat patients with reasonable skill and care, keep professional secrets inviolate (except under privileged communications) and take special precautions whenever needed.
ii) To conduct medical examinations after obtaining due consent.
iii) To conduct operations after taking informed consent and observing the necessary precautions for safety of patient.
iv) To issue certificates with regard to illness, death, fitness, vaccination, insurance etc. after taking care.
v) To conduct post-mortem examination in medico-legal cases after proper authorisation.
vi) To inspect prisons and reformatories after obtaining authorisation.
vii) To attend to accidents as a moral duty.
viii) To conduct medico-legal examinations and issue relevant certificates.

2) Consent is important in present context, because of the increased number of litigations against doctors under Consumer Protection Act. Every doctor has an absolute and imperative duty to inform the patient about facts related to the diagnosis, treatment or procedure to be carried out, the risk involved, the prognosis if procedure is not done before undertaking any procedure.

3) **Consumer:** Any person who buys any goods or avails of any service, for a consideration which has been paid or promised to be paid; either fully, or partially or in some form of deferred payment.

Service: Means service of any description which is made available to potential users, and includes the provisions of facilities in connection with banking, financing, insurance, transport, processing, supply of electrical or other energy, board or lodging, entertainment, amusement or purveying of news or other information; but does not include the rendering of any service free of charge or under contract of personal service.

Deficiency: Means any fault, imperfection, shortcoming or inadequacy in the quality, nature and manner of performance which is required to be maintained by or under any law for the time being in force; or has been undertaken to be performed by a person in pursuance of a contract.

4) The various consumer disputes redressal for a under the Consumer Protection Act are as follows:
i) District Forum – At District level.
ii) State Commission – At State level.
iii) National Commission – At National level, situated at New Delhi.

5) i) F ii) F iii) F iv) T v) T

Check Your Progress 2

1) The most important implication is that those patients who are getting 'free' treatment in

govt./non-govt. hospitals where some patients are being charged; can also file cases under Consumer Protection Act.

2) Medical record is defined as "a clinical, scientific, administrative and legal document relating to patients care, in which are recorded sufficient data written in the sequence of events to justify the diagnosis and warrant the treatment and results." It is useful for the doctor to maintain proper records for protection from legal suits; assisting in continuity of care and helps in evaluation of care.

3) i) F ii) T iii) T iv) T v) T

3.8 FURTHER READINGS

McGibony, *Textbook of Hospital Administration.*

Parikh's Text book of Medical Jurisprudence.

UNIT 4 FUNDAMENTALS OF QUALITY MANAGEMENT

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- identify the problem areas, and their causes and effects relationship;
- describe the concepts of quality care and quality management;
- enumerate the needs and benefits of quality system of management;
- list the steps involved in organising a quality management programme; and
- examine and analyse various methods required to be adopted to assess delivery of efficient and adequate quality of medical care.

4.1 INTRODUCTION

This unit aims at making you aware of the problems associated with delivery of medical care services by various health care establishments; we will also discuss the problems encountered by the recipients of care. It also highlights latest concepts of quality management system which can be adopted and implemented by administrative authorities at various levels, to be able to provide efficient and adequate medical care.

You are aware that with the advancement of medical sciences and technology in recent years there has been a growing sense of discontent amongst the people. The cause of this discontent in the society is the failure of the health care delivery system in India to meet the expectations of people. During the last decade the quality of medical care and hospital services have come under heavy scrutiny from the consumers and the community at large. The rising cost and scarcity of resources have added a new dimension to the problem. Patient considers health care as a basic human need and right, and he is vitally interested

not only in the availability of care but in the quality of care as well. He has also started questioning providers of care about the quality and cost of care and, in a number of cases, have gone to court of law or consumer forum for justice.

The massive investment made by the society in health care has had mixed results, in that some people have been benefited whereas majority of people do not have access to the quality health services. The inequities that require immediate attention are inaccessibility, fragmentation, and high cost of health services combined with lack of concern with total well being of the individual.

You will appreciate that the present situation calls for efficient and economic management of medical care delivery system, capable of providing adequate medical care, both in quality and quantity, at minimum cost, to the satisfaction of the consumers. This implies proper organisation and efficient management of the hospital system for better utilisation of physical facilities, staff, equipment, clinical services, and diagnostic and therapeutic facilities. Quality management strategies introduced during early 90's aim at optimum utilisation of available resources, focus on cost effective methods, and introduction of hospital-wide systematic on-going quality control and quality assurance programmes to continuously monitor and evaluate the performance, to improve the quality of care rendered, and to increase productivity of the health care organisation.

4.2 HISTORICAL BACKGROUND

You have already learnt that Modern medicine in a large way is indebted to Hippocrates, known as the "father of medicine", who lived and worked in Greece some 400 years before Christ. He was a modern type of scientist physician in that he observed closely with a surprisingly open mind; he described what he saw, he recorded his failures as well as his successes. Much of what wrote so long ago is still of interest and value today. He required his students to swear to an oath that the care administered to patients by them would always be to the best of their ability. This was to ensure quality care.

The great names in Hindu Medicine are those of Sushruta in the 5th Century before and Charaka in the 2nd Century after Christ. Sushruta, the professor of medicine in the Banaras University wrote down in Sanskrit a system of diagnosis and therapy whose elements had descended to him from his tutor Dhanwantari. He described many surgical operations, such as, cataract, hernia, amputations, setting of fractures etc. Medical record keeping stands today as proof of quality care ensured in those days.

Coming to the medieval period, we find that patient records were kept in St. Bartholomow's Hospital, London, the only hospital still exists (1137).

In nineteenth century, establishment of the famous Massachusetts General Hospital, Boston USA is regarded as the landmark in the development of quality care concept, by ensuring proper medical record keeping.

Tribute must be paid to Florence Nightingale, pioneer in modern nursing. She advocated that "no harm should be done to a patient under care", and she was responsible for laying down the standards of nursing care in 1859.

In twentieth century the idea of enforcing quality care by medical audit may be traced back to 1900, when education leaders in the medical profession in the USA were trying to cope with the problems of commercialism and general lack of skill of the profession. Consequently American College of Surgeons was formed in 1913. Its Board of Regents decided that the objective of "proper care of the sick and injured" could be achieved by a continent-wide standardisation of hospitals. Thus a "Hospital Standardisation" programme was inaugurated in 1918. One of the major requirements of the hospital standardisation was the regular review and analysis of the clinical work of the hospital by the medical staff through the medical staff conferences. In 1928, Thomas R. Ponton, MD presented a plan for "Professional Service Accounting" and "Medical Auditing" based on the procedures used by financial accounts.

Quality Assurance activities began with the formation of Joint Commission on Accreditation of Hospitals JCAM in USA, in the 1960s. A document specifying "Standards for Hospital Accreditation" was published jointly by the American College of Physicians,

American College of Surgeons, American Hospital Association and American Medical Association.

The Joint Commission on Accreditation of Hospitals (JCAH) was renamed as Joint Commission on Accreditation of Health Care Organisations (JCAHO). They have revised the document in 1995 and published as "Accreditation Manual for Hospitals". The mission of the JCAHO is to improve the quality of care provided to the public.

The Geneva based International Organisation for standardisation was raised in 1946 with India as a founder member amongst 25 countries at that time. ISO 9000 series of standards have generated maximum interest world wide and already 90 countries have adopted these so far, including all developed countries. The prime role of quality system is to provide effective means to assuring that the customer requirements are met fully. The system is aimed to achieve, sustain and improve the quality of product or service.

In India, quality assurance programme or medical care standards for hospitals are non-existent. Bureau of Indian Standards (BIS) have adopted the concepts of total quality management advocated by International Standards Organisation (ISO) as applicable to services provided by health care organisations. However, the progress made by BIS in laying down standards is very slow. A few corporate hospitals have made remarkable progress in adopting ISO standards for accreditation.

Check Your Progress 1

1) Great names of Hindu Medicine are those of

   i) Sushruta in .....

   ii) Charaka in .....

2) i) To check problems of commercialism in medical practice ..... was introduced in 1900 in USA to ensure quality care.

   ii) Hospital standardisation programme was inaugurated in .....

3) The following stands for

   i) JCAH .....

   ii) JCAHO .....

   iii) BIS .....

   iv) ISO .....

4) JCAHO is composed of:

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4.3 CONCEPTS OF QUALITY CARE AND QUALITY MANAGEMENT

You are already aware of that health is considered as physical, mental, spiritual and social well being and also enjoyment of highest standard of health is fundamental human need and right. Society as a whole has some responsibility to provide care of the sick and to prevent the occurrence of disease among its members. In the previous block you have also learnt that hospital is an institution evolved round the concerned care for sick among the population.

What is that the average patient really wants from health professionals? Patient wants someone who beside being a primary physician and an expert in diagnosis, can also give advice, allay fears and educate; secondly, patient is vitally interested not only in the

availability of care but in its quality as well, and is also concerned with the cost of care; thirdly, he is interested in well patient care, i.e. promotive and preventive care; fourthly, he expects personal attention as OPD or in-patient.

Health care services include a wide variety of quality aspects all of which are important. In case of medical services, the sellers are doctor, hospital, nursing home, clinic etc., because they offer health services at stipulated prices. The buyer, i.e. the patient as a customer wants acceptable quality services which must be commensurate with what he is paying to the seller. Acceptable quality services not only include the quality of direct medical services, such as, diagnosis, medicines, surgery, and treatments, but indirect operations, such as, administration, purchasing, stores, house keeping, linen services and so on, are also included as their costs are reflected in what the buyer pays. It may also include quality of performance that is directly connected and closely related to health care, such as, food, housing, safety, security, attitude of employees, and other factors which arise in the context of hospitals and nursing homes.

4.3.1 Concepts of Quality Care

You will appreciate that the key person for whom all activities are performed is the patient and the key word related to health care services is quality, which is understood as customer satisfaction. Therefore, the quality of service should always be in line with the customer's needs and expectations.

The "Quality of Service" may be defined based on ISO 8402 as, **"Totality of features and characteristics of service that bear on its ability to satisfy stated and implied needs of its patients."**

In this definition the "features and characteristics" refer to specifications relating to standards for various dimensions of quality, such as, accessibility, appropriateness, continuity, effectiveness, efficiency of care and so on. As regards the customers **"stated and implied needs"** his main aim of coming to a hospital is to get totally cured of his ailment. His implied need may be treatment in the shortest time at most reasonable cost, and possibly physical and emotional security.

The quality of care generally means the degree of excellence of the medical care delivered, whether it meets or exceeds accepted standards. Criteria necessarily changes with improved efficiency related to technological advancement; therefore, standards of quality change with time. For example, in 1960s a cardiac patient was satisfied with an ECG test but now with newer technology the patient probably expects a Tread Mill test or an Echo Test. Achievement of satisfactory quality involves implementation of quality needs at all stages of process of care, like diagnosis, treatment and post treatment follow up and monitoring.

Quality of care has been defined by JCAHO as **"The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"**. Dimensions of quality include the following: Patient perspective issues, acceptability, continuity, effectiveness, equity and efficiency.

1) **Dimensions of Quality in Health Care**

- Patient perspective issues (patient focused functions) Patient Rights, organisational Ethics.

  —Rights to information

  —Considerate and respectful care

  —Right to privacy, Safety

  —Right to choose and to be heard

  —Right to Consumer education

- Acceptability includes

  a) accessibility

  b) the patient-practioner relation

  c) amenities

d) patient preferences as to effects of care

e) patient preferences as to the cost of care

- Effectiveness—Degree to which the care proposed would achieve the expected outcome, given the present condition of patient and current science and technology of health care.

- Equity—Conformity to a principle that determines what is just or fair in the distribution of health care and its benefits among the members of a population.

- Efficiency—Work of the services as a whole, not the end itself but the way the end is achieved; concerned with systemic efficiency of various facilities which put together contribute towards quality of care at minimum cost.

- Efficacy—The degree to which the care of the patient has been shown to accomplish the desired or projected outcome(s).

You might wonder if an assessment of quality is at all possible, seeing the multiplicity of dimensions or attributes relevant to the concept of quality, and the possibility the goodness in one might conflict with goodness in another. Fortunately, the principles of "Contextuality" offers a way out of the difficulty. You will appreciate that in any given situation certain dimensions are more important and relevant; other components can be left out, although in a different situation, those excluded components would be the very ones to include.

2) **Conceptual Issues Relating to Quality Care and Cost**

From the foregoing description you will appreciate that prime focus in quality management is not on providing the best possible care at any cost. The whole emphasis is on making available care of an acceptable standard as per needs of each patient, at the least cost. The following factors are relevant for consideration:

i) ***Preventive Versus Curative Care***

Past research findings have undoubtedly established the fact that promotive and preventive health care schemes are definitely more cost effective than curative and rehabilitative care for the population. However, at a micro level, where an individual patient is concerned if appropriate care is rendered at OPD level it is possible that inpatient admission may be avoided. Again, as inpatient prevention of nosocomial infection becomes important to avoid extra length of stay, which add to the hospital cost.

ii) ***Manpower Substitutability***

It means allocation of right job needing particular skill to the right person. Delivery of health care involves series of activities ranging from the highly skilled sophisticated activities to the most ordinary repetitive ones. It is necessary to identify which health worker can perform each task efficiently at minimum cost. For example routine BP can be recorded easily by a nurse for which doctors' time should not be wasted.

iii) ***Quality Care Versus Costs***

It is commonly believed that emphasis on quality means generous use of sophisticated technology, which of course, result in escalation of costs. Quality care means need based care, which should ensure nothing less nor anything extra done than is essentially required. Aim should be to provide the best under the given circumstances and whatever diagnostic and therapeutic procedures are necessary are carried out with maximum efficiency, effectiveness and economy.

iv) ***Quality Care and Productivity***

Efficient utilisation of resources will ensure better quality which in turn will reduce cost and increase productivity. Marketing strategies are required for ensuring optimum bed occupancy and maximum use of costly sophisticated diagnostic and therapeutic equipment. Work standards are necessary for quality performance by minimum staff and to monitor labour productivity on regular basis. Clear cut policies, value analysis, adoption of inventory control techniques, proper preventive and breakdown maintenance, control over

misuse, overuse of resources like drugs, Lab, imaging facilities will add to the quality care and increase productivity by reducing cost.

Check Your Progress 2

1) What an average patient wants from health professionals?

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2) Acceptable quality services include the following:

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3) List the dimensions of quality in health care:

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4) How a balance between quality care and cost can be maintained.

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4.3.2 The Concept of Quality Management System

With liberalisation and globalisation of Indian economy, quality has become a buzzword for survival in the competitive world market. It is obvious that health care costs are escalating at a dizzying pace. When cost in manufacturing environment reaches a dangerous proportion the same is efficiently controlled by quality management techniques. To understand the coplexities of introduction of quality management in health care services it is necessary to understand the functioning of hospital system.

1) **Hospital System**

In Block 1 of this course you have learnt about the concept of hospital as a system. You have learnt that a system is a hierarchical chain of system and subsystems, interconnected and interdependent, having clear objectives at each level of the system or subsystem, obtains enough inputs from the environment to offset its output; it operates with varying processes or methods to achieve the ultimate objective of the system.

You will appreciate that for efficient management of hospital, the administrator should have a conceptual model of a hospital which functions as a system, consisting of various service areas as subsystems, to achieve ultimate objective of patient care. A large hospital may have 40-70 departments, which may be functionally grouped under following heads:

a) **Clinical and Nursing Services**: such as OPD, OT, Inpatient, Emergency Services

b) **Supportive Services**: X-ray, Laboratory, Blood Bank, Records, Dietary etc.

c) **Utility Services**: Laundry, CSSD, Engineering, Transport, Communication, Security etc.

d) **Business Services**: Personnel, Finance, Materials, Administration etc.

The system concept as applied to a hospital will imply collection of departmental subsystem components, which operating individually and collectively perform a set of operations in the accomplishment of defined objectives of the hospital system, i.e. delivery of patient care services.

The 'System Concept' in management is only a tool, which the administrator can use to correct the disorganised resources of men, machines, materials and money into a useful and effective institution. Management is the process whereby those unrelated resources are integrated into a total system of objective accomplishment.

Before you proceed further let us examine a simple model of hospital system as shown in Fig. 4.1. In this figure you will see that the patient information obtained and fed to the decision centre which represents the doctor, who makes the diagnosis. He in turn orders certain supplies and services for diagnosis and therapy. These supplies and services are checked, and administered by the doctor or his representative, the nurse. The second decision centre as well as the first decision centre regulates the flow of patients stay in the hospital. Statistical data obtained from medical records of discharged patient provides further information to the decision centres for planning of the future services. The regulatory function is accomplished by decision centres through their control on action centres, i.e. all departmental sub-systems in the organisation, involved in patient care. For simplicity, it is not possible to show all the action centres, but their existence is apparent by the fact that there is recovery or output rate, which is possible only with the assistance of all supportive, utility and business services.

You may have observed the following salient features in the model of hospital system, which are very relevant for the quality management system:

a) There is a continuous flow of information from the time of patients' admission till after discharge which are essential for decision making.

b) Each sub-system (ward unit as shown) has a clear objective, obtains input from its environment (both internal and external) and operates with varying processes or methods to achieve an output or ultimate objective of the system.

c) There are decision centres (both doctors and administrators) who control input and output rate of patients, supplies and services.

d) A clear cut feedback system is available for the users for planning, monitoring evaluation and decision making.

e) Medical records play a vital role in providing patient care related data for both professional and administrative management.

2) ISO-9000 Quality Management System

Quality Management is concerned with "All activities of the overall management function that determine the Quality Policy, Objectives and responsibilities, and implement them by means such as quality planning, quality control, quality assurance and quality improvement." Quality management is the responsibility of all levels of management but must be led by the top management. Its implementation involves all members of the organisation.

As already stated earlier, the ISO-9000 series of standards for quality management system have generated maximum interest world-wide and already 90 countries have adopted these so far. ISO-9004 is a guide for application of quality management system. It is in two parts, Part-1 for manufacturing sector and Part-2 for service sector, like health and hospital services.

This quality system is based on the principle that prevention is better than cure. The prime role of quality system is to provide an effective means to assuring that the customer requirements are met fully. The system is aimed at firstly, to achieve, sustain and improve the quality of product or service; secondly, assurance to the management that internal controls are effective, and thirdly, assurance to the customer that the service conforms to his requirement.

The main emphasis of ISO-9000 series of standards is on the following:

- Every man is involved in maintaining the quality of the activities that he performs apart from the centralised quality checks.

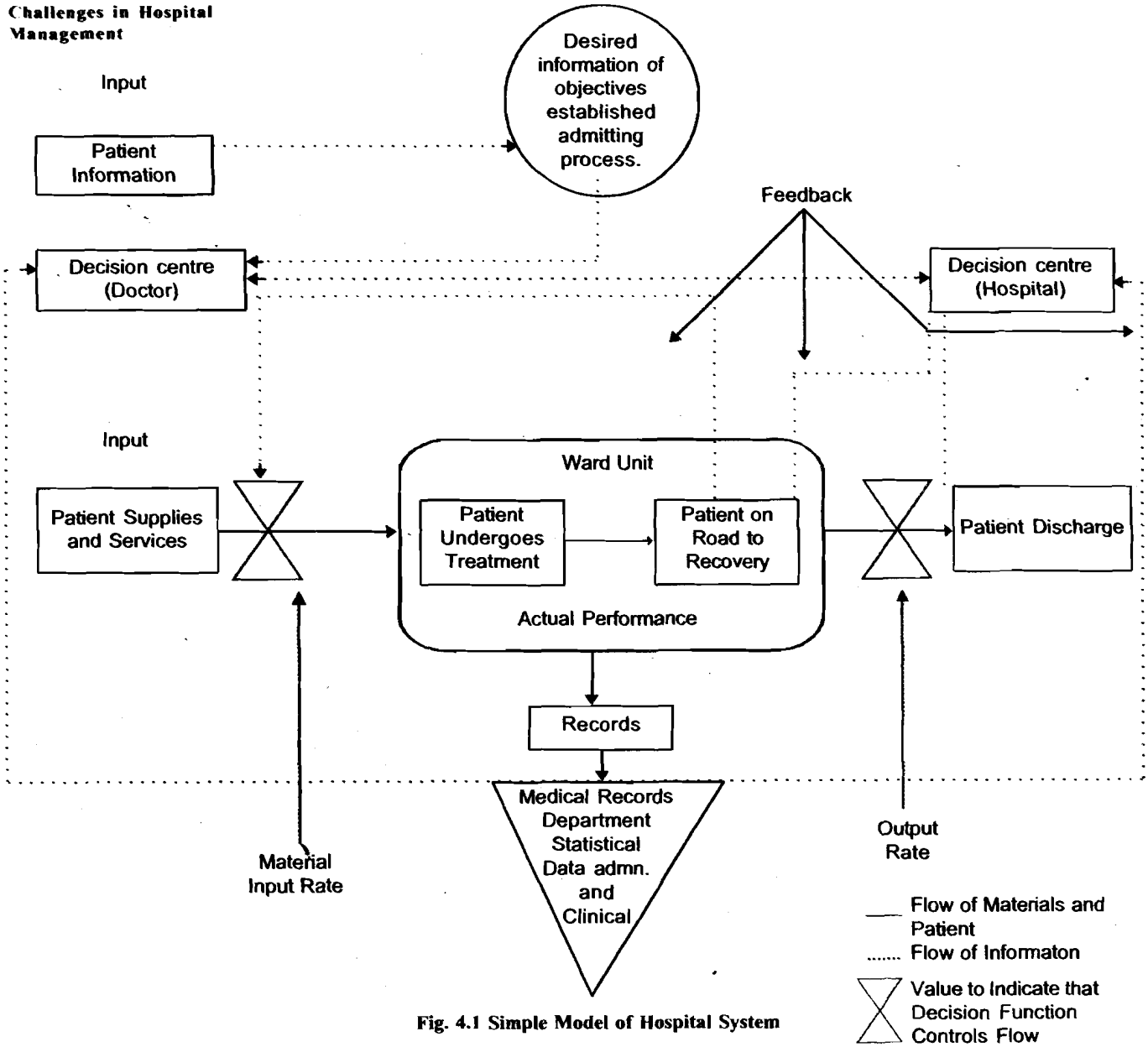

Fig. 4.1 Simple Model of Hospital System

- Importance of customer which has been sub-divided into external and internal customer. In the case of hospital the external customer is the patient or his relations, whereas the internal customer may be an employee or a department receiving product or service from another employee or department. For example, employees or departments receiving stores from CSSD, Laundry, Medical stores etc. are considered as customers of the issuing departments.
- Utilisation of intellect of the operator : As a matter of fact Japanese have "quality circles" in which all members of the team are invited to suggest improvement of the existing system or working procedures. This shows total involvement of all employees working in organisation.
- "Continuous improvement" is yet another important aspect that the Japanese call "Kaisan". Quality management system incorporates various methods like management review, internal audit and statistical techniques for measuring and assessing the quality of the system on a continuous basis to correct deviations.

You have come across the terms like 'quality control' and 'quality assurance' in the definition of the term quality management.

Quality control refers to **"the operational techniques and activities that are used to fulfil requirements of quality"**. It will therefore be clear that quality control techniques applied in quality management are concerned both in monitoring and evaluation of the system

implemented to eliminate causes of unsatisfactory performance at all stages i.e., during input, process and output stages, in order to achieve standards of quality and economic effectiveness.

Whereas, "quality assurance" is concerned with "All the planned and systematic activities implemented within the quality system and demonstrated as needed, to provide adequate confidence both internal and external customers as explained above that an entity (i.e. service or product) will fulfil requirement for quality".

In fact some quality control and quality assurance actions are interrelated and are complimentary to each other.

The latest terminology used in quality management is "Total Quality Management"(TQM), which has a wider base and is a all pervasive approach to quality management. It is defined as a "management approach of an organisation, centered on quality, based on participation of all its members, and aiming at long term success through customer satisfaction, and benefits to all members of the organisation and to society". You will note that it has the following elements:

- The approach is centered on quality.
- The expression "All its members" designates personnel in all departments and at all levels of organisation structure.
- The strong and persistent leadership of top management and the education and training of all members of the organisation are essential for the success of this approach.
- In this the concept of quality relates to the achievement of all managerial objectives.
- The concept "Benefits to Society" implies, as needed, fulfilment of the requirements of society.
- Total Quality Management (TQM) or parts of it are sometimes called "Total Quality" or "Company Wide Quality Control " (CWQC), or "Total Quality Control" (TQC) and so on.

After going through the concept of quality management system and various terminologies used in this connection, you will learn about the expected effects and benefits of ISO 9000 quality management system.

3) Effects and Benefits of ISO-9000 Quality Management System

i) *Effects*

- Clarity of customer requirement of product or service, as the service is designed based on market study to fulfil customer needs.
- Clarity of roles and responsibilities at all levels through system analysis and process study.
- Clear business objectives and targets and clarity of service to be delivered at each point.
- Control over quality of operations, through decentralised individual check for quality and centralised quality check by quality control team.
- Assurance of quality of supplies and service at all stages–input, process and output.
- Continued Education and training of personnel. This is to ensure that every man remains confident of his capability to provide results expected thereby motivated to work.
- Efficient and effective working methods, as the new procedures and works instruction are based on quality model, prepared by employees themselves.
- Independent Audit of all operations to ensure that the quality system covers all aspects, being implemented in the desired manner, and provide continuous feedback to the management for timely corrections, if required.

ii) ***Benefits***

- Competitive advantage in the market and increase of image and credibility.
- Expanded and continued market share, due to favourable publicity by satisfied customers.
- Higher productivity and profitability proportionate for reduction of cost of operation by improving efficiency.
- Higher potential for growth.
- Baseline information for planning future services and initiating improvement.
- Safeguard interest of both providers and recipients of care, due to improved quality care, and supporting documentation/data base—to meet the challenges in cases of complaints registered with consumer court.

Check Your Progress 3

1) What do you understand by "System Concept" in Management?

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2) What are the aims of Quality Management System?

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3) What are the main emphasis of ISO-9000 series of standards?

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4) List five benefits of ISO-9000 quality management system.

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4.4 PRESENT INDIAN SCENARIO

The print media has been repeatedly bringing out the state of the nursing homes as also the public and private hospitals. As per reports public hospitals turn into 'illness factories' and going to the hospital remains a 'nightmarish experience', as can be seen from the following findings:

- Big crowds, long queues
- Confusing maze like layout
- Incomprehensible instructions and tedious procedures
- Casual diagnosis
- Rude physicians, rough handling by sullen staff
- Bribe taking by touts
- Complete absence of accountability
- Unjustified delays
- Gross negligence due to callousness and incompetence
- Malpractice, like un-indicated surgery.

The private hospitals and nursing homes have been labelled as "Shrine to Mammon". Mammon is known as God of Riches. These institutions are thriving in spite of glaring inadequacies in facilities provided therein. As per survey reports on nursing homes in cities like Bombay, Delhi, Calcutta, Patna, Lucknow, Bangalore, gross inadequacies have been noticed with some variation. In Delhi for instance it has been reported that out of estimated 2000 private nursing homes, over 1500 are unlicensed.

Some major centres of learning do have some appraisal activities, such as, periodical publication of statistics relating to patient load, mortality and morbidity; clinical conferences, clinico-pathological reviews, analysis of fatal cases and enquiry into major cases of negligence. These, however, focus on technical aspects, such as, accuracy in diagnosis, investigation reports, treatment regimen and so on. The legitimacy of the diagnostic and therapeutic procedures adopted, related to the cost of care, the problems encountered during the patients stay, the professional and administrative lapses and so on, are never examined in detail for remedial measures.

In general, except a few, the Indian hospitals do not have any quality assurance programme to regularly monitor and evaluate the standard of care delivered.

You will appreciate that considering "the health is a basic human need and right" the hospital Board or Trustee or an Owner of any health institution has the following obligations:

- Moral—Patient interest to be protected
- Legal—Appropriate measures to ensure quality and patient safety
- Contain the cost of care
- Identify inadequacies in the system
- Regulate activities to ensure quality and efficiency by maximum utilization of resources
- Assess effectiveness of delivery of services rendered.

The causes of the present malady are multidimensional and the remedy lies in introduction of quality management system, to provide efficient and adequate services both in quality and quantity, at minimum cost to the best satisfaction of customers and the society.

4.5 ORGANISATION OF QUALITY MANAGEMENT SYSTEM

According to quality guru W. Edward Deming, an organisation should focus not on bad employees but on bad systems. Deming estimates that 94 per cent of all errors are system errors, not employee errors. He further estimates that only 15 per cent of quality.

improvement opportunity lies in focusing on the performance of people, with the remaining 85 per cent of impediments to quality coming from systemic factors that are optimally addressed by involving everyone in the system in the quality improvement activities.

One of the most crucial factors for success of any quality system is the commitment of the top management of the organisation.

At the outset it is necessary to take a decision by the top management that Quality Management System should be introduced in the organisation. Once this crucial decision is taken in consultation with members of the governing body, medical staff and administration, the following steps are necessary before introduction of the quality management programme.

4.5.1 Organisational Analysis

- Review organisations relationship with its external environment. Today, successful health care organisations must be able to anticipate, understand, and proactively and flexibly respond to change in the dynamic health care environment.
- Examine organisations internal characteristics and functions. Excellence in patient care requires state-of-the-art professional knowledge: clinical, Management, Governance and Support expertise; and Competent technical skills integrated and co-ordinated organisation wide to effectively and efficiently respond to patient and family needs. The existing characteristics that is, its strengths and weakness can be assessed through a review of systems, policy, rules and procedures and operational statistical data of each department in the organisation.
- Thirdly, identifying problem areas and analysis of problems to understanding cause and effect relationship. This will help in systematically assessing and improving important functions and work processes and their outcome.

4.5.2 Awareness Campaign and Development of Quality Culture

Corporate culture is the basic pattern of shared belief, behaviours, attitudes and assumptions acquired over time by members of an organisation. Corporate culture impacts on the organisational performance and productivity. For this it is necessary to create a system of values, beliefs and behaviours (individual and team) for the success.

4.5.3 Training

- Training of top management to help them in decision making regarding implementation of the quality system. These senior managers are generally the heads of departments and will subsequently form the steering committee.
- Training of senior and middle level managers who will form the task force on the project team to design and develop the quality system best suited for the organisation.
- Training of all other members of the organisation to familiarise them with the quality system requirements, and their role in its implementation.

4.5.4 Development of Quality Manual

Quality manual is a document stating the mission and vision of the organisations as to the quality, the quality policy and describing the quality system of an organisation (ISO-8402). The document should reflect the following:

- The mission and vision of the organisation.
- The approach of the organisation for compliance of the quality system elements.
- The organisational structure, defining broad responsibilities and methodology of organising various activities.
- The policy guidelines as to how the system would operate.
- The indicator measurement system for measurement/overviews, which involves both routine, ongoing data collection for processes or functions performed by individuals or multidisciplinary teams or groups, as well as time specific, focused data collection.

A self contained measurement system includes important dimensions of performance,

collects data about relevant processes, outcomes, resource consumption, and satisfaction levels, and taps into patients, practitioners, and employee perceptions of quality. The quality cube shown in Fig. 4.2 presents a model for assessing quality that illustrates the relationship of dimensions of performance and important functions to a range of patient populations and services provided. The cube is a tool that can help stimulate thought about, and focus measurements related to, important priorities.

Fig.4.2 below explains the forms of Quality Assurance (QA) studies applying the quality control technique.

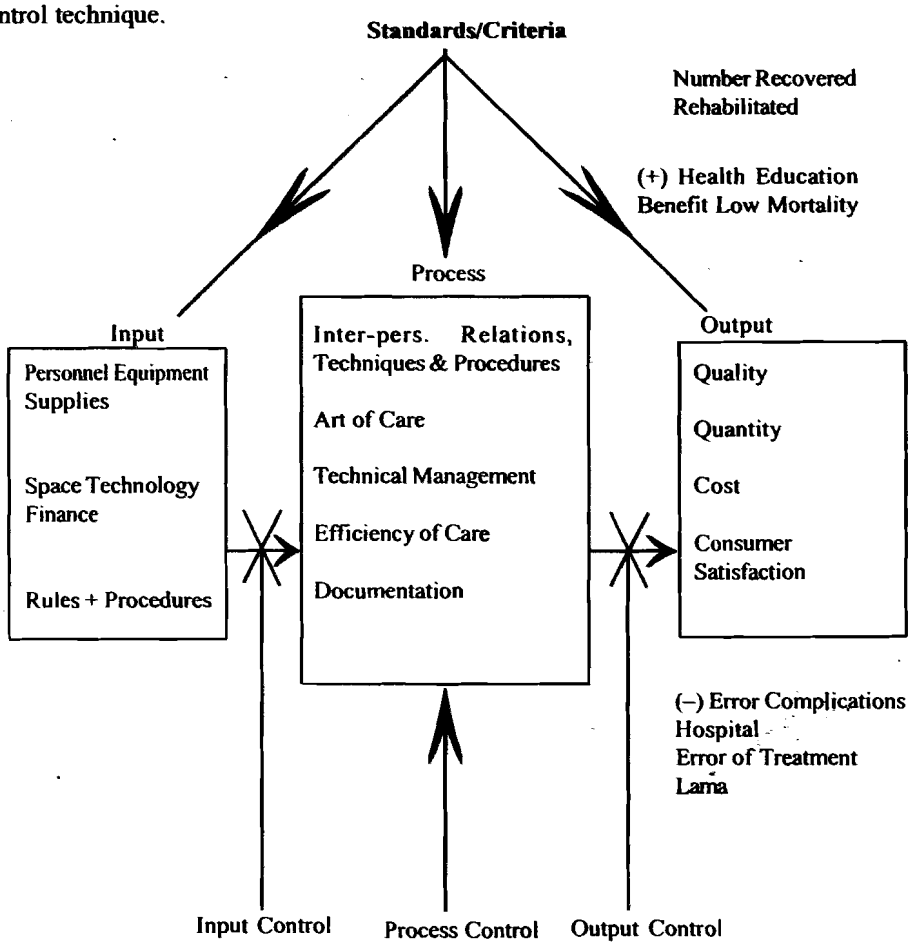

Fig. 4.2: Quality Control (Monitoring & Evaluation—A Tool for QA)

The dimensions of performance, as shown in Fig. 4.2, are patient centred activities involving functions of all the services. Systematic assessment and improvement of performance is a continuous process which involves:

a) Study of problems to identify process weakness and not individual incompetence;

b) Careful co-ordination of work and collaboration among departments and professional groups;

c) Seeking judgements about quality from patients and others and using such judgements to identify areas of improvement; and

d) Setting priorities for improvement of performance of all important functions, and maintaining stability of these functions.

You will now learn about the dimensions of performance as given by JCAHO.

Doing the Right Thing

Efficacy : The degree to which the care (procedure or treatment) of the patient has been shown to accomplish the desired or projected outcome(s).

Appropriateness : The degree to which the care provided is relevant to patient's clinical needs, given the current state of knowledge.

Doing the Right Thing Well

Availability : The degree to which the appropriate care (needed test, procedure, treatment or service) is available to meet the patient's needs.

Timeliness : The degree to which the needed care is provided to the patient at the most beneficial or necessary time.

Effectiveness : The degree to which the needed care is provided in the correct manner, given the current state of knowledge, to achieve the desired or projected outcomes for the patient.

Continuity : The degree to which the needed care for the patient is coordinated among services, practitioners, and providers and over time.

Safety : The degree to which the risk of an intervention and risk in the care environment are reduced for the patient and others, including the health care providers.

Efficiency : The relationship between the outcomes (results of care) and the resources used to deliver patient care.

Respect and Caring: The degree to which the patient or a designee is involved in his or her own care decisions, and to which those providing services do so with sensitivity and respect for the patient's needs, expectations, and individual differences.

4.5.5 Development of Hospital Information System

The framework of the hospital information system should be so organised that there is rapid and regular feedback of information, related to the quality of patient care rendered by clinical departments and also overall performance of all services including Supportive, Utility and Business Services of the organisation.

The information based upon the "hospital" is called the "Hospital Operational Statistics" which can be grouped as under:

- Resources of the hospital, e.g., bed, diagnostic and therapeutic facilities, staff available, supportive services etc.
- Utilisation of hospital resources including statistics of:
  - —Patient movement, days of care, bed occupancy etc.
  - —Outpatient visits
  - —Operations, deliveries
  - —Number and type of Laboratory and radiological investigations and so on.
- Administrative and Financial Data—organisation and analysis of data required for utilisation review, performance review, cost analysis, patient satisfaction study to assess and improve quality of patient care.

The information based on the "Patient" may be termed as " Hospital Morbidity statistics". The statistical unit is patient and the information is collected from medical records. The report includes:

- Personal characteristics of patients, age, sex, occupation etc.
- Length of stay, overall and speciality wise
- Presence of complications, consultations, infections
- Type of investigations and treatment
- Outcome of hospital stay—Patients recovered and rehabilitated, pre-natal mortality, surgical fatality, mortality for other causes and so on.

As you know the primary source of patient statistical data in hospital is the medical records. Therefore, accurate and complete record keeping and good patient registration system is essential.

4.5.6 Formulation of Criteria and Standards

All measurement requires something analogous to a yardstick. Criteria and standards are the yardstick for quality assessment. The definitions, along with some examples are given in the table below:

A) **Definitions**

Criterion : Attribute of structure, process or outcome capable of leading to an inference about quality.

Standard : A specific, quantitative measure that defines goodness.

B) **Examples**

		Structure	Process	Outcome
Criterion	:	Staffing of Intensive Care Unit	Blood Transfusion during surgery	Casefatality
Standard	:	Not less than One RN per two occupied beds	Not less than 5% not more than 20% of average cases	Not to exceed 0.1% for a specified procedure.

Criteria and standards may be derived in two ways: (a) "normatively", which means from the scientific literature, supplemented by the opinions of recognised experts, and (b) "empirically" which means, from examples of actual practice or behaviour.

Check Your Progress 4

1) Enumerate the obligations of Hospital Board or Trustee of a health institution in respect of patient care.

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2) What are the steps involved in organisation of quality management programme?

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3) List the dimensions of performance.

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4.6 APPROACH TO MEASUREMENT OF QUALITY

The measurement of quality of care or service poses many problems as it is not possible to establish accurate standards of judgement. Yet we need to have some indicators, i.e. some kind of criteria and standards for evaluating the service; only then the efficiency of performance and in turn the community benefit, can be assessed for further improvement.

In health care for the purpose of measurement of quality one needs to look at the entire process, including the resources available, the setting in which the care is rendered, the process of delivery of care, and the competency of those delivering the care. Therefore qualitative studies include studies of structure, process, and outcome of care. Quality study of factors influencing quality care may be termed as "Resource Utilisation Study" and actual performance appraisal may be termed as "Professional Activity Study" for evaluation of quality care.

4.6.1 A Framework for Measurement of Quality

"Structure" deals with the resources associated with the provision of care and indirectly influencing quality care, such as:

i) Beds: number available and their utilisation

ii) Personnel: adequacy, qualification, level of motivation etc.

iii) Equipment: adequacy, state of repairs/replacement

iv) Supplies: adequacy, supply breakdowns, pilferage

v) Space: does it meet minimum standards, state of maintenance

vi) Rules and Procedures: available or not for all areas

vii) Technology: appropriate or not

viii) Finance: adequacy, proper allocation and utilisation

"Process" aims to analyse the practice of care delivery. In clinical areas, it involves direct observation of patient care and studies based on medical records (professional service review).

i) Physician-patient interaction
   —Art of care
   —Technical management of care i.e. proper utilisation of diagnostic and therapeutic facilities
   —Efficiency of care relates to overall management of patients' problems consuming minimum resources.
   —Documentation

ii) Interpersonal relations—conflicts, grievance procedure

iii) Techniques and procedures—available and appropriate

In other areas, such as, supportive and utility services, it is necessary to study the legitimacy of methods adopted to achieve the end-result.

"Outcome" Studies emphasize the results of care:

i) Quality of work done—how good is the service;

ii) Quantity of work done—is it optimal, minimal or maximal;

iii) Cost of care to the patient and the cost of hospital operation;

iv) Consumer satisfaction with the type of attention received.

In outcome related to quality care the credit points are, number of lives saved, number recovered and rehabilitated. Debit points are, deaths, complications due to drugs or procedural errors, hospital infection and so on.

Check Your Progress 5

1) What areas one should look for the measurement of quality?.

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2) What are the factors influencing quality care?

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3) At what level the quality control technique should be applied to maintain quality of service ?

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4.8 LET US SUM UP

In this unit you have learnt that considering the rising consumer awareness and expectations, and the escalating cost of health care, the health organisations can no longer remain insensitive to the need of quality management. Introduction of quality management system in any health establishment, be a small or large, will be of considerable benefit to the provider of care, and to the patient and community, as it ensures delivery of efficient care of quality and quantity, at minimum cost, to the satisfaction of customers.

Further you have learnt that the quality management system can be introduced at no cost or minimum cost, depending on the quality policy and approach, provided the organiser of care is able to (a) design a mechanism for proper selection and training of all categories of staff, (b) develop a quality culture related to cost, (c) maintain good medical records, and (d) introduce a framework for hospital information system capable to meet the user requirements in the system.

You also learnt that prompt attention to patients, courteous behaviour by staff, providing reassurance and comfort to patient in a clean and safe environment, will provide best satisfaction to the consumers of care at no cost.

Subsequently you learnt that the productivity of a hospital can be increased while maintaining the quality, through the following steps:

- Manpower utilisation— right man for the right job, and ensuring doing right things well.
- Maximum use of diagnostic and therapeutic facilities and maximum bed occupancy, through dynamic marketing strategy.
- Quality versus cost ensure nothing less or nothing more.

- Optimum utilisation of all available resources
- Clear purchase policies, standardisation of equipment and value analysis.
- Enforce inventory control procedures.
- Control overuse, underuse and misuse of resources
- Reduce cost of poor quality, disquality, due to poor performance, non-performance, in clinical and supportive services; such as, wasted x-ray films, unjustified investigations, medication errors, misdiagnosis, hospital infection and so on.
- Develop basic quality standards and criteria for all key performance areas, which may be adopted as indicator for measurement.

Towards the end of the unit you learnt that development and management of information system is an important function focused on meeting the organisation's information needs. Its goal is to obtain, manage, and use information to enhance and improve individual and organisation performance in patient care, governance, management and support processes.

4.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) i) 5th Century BC
   ii) 2nd Century AD

2) i) Medical Audit
   ii) 1918.

3) i) Joint Commission on Accreditation of Hospitals
   ii) Joint Commission on Accreditation of Health Care Organisations
   iii) Bureau of Indian Standards
   iv) International Organisation for Standardisation

4) American College of Physicians. American College of Surgeons, American Hospital Association and American Medical Association.

Check Your Progress 2

1) a) Reassurance and advice
   b) Quality of Care and Cost of Care
   c) Promotive and preventive Care
   d) Personal attention

2) a) Quality of direct medical service, as diagnosis, treatment etc.
   b) Appropriateness of indirect operations, such as, housekeeping, linen, stores, administration etc.
   c) Quality of utility services, such as, food, housing, safety, security, attitude of employees and so on.

3) Patient perspective issues, acceptability, continuity, effectiveness, equity, efficiency, efficacy and timeliness of care.

4) The whole emphasis is on making available care of an acceptable standard as per needs of each patient, at the least cost. This could be achieved by:
   a) emphasis on preventive care
   b) allocation of right job to right person
   c) efficient utilisation of resources
   d) Cost monitoring and cost management

Check Your Progress 3

1) It is only a tool, which the administrator can use to correct the disorganised resources of men, machines, materials and money into a useful and effective institution. Management is the process whereby those unrelated resources are integrated into a total system of objective accomplishment.

2) a) to achieve, sustain and improve the quality of product or service
   b) to assure the management that internal controls are effective.
   c) to assure the customer that the service conforms to his requirement.

3) a) maintaining quality through checks individually and centrally.
   b) customer oriented service
   c) utilisation of intellect of the operator- e.g. 'quality circle'.
   d) continuous improvement.

4) a) Increase of image and credibility
   b) Higher productivity and profitability
   c) Higher potential for growth
   d) Baseline information for planning of services
   e) Safeguard interests of providers and recipients of care.

Check Your Progress 4

1) a) Normal
   b) Legal
   c) Contain cost of care
   d) Identify inaccuracies in the system
   e) Regulate activities to ensure quality and efficiency
   f) Assess effectiveness of services rendered.

2) a) Organisational analysis by reviewing external environment, examining existing characteristics of internal organisation to ascertain strengths and weakness, and thereby identifying the problem areas for detailed analysis of cause and effect relationship.
   b) Awareness campaign and development of quality culture
   c) Training of all managers and other members of staff
   d) Development of quality manual
   e) Development of Hospital Information System

3) a) Efficacy
   b) Appropriateness
   c) Availability
   d) Timeliness
   e) Effectiveness
   f) Continuity
   g) Safety
   h) Efficiency
   i) Respect & Caring

Check Your Progress 5

1) One should look at the entire process, including, the resources available, the

setting in which the care is rendered, the process of delivery of care, and the competency of those delivering the care.

2) Beds, personnel, equipment, supplies, space, technology, rules and procedures, and finance.

3) At the level of (a) input, i.e. the quantity and quality of resources made available, (b) process i.e. how efficiently the resources are utilised for delivery of care, and (c) output or outcome, i.e. checks and measures applied to ensure quality at the time of final disposal of the product or service.

4.10 FURTHER READINGS

JCAHO: *Accreditation Manual for Hospital*, vol.I Standards, 1995, One Renaissance Boulevard, Oakbrook Terrace, Illinois- 60181, USA.

Raandi Schmidt, J.Trumbo, and R. Johnson: *Quality Assurance in Health Care Services*. ASQC Quality Press.

Richard P. Wenzel. *Assessing Quality Health Care: Perspectives for Clinicians*,William & Wilkins

Rosander, A.C.: *Deming's 14 Points Applied to Services*, ASQC Quality Press.

Rosander, A.C.: *The Quest for Quality in Services*, ASQC Quality Press.

Vincent K. Omachonu: *Total Quality and Productivity Management in Health Care Organisations*, ASQC Quality Press.

UNIT 5 RESEARCH IN HOSPITAL ADMINISTRATION

Structure

5.0 OBJECTIVES

After going through this unit, you should be able to:

- define the research and enlist its types;
- describe the various models of research;
- enlist the pre-requisites for conducting research;
- describe the steps in conducting a research;
- explain the purpose of research; and
- identify the areas of research in the field of hospital administration.

5.1 INTRODUCTION

In this unit you will learn about the importance of Research Methodology in Hospital and Health Care Management. You will appreciate that the concept of Research Methodology is an important prerequisite for analysis of the problems, planning and operation of the health care system and hopsital organisation. You would further learn about the concept and definition of research. You will also learn the application of research in hospital and health care management. Towards the end you will learn conduction of research and its documentation and report writing, what is research, how is it applicable in hospital and health care management and how to go about conducting a research, as well as its documentation and report writing.

5.2 EVOLUTION OF RESEARCH AS A METHOD OF STUDY

Until about **2500 BC** people acquired knowledge by observing the nature and facts. The observation were explained merely in acts of the God or other supernatural power. The first attempts to supply rational explanations for their observations were made by the **Greeks**.

Their **hypothesis** appears naive today but it must be borne in mind that our present hypothesis which appears very sophisticated today will not be so impressive 2,000 yrs from now. The importance of a Greek hypothesis lies not in its correctness but the break through in the approach to research from traditional explanations.

The evolution of scientific research was initiated by the writings by **Hippocrates (460-370 BC)** but thwarted by those of **Plato** and **Aristotle**. They allowed the development of rational hypothesis but prevented the appearance of the third step of scientific research, i.e. **experimentation**. And the Greeks remained, in general, theoriticians and they did not verify their theories by experiments.

Experimentation, first appeared on the scene with **Archimedes** in 287-212 B.C. He was the **first experimentalist**. However, the birth of **modern science dates back to 1543** – the year of the publication of **Copernicus**, "The Revolutions of Heavenly Bodies" and **Vesaliuis**, "The Structure of Human Body", the two monuments to mark, the beginning of modern science. From then on the growth of modern science was continuous and rapid and the work of **Galileo Galilei** (1564-1643) provided a final direction which modern science and scientific research was to take.

Check Your Progress 1

Fill in the blanks:

1) Evolution of scientific research was initiated by .....

2) .....was the first experimentalist.

3) Birth of modern science dates back to year.....

5.3 CONCEPT AND DEFINITION OF RESEARCH

You must be knowing that research is a systematic enquiry, seeking facts through objective verifiable methods in order to discover the relationship among them and to deduce from them broad principles or law. American Public Health Association, in 1962 has defined "Research as a systematic study to describe facts accurately to develop common principles, to put these principles into practice and finally evaluate the results." The emphasis may be observational, to develop new hypothesis or experimental, to test such hypothesis. In new areas observational studies predominate until enough facts emerge to form testable hypothesis.

Professor **Clifford Moody** said, "It compromises defining and redifining problems, formulating hypothesis or suggested solution; collecting, organising and evaluating data; making deductions and making conclusions; at last, carefully testing the conclusions to determine whether they fit the formulated hypothesis."

To put it in a simplifed way—research is essentially an attitude of mind and the application of a technique in confronting a problem. This attitude is synonymous with an open mind, whether in collecting facts or interpreting them, i.e. a mind with the maximum possible freedom from prejudices and preconceptions.

5.4 PECULIARITIES OF RESEARCH IN HOSPITAL ADMINISTRATION

Problems peculiar to Research in Administration partly in the **scarcity of testable hypothesis** and partly in the implication that the findings of such research **should be rapidly applied** to the programme under study. To solve the first problem, many initial administrative studies must be descriptive in order to develop testable hypothesis; then the planned experiments may follow. Possibly, the second problem will be solved only by compromise. If we aim seriously at producing new knowledge, investigators may have to be satisfied when their results are applied to other similar programmes rather than the programmes under study. Valid administrative research may create human stresses that prevent findings being applied by programme directors who have been disturbed by the resutls. The alternative course, of converting the project into attitude—changing exercise, often produces findings of little general value.

Unlike the researches in other subjects which derives its prestige largely from occasional new discoveries which advance the level of knowledge, the **administrative research raises questions like**:

- **What is the cost involved** in conducting the research?
- **Who would be benefitted** and by how much?
- Whether the output from this particular research would outweigh the inputs i.e. **efficiency and effectiveness** of the study.
- How much is the **practical implication** of the topic chosen?
- Are the users **competent to use the techniques** suggested?

The **application of research methods to administration involves the following problems:**

- The **definitions, assumptions** and other parameters that are **not clearly defined.**
- Many **variables are difficult to hold constant**. Thus, findings may be unrealistic when taken out of context.
- **Few testable hypothesis** have been stated. In beginning a programme of administrative research, one should first define some reasonable area for study, then develop methods for measuring the effects of the programme under study.

5.5 PURPOSE OF RESEARCH IN HOSPITAL ADMINISTRATION

Before discussing the purpose of research in Hospital Administration you must understand the goal, objective and the philosophy of Hospital Administration in contemporary socio-economic scenario.

Research in Hospital Administration is **concerned with the way in which hospital services are provided** and with all factors that have bearing on providing these services. Administrative research **develops new knowledge** about institutions, programmes, operations, the people working in these activities, or the individuals or communities served by them. Administrative studies in the hospital focus primarily on these subjects, while diseases and patients tends to be side issues, sometimes acting as **yardsticks** for identifying the success and failure of patient care. Human behaviour and motivation, the economic results of programmes, **the pattern and consequences** of administrative decisions, the collection and interpretation of diseases, statistics, physical facilities **operational management** are all among the many facets of Administrative Research.

Administrative Research also aims at **developing norms, standards** and a series of gradual prescriptions against the shortfalls of Hospital Management. Such prescription in earlier years were based on long experience and at times on common sense which does not withstand the test of time. Particularly, into ways of scientifically-derived principles in administration. **The goal of Administrative Research, therefore, is to plant new scientific principles among the empirical foundations.**

Check Your Progress 2

1) List the peculiarities of research in administration.

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2) List four purposes of research in Hospital Administration.

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5.6 TYPES OF RESEARCH

The types of research can be **distinguished according to the degree of abstract thought underlying them.** There are three types of research:

Discovery of Facts

In this type gathering of facts is the dominant objective as in social surveys. It **utilises the "Primary Data"** (first hand colection of data) techniques e.g. Rural credit survey of the Reserve Bank of India.

Interpret Already Available Information

This largely inteprets already available information. It is bibliographical in approach i.e. **makes use of "Secondary data"** (assimilation of data collected by other investigators). Emphasis is more on analysis and interpretation of existing information.

Research in Purely Theorising Type

The essence of this type is building up of higher reaches of pure theory based distantly upon Primary and Secondary data and some times on the basis of pure reasoning.

Research planning in health departments tends to originate in two ways:

- The **solo approach**, where individuals attack specific problems and carry out research independently of other health department operations. In a large department, it may eventually result in a central coordinating mechanism to eliminate the duplication of research activities.

- The **integrated approach** where a small team is employed to stimulate and help others develop research projects which may be closely related.

5.7 COMPONENTS OF RESEARCH

Research as you know in any science and of any kind has some broad features. Some of these are presuppositions, forming the permanent framework of any type of study and others are the varibale framework related to particular sciences or groups of sciences. You will also appreciate that the **permanent framework of any research uses symbols, often mathematical and the logical processes.** These approaches aims at:

- giving precision and effect a saving in time and energy
- standardising and systematizing the thinking process
- describing the objects themselves and relation between them
- publication of results obtained and techniques employed.

This means the fundamental article of faith of scientific research lies in Objectivity, Reproductivity, Validity and Reliability. That is, the **sine qua non feature of any research is**: Each one of these can be explained as follows:

Objectivity : It is the unbiased devotion to look for facts and to establish the truth.

Reproductivity	:	It means that the results obtained in the study are same if two different researchers apply the same methodology independently in similar circumstances.
Validity	:	It means the method involved in the research evaluates what it is intended to evaluate.
Reliability	:	This refers to the internal excellence of a method used in a research project.

5.8 CATEGORIES OF RESEARCH

You must be knowing that all researches can be categorized into two i.e. the basic research and the applied research.

5.8.1 Basic Research

It is the search for basic principles and synthesis without any immediate utilitarian objective. It arises from a instatiable intellectual curiosity like that of i.e. Einstein's theory of relativity. Basic research resembles "Sowing" of Seeds and its path radiates".

5.8.2 Applied Research

It is associated with particular projects and problem oriented. It relates to current activity and practical situations e.g. field survey techniques in market research. Applied research resembles "harvesting" and it follows the path of convergence. All administrative researches are of applied variety and basic research has its limitations in administrative issues.

Check Your Progress 3

1) Enlist three types of research?

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2) What is Primary data?

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3) What is a secondary data?

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4) Name the four components of research.

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5) Fill in the blanks :

a) ..... resembles "sowing" of seeds and its path radiates.

b) All administrative researches are..... variety.

5.9 MODELS OF RESEARCH

In this section you will learn about different models of research. There are five models of research:

1) **Problem Oriented Model**

This requires the knowledge of entire configuration of the problem and of the different possible research devices that might help the analysis. The second fact which is emphasised is that the broader the purpose and wider the problem; the more composite the tool should be.

Behavioural sciences such as psychology, sociology, social anthropology and public relation issues of administration are problem oriented method of research, particularly in the hospital and health care administration.

The model verifies general propositions, use carefully refined concepts and do not attempt predictions.

2) **Method Oriented Study**

The documentary sciences such as history, law and political science deal largely with method and study of documents. Method oriented study explains unique events or situations, utilise common language, though in a refined and careful way, and attempt to predict by comparing cases.

3) **Scientific Method of Research**

The scientific method pursues the path of systematic analysis of doubt and is not satisfied with psychological certitude, and remains ready to abandon a theory when the facts so demand.

It is a collective term denoting the various processes by the aid of which the sciences are built up. In a wide sense any method of investigation by which scientific or other impartial and systematic knowlege is acquired is called a scientific method.

The scientific approach has two components:

- **The procedural components** are observation, hypothesis and verification. **Observation** is something, on which a hypothesis is built, is itself based on data currently available to the researcher before he begins his investigation. Such a knowledge depends on the available literature and personal observation as well as researcher's hunches, if any.

  The **Hypothesis** which is described later, is a tentative conclusion based on inadequate and necessarily vague observational data. Its main purpose is to guide the collection and processing of facts and to indicate the direction of investigation. All the succeeding steps in the investigation centres around the verification of the hypothesis.

  Verification, the third step, in the most crucial step and forms the core of research and the scientific approach. It comprises of four different facets, namely, collection, analysis and interpretation of data leacding to hypothesis testing and the generalisation.

- **Personal component** relates to the researcher's knowledge of the field he investigates so that he should know broadly where to find the data. As you know and has been said by **Eigelbarner** "one needs the scientific imagination to construct hypothesis, the analytical ability to devise crucial experiments to test the hypothesis, the resourcefullness, persistence to carry through the experiment, the perspective which distinguishes the essential from the non-essential and the reasoning which coordinates individual facts into a principle".

This is known as **scientific attitude** which depends on:

Professional qualities (i.e.) the knowledge, training and devotion for the subject.

Personal qualities (i.e.) the ability to assess the adequacy, relevance and value of data.

Integrity (i.e.) honesty, sincerity of purpose and truthfullness.

These qualities are essential in a researcher.

4) **Descriptive Method of Research**

This is the simplest and method applicable to a number of social problems especially in under developed countries. It is essentially a fact finding approach related largely to the

present, and abstracting generalisation by the cross-sectional study of the current situation. It comprises mainly of collection of data; however, mere collection is not research unless there is adequate interpretation in the form of elaboration of casual connection, the descriptive method to some extent also interprets the data.

This is extensively used in physical and natural sciences, for instance, when physics measures, biology classifies, zoology disects, geology and administration studies, as in socio-economic surveys and job and activity analysis in administration.

5) **Historical Method of Research**

The word is self explanatory. It is the study of the past and its casual relation to the present. This is an important method of research in social science where the history has impact on the present and future social cultural structure. It is useful to analyse the past to have a vision of future and make prediction of discussing opinion.

However, the limitation here is the more distant the past, the greater in the difficulty to get the relevant facts. Secondly, neither the data or the inferences are capable of verification and repetition. Thirdly, calculation and measurement as in statistical studies are not possible in this method.

So, after understanding the various methods and models of research it is evident that scientific method of research in the ideal method. Therefore, in the subsequent section we shall be discussing only the scientific method of research.

Check Your Progress 4

1) Name the models of research in Administration.

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2) Name the two components of scientific approach.

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3) What are procedural components?

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4) Scientific attitude for research depends on what?

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5.10 PREREQUISITES TO CONDUCT A RESEARCH

Before you can conduct a research, there are certain prerequisites. They are:

- Selection of a problem
- Review of literature to:

  —find the resemblence of work carried out previously.

—understand the problems encountered by the precedor ?

—find out alternatives to overcome the problems

—avoid the mistakes committed by the predecessor

- to develop a hypothesis
- to define the tools and techniques which will be used while conducting the research
- to test the validity of the tools.

You will learn about these prerequisites in detail in this section.

1) **Selection of the Problem**

This is the analysis of problem from all sides and to understand it in broad prospective. While selecting a problem, the points to be kept in mind are as follows :

i) **Practicability:** It is to assess if the time and energy spent on a particular project is worthwhile or not.

ii) **Urgency:** All problems leading to investigation are, no doubt, important but some are more so than the others. Therefore, one must assess the relative urgency of alternative projects.

iii) **Utility:** This is to see, how useful the project would be for the organisation to reach the organisational goal.

iv) **Anticipation of problem:** It is to foresee problems, leading solutions which would fit into immediate future. This requires a great deal of experience in judging the current situation and its repercussions and also imaginative assessment on the part of the investigator.

v) **Resources (tools and techniques):** Research project is conditioned by types of facilities available. These resources relates to the tools and techniques used.

vi) **Available information:** This is another facet of resource, which relates to the evidence or information that can be found before starting a project which needs to be verified with the data collected.

vii) **Field of specialisation:** For the efforts to be effective and its findings accurate, comprehensive and meaningful research must concentrate on a particular, though broad, area of knowledge.

viii) **Administrative consideration:** The incidence of administrative work depends on the size and nature of the project. The organisation must balance administrative burden of the enquiry against the large component of technical personnel.

ix) **Equipment:** The resources needed for sorting, tabulating, processing etc.

x) **Operation funds and miscellaneous considerations :** Operation funds is the working capital necessary for operational purposes.

Miscellaneous includes the size of problem to be investigated and the consideration in terms of resources as well as the time needed for effective conclusion of the research project.

2) **Review of Literature**

After defining the problem, a preliminary review of literature is carried out. This is to note the similar work resemblances and to get guidance for developing the plan of action.

3) **Final Statement of Problem**

After completing the first two steps the researcher can focus readily on real issues involved.

This is to define the problem clearly and precisely to avoid getting involved into newer problems.

4) **Developing a Hypothesis**

Now a tentative assumption is made based on inadequate and necessarily vague observational data. Its main purpose is to guide the collection and processing of facts and to indicate the direction of investigation and to prove whether the assumption is right or wrong. Hypothesis need not be documented always, however, it is always necessary to proceed with the study.

Types of Hypothesis

a) Null hypothesis : neutral hypothesis

b) General hypothesis : purposeful hypothesis

c) Complex hypothesis : interrelation of multiple variables

Criteria for Good Hypothesis

1) Conceptual clarity

2) A moral, empirical, reference word i.e. should, bad, good etc. words should be avoided

3) Specific and precise

4) Relevant techniques

5) It should be related to the tools of the theory

6) Design of study: A good design can characterise a good hypothesis. Design of study depends on:

—The tools of technique which have been finalised.

—The decision of the time frame within which the study would be conducted.

—How much the hurdles have been anticipated and logistic limitations therein.

5) **Secondary Review of Literature**

Once the problem is defined and working hypothesis is finalised the actual study begins with the detailed review of literature i.e. the secondary review of literature. This is to have a detailed study of the work of previous investigators who have addressed the similar issue and to understand the problem in a better way, so as to reduce the wastage of time.

6) **Tools and Techniques**

The tools of collection and analysis are the available techniques at hand and should be used wherever possible as checks and counter checks.

Facets of a good tool are:

- It helps in collecting a comprehensive data which is correct, consistent, objective and uniform recording of concrete relevant details.
- It should not be generalised enquiry of details.
- Concepts are clearly defined in a good tool of enquiry.

All the above qualities depends upon the variety, appropriateness and accuracy of the observational and measuring devices.

7) **Testing the Validity of Tools**

It is done through a pilot study i.e. a trial run of the actual project.

Check Your Progress 5

1) While selecting a problem of research, what are the points to be kept in mind ?

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2) Define hypothesis.

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3) Enlist the types of hypothesis.

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4) How will you test the validity of tools?

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5.11 STEPS IN CONDUCTING THE RESEARCH

After you have defined the problem, made a hypothesis to work on, designed the tools you would be using and seen into the history of the subject about the type of mistakes your predecessors have committed, you should consciously make an effort not to commit the same mistake and start on with your actual work.

Your work starts with :

- Data collection
- Analysis and interpretation of data
- Verification and proving the hypothesis you have defined earlier
- Writing the report
- Making recommendation which can be used practically

1) **Data Collection**

Data is the raw, unprocessed details which is collected during the course of study. The data collecting tools and techniques are:

a) **Survey**: It is a fact finding study.

b) **Interviewing**: It is the conversation with a purpose and therefore is more than a meagre oral exchange of information. It is usually direct and is the only way by which certain types of information can be obtained.

c) **Questionnaire**: It comprises of a series of questions to a person who can give the information required without the need of any personal contact i.e. the interviewing technique.

d) **Observations**: It comprises of recording of data, as they come to the investigator's notice when he plays largely a passive part. It consists of collecting facts in direct knowledge of the investigator. It depends on three qualities of the investigator—sensation, attention and perception.

Observation is of two types :

Controlled and non-controlled type : The latter is characterised by the absence of any attempt to use precision instruments to measure and record facts and to check their accuracy. Mechanical aids are not used, and data are collected without standardising procedure and without resorting to a random sample.

Participant and non-participant type : Both controlled and non-controlled observations could be of the non-participant types. In the latter the observer keeps himself outside the situation he is studying. For example snap shots taken by a tourist rather than a studio photograph. This is less accurate study of situation and does not enable penetration behind the apparent.

While, by and large, participant observation is more accurate and dependable. Its operability depends on the particular situation and the problem at hand.

2) **Analysis and Interpretation of Data**

After the raw material is collected, it is put in a systematic form e.g. tables, bar diagrams etc. Now in this systematic form it becomes easy to analyse details and interpret the data. This becomes an **"information"** for the researcher which he can document and use in drawing conclusions and making recommendations.

3) **Discussion**

Once you have interpreted the data, the next step is to discuss the results. It should highlight two aspects:

- Bring out the implications of the data.
- Establish continuity in the scientific knowledge between what was already known to what has been now added or rejected.

There are thus three aspects being incorporated in discussion:

a) **Interpretation**: This is, how can one explain what has been done and what was observed. Irrelevant findings should be omitted and the important factuals should be put statistically to support the original hypothesis beyond doubt.

b) **Disputation**: This is how one's work fit into the general body and knowledge of the subject? This is where references to the published work will come. The chain of others can be discussed and unsettled issues if any, can be stated.

c) **Disquisition**: This defines what are the implications of one's work for disciplines and how they might affect current practices? This in the section for opinion, philosophy and a little theory, some of which may alert another investigator to plan further experiment or a purpose of new hypothesis.

4) **Verification of Hypothesis**

Once the analysis and interpretation of data is done it automatically verifies whether the hypothesis with which we started the study is right or wrong. This further helps in result generalisation. It forms the core of a research project.

5) **Conclusion**

After the work has been completed the study in concluded. Most of the results of scientific study falls in the following categories :

- The conclusion agrees with what everybody already knows.
- The conclusions sustain ideas and views suspected to be true for which there was previously little corroborative evidence.
- The findings are entirely new and have not been thought of before. Fortunate indeed is the author whose work comes into this category.

6) **Summary**

A summary of the investigation is highly useful. Its purpose is to enable the researcher to

and findings. The summary in a brief resume of the major findings, conclusions and recommendations. It should faithfully reflect the earlier phases of the investigation. No idea or fact is introduced in the summary.

7) **Writing the Report and Recommendation**

Research reporting is the oral or written presentation of the evidence and findings in such detail and form as to be readily understood and assessed by the reader to enable him to verify the validity of conclusion.

This requires considerable thought, effort, patience, skill and penetration and overall approach to the problem, data and analysis as well as firm control over language and greater objectivity.

There are three types of written report:

a) **To the layman**: This is intended to disseminate the broad facts, findings and recommendations. It must be particularly lucid, simple and yet dignified, scrupulously avoiding distortion, jargon and technical camouflage.

b) **Report to the administrator**: This should be of medium size, with some technical details and supporting data followed by a summary and principal recommendations. The language in this should lean towards simplicity and directness with technical terms and jargon interspersed a little.

c) **Technical report**: This is meant for fellow professionals. The four important facets of technical report are:

   i) The problem and its nature
   ii) Method and scientific accuracy
   iii) Data and dependability
   iv) The logical relationship of data and its interpretation

   Technical report can be presented in four different types:

   i) Detailed report
   ii) Monograph
   iii) Article
   iv) Full technical report

8) **Dissemination of the Report**

Although this forms the tail end of an investigation, it should begin much earlier. Infact, there are two stages of dissemination :

i) During the investigation
ii) After data collection, analysis and interpretation

The major factors influencing a good write up are:

i) The reader's view
ii) How technical the problem is ?
iii) The researcher's hold over his facts and techniques
iv) His command over language
v) The form and fullness of the notes.

The writing may have to be done quite a few times:

a) **First draft**: This concentrates on substance i.e. fullness of facts, accuracy of facts, coherence or logic of facts, movement or transition of facts.

b) **Second draft**: In the second draft the researcher concentrates on form and language.

c) **Third draft**: This is the final draft. It concentrates namely on the finish and final touches i.e. on documentation and polish to make the report weighty, authoritative, convincing and attractive.

9) **Documentation**

in order to decide whether the information is valuable for his own investigation.

However, in research reporting the word has a different meaning. It indicates the references to the sources, other previous and current work and views additional data and discussion, and suggested further reading on the specific problem. In other words, it is, on one hand, evidence of thoroughness of investigation and on the other, a guide to further work.

Documentation has five components :

i) **Footnotes**: This is the most important component of a document. It is cited below every page. It serves the following purpose to:

- acknowledge facts and ideas borrowed.
- provide reference of the source which may be consulted.
- illustrate statements not relevant to the text.
- acquint reader with larger context of the problem.

Usage	Explanation
1) Alfred Marshall : *Principles of Economics*, p. 305., Macmillan and Co.: London, 1921.	First citation of a "book" Cite the page. Give preferably place, edition volume and date of publication. Underline (italicise) the title of book and not that of author.

ii) **Bibliography**: This contains information about books, reports, articles and other sources relevant to investigation.

How to present ?

- Make the list, alphabetically.
- Put the surname of the author first and then his personal and other names.
- Capitalise all important words in the title and italicise the full title.
- For articles, italicise the name of the journal and not the title of the article which must be within inverted commas ('.....'). Invariably mention the pages in the journal.
- If the author is not known, put it under the first important word of title.
- Mention also date of publication, publisher, edition, volume, pages etc.
- It is to be included at the end of each chapter or part at the end of the completed report. e.g. Pautine, V. Young: *Scientific Social Surveys and Research* Prentice Hall: N.Y., 1951.

iii) **Tables, Charts and Graphs :** This is very useful when the investigation is statistics based. Some useful points to bear in mind while making them are:

- Be selective and discriminative in introducing tables and charts.
- It should be able to put the voluminous data in a compact form.
- It should be self explanatory.
- Better limit each table in a single page.
- Do not repeat in table whatever is in the text and vice versa.
- Space tables to facilitate reading.
- Avoid statistical sophistication.

iv) **Quotations**: They are opinion and facts which may be cited to support the investigators own finding. It can be in original language or in translation with or without the original passage.

v) **Appendices**: They are useful for placing cumbersome material, breaking the continuity of

main text. They are not dumping ground for irrelevant materials, rather are either technical or non-technical informations. Under technical head, 3 types of material are included.

- discussions of particular techniques
- elaboration of concepts, terms, definitions
- mathematical deviations and formulae
- additional graphs and charts.

The non-technical appendices are more numerous and common. They include:

- Information useful and relevant but too elaborate for the text.
- Raw on supporting data and lengthy tables
- Lengthy quotations
- Forms of questionnaire, schedules, interview forms etc.
- Sometimes bibliography is also included.

Check Your Progress 6

1) What are the tools and technique for data collection?

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2) Fill in the blanks :

a) Data after interpretation and analysis becomes.....

b) Three aspects ....., ... and ..... are incorporated in discussion.

c) The brief resume of major finding, conclusions and recommendations of research is called as .....

3) What are the five components of documentation?

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4) To summarize, what are the four steps in conducting a scientific research?

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5.12 AREAS OF RESEARCH

Until now you have learnt what is research, what are the methods, prerequisites and steps in research. You have also learnt about the peculiarity and purpose of research in hospital and health administration. In this section you will learn about the Medico Administrative areas where research can be conducted. These are:

i) Hospital planning and architectural studies

—Planning of CSSD, Laundry, Blood Bank

—Planning of OPD, Ward, OT and ICU Services

ii) Utility service studies

—Organisation and layout of Dietary, Linen and Laundry services.

iii) Supportive service studies

—Organisation and layout of Blood Bank

—Medical Record, Pharmacy and Mortuary.

iv) Study of services provided in clinical department

—Study of emergency services department

—Study of psychiatry, ENT, Eye and General Surgery services.

v) Disaster management studies

—Study of existing prehospital services in a particular zone of the country

—Study of existing disaster management strategy of a hospital.

vi) Study of hospital waste management

vii) Utilisation studies

—Manpower utilisation

—Equipment utilisation

—Bed utilisation

—Inpatient vs. Day Care Procedures

viii) Cost evaluation studies

—Costing of inpatient, OT, ICU Services

—Costing of Housekeeping, Hospitality and OPD services

ix) Patient satisfaction studies

x) Job satisfaction studies

xi) Employees motivation studies

xii) Human resource management studies

—Study of absentism

—Study of employee turnover

—Study on Public Relation vis-a-vis Health services

xiii) Evaluation of hospital and health care services

xiv) Study of employees' health services scheme

xv) Medical ethics and Organ Transplantation

xvi) Financing of health care services

xvii) Study of hospital and health information system

—Role of computers in health care delivery system

—Planning and developing a soft ware package for store management

xviii) Role of hospitals in Primary Health Care.

5.13 LET US SUM UP

In this unit you have learnt the peculiarities, purpose and the scope of research in hospital administration. While studying the categories and the models of research you have learnt

the administrative research is of applied nature and is problem oriented, and follows scientific approach to problem solving. You have also studied the pre-requisites to carry out a research study and the different steps in conducting the same, such as data collection, compilation, analysis and interpretation of data, proving the hypothesis and writing the report with recommendations. You have also learnt the method of documentation in a research study. At the end of this unit some examples of areas of medico-administrative research have been enumerated for your guidance. The list is however not exhaustive. Before initiating an administrative research what you need to remember is that whether the study would be cost-efficient, technically feasible, has practical usefulness and would benefit the organisation.

5.14 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Hippocrates.

2) Archimedes.

3) 1543.

Check Your Progress 2

1) a) Scarcity of testable hypothesis.

   b) Needs rapid application.

   c) Disturbing results leading to stress.

   d) Talks about efficiency and effectiveness of a particular research.

   e) Many variables are difficult to hold constant.

   f) Cannot be undertaken without any practical implication.

   g) Definitions, assumptions and other parameters are not clearly defined.

2) a) Find the way in which hospital services are provided.

   b) Develop new knowledge.

   c) To find consequences of administrative decisions.

   d) To develop terms and standards.

Check Your Progress 3

1) Type of research can be distinguished according to the degree of abstract thought underlying them:

   a) Discovery of facts

   b) Interpret already available information

   c) Purely theorising type

2) It is the first hand data collected by direct observation or surveys.

3) It assimilates and interprets the data already collected by other investigators.

4) a) Objectivity

   b) Reproductivity

   c) Validity

   d) Reliability

5) a) Basic Research

   b) Applied

Check Your Progress 4

1) a) Problem oriented research
   b) Method oriented research
   c) Scientific method of research
   d) Descriptive method of research
   e) Historical method of research
2) a) The procedural
   b) The personal
3) a) Observation
   b) Hypothesis
   c) Verification
4) a) Personal qualities
   b) Professional qualities
   c) Integrity

Check Your Progress 5

1) a) Practicability
   b) Urgency
   c) Utility
   d) Anticipation of problem
   e) Resources (Tools and techniques)
   f) Available information
   g) Field of specialisation
   h) Administrative consideration
   i) Equipment
   j) Operation funds and miscellaneous consideration
2) It is a tentative assumption made based on inadequate and necessarily vague observational data.
3) a) Null hypothesis
   b) General hypothesis
   c) Complex hypothesis
4) By doing a pilot study.

Check Your Progress 6

1) a) Survey
   b) Interviewing
   c) Questionnaire
   d) Observation
2) a) information
   b) interpretation, disputation, disquisition
   c) summary
3) a) Footnote

b) Bibliography

c) Quotations and translations

d) Tables, charts and diagrams

e) Appendices

4) a) Observation

b) Hypothesis

c) Experimentation

d) Induction

5.15 FURTHER READINGS

Gopal, M.H. (1964), *An Introduction to Research Procedure in Social Sciences*, Asia Publishing House: Bombay.

Research in Public Health Administration-II, (1963), School of Hygeine and Public Health, John Hopkins University: Maryland, USA.

Research in Public Health Administration-III, (1964), School of Hygeine and Public Health; John Hopkins University: Maryland.

Sodhi, H.S., Ahuja M.M.S., (1975), *A Practical Aspect of Medical Research;* Arnold–Heinemann Publishers: Delhi.

UNIT 1 BASIC ENGINEERING SERVICES

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- explain the rudiments of hospital engineering services;
- describe the important components and areas needing attention; and
- contribute towards better performance of the facilities.

1.1 INTRODUCTION

The primary duty of any hospital as you know is to care for the sick and suffering so that they regain their health speedily. This function can be carried out with greater effect with the assistance of certain facilities, the foremost of which are the building, water and electricity supplies, sanitation and an excellent environment alround. You would have noticed that state of the art equipment are playing an ever increasing vital role in quick and painless diagnosis and appropriate treatment of the ailment and all of them need engineering services to function at optimum level. The Engineering and Allied Services comprise of the following:

- Civil assets
- Electricity supply
- Water supply
- Steam supply
- Central medical gases, air, and clinical vacuum delivery system
- Air-conditioning and refrigeration
- Non-conventional energy devices
- Workshop facilities
- Engineering services department

Hospital laundry, incinerator and fire protection have been dealt separately.

In this unit, you will learn about the basic engineering services that facilitate efficient functioning of the hospital, such as civil assets, supply of water, electricity, steam, central medical gases, air and vaccum delivery system. Other areas listed above will be covered in the next unit.

1.2 CIVIL ASSETS

Civil assets of a hospital complex consist of the land on which the hospital premises stand, the hospital buildings and several others that serve it, the roads and pathways, and the general environment created around the buildings bounded by the compound wall. It is an accepted practice to consider the normal internal services like electricity supply, lighting, ventilation, water supply plumbing and fittings, public health services, lightning protection as part of the building. "Building including internal services", is a common phrase. Modern hospitals are invariably provided with lifts and dumbwaiters, telephones and communication arrangements, TV and music systems. These can also be considered as internal services.

1.2.1 Land and Siting

A large piece of land will provide the best possible clean environment for a hospital. Presently, economy considerations have promoted maximum utilisation of every bit of land space permitted by laws for building construction leaving least open spaces that do not permit good ventilation. Even Indian Standard states that the total area to be provided for a hospital complex shall depend on the availability of land and recommends for guidance an area of one hectare (10,000 sq. m) for every 25 beds.

Hospitals should be easily accessible to the public and the staff, to supply lorries and fire fighting vehicles. So also, civil amenities like roads, water and electricity supplies, central sewerage system, communication and banking services etc. should be available reasonably

close to the site. A well thought out layout and orientation of the buiidings will reduce air-conditioning and ventilation loads.

1.2.2 Hospital Buildings

Hospital buildings are unique in that they have to shelter and protect a large number of human beings and sensitive equipment, and facilitate their efficient performance under all conditions. They are very costly and this may exceed 50% of the total cost. They are planned primarily to offer the best medical care to patients and best as well as safe working conditions for the staff. In addition, security measures for patients, personnel and the public consistent with the conditions and risks prevailing in the locality of the hospital are also considered. Hospital should provide certain basic amenities to patients and their relatives or attendants. Wastage of space and time in movement from department to department should be curtailed. Hospital building as a whole should be compact with the several departments placed in a functionally correct and operationally efficient manner.

Hospitals are planned in accordance with norms, standards and prevailing laws. Publications of Medical Council of India and Bureau of Indian Standards including the National Building Code contain the guidelines and norms for planning and design of hospitals. Super-speciality hospitals which have sensitivity to outside noise should be sited carefully with the sensitive areas placed farthest from the noise source. Circulation areas such as hospital streets, corridors and passages, entrance halls, staircases and lift lobbies inside hospital buildings can take up as much as 30 per cent of total floor area. They should be wide enough to allow smooth trolley and wheelchair movement. Best materials should be used in construction and the design should curtail noise created by walking, talking, trolley movement, banging of doors and windows and even patient's exclamations during treatment. A ramp and fire escape staircases are provided on the external side of the building. The finishes adopted should be of high quality to obtain good hygienic conditions and reduce maintenance effort.

Areas concerned with Radiography, Brachytherapy, Linear Accelerator, Nuclear Medicine, Cardiac Catheterization, Emergency, Operation Theatre, Intensive Care Unit, Laboratory etc. are given special preference in planning adopting specific norms and incorporating superior and selected materials. Cobalt-therapy or mega-voltage therapy rooms should have entrance doors interlocked with the machine control panel so that the doors cannot be opened when the machines are in use. Radiation Medicine Centre and Division of Radiological Protection of Bhabha Atomic Energy Centre at Mumbai have issued guidelines for starting Nuclear Medicine Laboratory and their prior permission has to be obtained before embarking on such a facility. Planning takes into account such factors as the nature of occupation on all four sides as well as above the roof and below the floor of the treatment zone. Many areas need effective shielding to prevent passage of radiation to outside. Lining with lead and using lead glass for peep windows have to be resorted to in many cases. Nuclear waste disposal has to be managed as per rules. MRI equipment is rated in terms of Tesla (denoted by T) which is a unit used in magnetism. These equipment have a magnetic influence zone inside which use of ferrous materials will have to be avoided. Operation theatres need conductive flooring to prevent build up of electricity and are planned to prevent accumulation of dust in corners and crevices. Even the ENT Clinic needs a sound-proof audiometery room and the Eye Clinic a dark room. The above information gives an idea of the intricacies involved in planning the departments of the hospital.

Hospital Buildings are generally huge in size and are multi-storeyed. Toilet facilities, which have to be provided as per norms, should be judiciously located at several points in all floors and some of them are bound to be in the interior portions. To take out the soil and waste water pipes, vertical shafts should be provided wherein these pipes, as also others like water pipes, are fixed vertically to the inner faces of the shaft walls. Pipes draining rain water from the roof top also run through these shafts.

Drainage piping should not be run hidden above the false ceiling as far as possible. It is best to avoid drainage piping in operation and delivery rooms, nurseries, central services areas, food preparation or serving or storage areas, sensitive areas like costly equipment rooms or electronic data processing rooms (computer rooms) etc. Floor drains should never be present in operating, delivery and cystoscopic rooms. Drain systems of autopsy tables should be carefully planned to prevent splatter and splashing and overflow at all costs.

Only a well planned, executed and maintained hospital will have no fear of cross infection taking place in its premises.

Provision for future expansion and renovation should not be overlooked at the initial planning stages as these are inevitable in the long run.

1.2.3 Internal Electrification and Lighting

Internal electrification supplies electricity for lighting and ventilation purposes, and for socket outlets which are sometimes called as convenience outlets or equipment outlets. One lighting circuit can be loaded with 10 lights and fan points provided their total load is less than 800 watts. Similarly one power circuit can be connected to two 16 amperes socket outlets, each to cater for a 1000 watts load, but the total load of both should not exceed 1800 watts. Power socket outlets should be used with utmost care and it would be better not to load them to the full extent, let alone overload them by equipment of high capacity (like sterilizers or heaters). These circuits are nowadays controlled by miniature circuit breakers (MCB) which trip on overload, but can be switched on after the malady is removed. They have virtually replaced the age old switches having replaceable fuses. Even with this better protection, failure rate of socket outlets is unacceptably high. Use of aluminium cables will reduce the cost, but copper cables provide better contact and continuity and are to be preferred for use in hospitals. For greater fire safety, fire retardant low smoke (FRLS) PVC cables may be used. In hospitals, internal wiring is mostly done in concealed conduits as surface conduits collect dust and dirt and defeat aesthetics. Steel conduit is better than PVC conduit which is susceptible to damages later on if someone drives a nail into the wall. Loose and dangling wires is a common sight in hospitals due to requirement of additional electric points not foreseen at the planning stage, but this should be avoided. If not, the wiring should be done properly as per standard practice.

Miniature circuit breakers (MCB) are extensively used in distribution boards (DB) and care should be exercised to use MCB of the "G Series" type to control circuits which operate "inductive loads" like room (window) air-conditioners, small horse power electric motors (used in pumps) etc.

Hospitals have extensive and varied lighting arrangements. In wards, patients have reading night lights in addition to general lighting. Operation theatre lighting is a case by itself with shadowless operating lights of advanced technology. In the area of influence of MRI equipment the lighting is of special nature. Generally high illumination levels are maintained in all patient areas and even in others like the kitchen and laundry.

With high cleanliness level of luminaries the lights will sparkle providing good illumination levels to dispel gloominess and usher in a mood of cheerfulness in one and all. Hospitals are generally big with hindrances to ingress of natural light. Therefore lights are almost always in use and partial switching off may be possible only in the night time.

Several light sources are available for use in hospitals. They are the incandescent bulbs, fluorescent tubes, mercury vapour lamps, low and high pressure sodium vapour lamps, metal halide lamps and so on. Incandescent lamp is best avoided as it has poor efficiency, short life and more often than not gets stolen. Fluorescent light is a good choice for use almost anywhere and has a long life with better efficiency. The market is flooded with numerous tube light fixtures to suit all purposes. Compact fluorescent lights (CFL) are very efficient and attractive. Mercury vapour lamp does not possess good light rendering and may be considered for use in laundry, plant rooms, workshop, parking lots and such like places. Sodium vapour lamp gives yellowish light and could be used in external surroundings, as its efficiency is very high. Metal halide lamps give good colour rendering with high efficiency, but are quite costly. Its life expectancy is also poor.

Illumination levels for some nursing facilities as per international practice are indicated in the table given on next page.

In places like anaesthesia store, the electrical fittings should be of flameproof category which are strong enough to withstand internal explosions. It is better not to have socket outlets and the like in such a place and to locate all switches outside the hazardous enclosure.

1.2.4 Ventilation

Ventilation is obtained by using ceiling, bracket (wall-mounted) or pedestal fans and by exhaust fans. In air-conditioned spaces, provision of fans is reduced. Combinations of natural and forced ventilation can be adopted in hospitals. For example, natural supply and

Illumination Level		
Area/Activity	**Illumination Values**	
	Lux	**Foot candles**
Administrative: office, medical records, conference room	500	50
Lobby:		
• General	200	20
• Reception	300	30
Waiting area:		
• General	200	20
• Reading	300	30
Corridors:		
• Nursing areas – day	200	20
• Nursing areas – night	100	10
Resident room:		
• General	150	15
• Reading/bed	300	30
• Toilet	300	300
Resident lounge:		
• General	150	15
• Reading	300	30
Resident dining	300	30
Toilet, shower, bath	300	30
Nursing station:		
• General	300	30
• Desk	500	50
• Medication area	500	50
• Corridors – day	200	20
• Corridors – night	100	10
Storage, General	200	20
Utility, clean or soiled	300	30
Dietary	500	50
Examination room	500	50
Physical therapy	300	30
Stairways	150	15
Occupational therapy work tables	500	50

natural exhaust, natural supply and forced exhaust, forced supply and natural exhaust or forced supply and forced exhaust. If no products of combustion or anaesthesia gases or other contaminants are involved, then the following air changes recommended in Indian Standard can be adopted:

Air Changes	
Space	**Air change per hour**
Operation theatre	15 to 20
Wards	8 to 12
Bathrooms, toilets	6 to 12
Kitchen	6 to 9
Laundry	10
Non air-conditioned areas	8 to 10

1.2.5 Internal Water Supply

All hospitals invariably comprise of multi-storeyed blocks and water tanks are placed at judicious locations on top of the roofs to supply water under pressure to assigned locations. These tanks are filled by pumping water into them. Like all storage appliances, these tanks also need periodical cleaning and upkeep. They should have sufficient storage capacity to ensure water supply throughout the day. No tank should exist in unused condition which will lead to water stagnation and deterioration in storage. Distribution pipelines convey water from these terrace-mounted tanks to the water taps and other pre-determined points. They are designed and laid so that water at the right pressure issues forth from the taps. A defective system will cause innumerable hardships like continuously low pressure, low pressure when another tap is opened for use, airlocks, etc. The entire system should be well-balanced so that water at the right pressure is available round the clock on all the floors at all points of use.

A major problem with pressure pipelines is leaks. These are to be considered as serious in case of hospitals. When the pipeline is empty, outside contamination can easily slip into the pipeline and cause havoc. A leaky pipeline inside the hospital building will cause dampness and unhygienic conditions. Moreover, wet floors can give rise to slippery conditions. A pipeline leak should be detected at the earliest and promptly attended to. Pipes showing signs of corrosion should also be changed.

Other problems which give rise to complaints are as follows:

a) **Dry tap:** Inadequacy of water is a major cause that is difficult to overcome. Water conservation, stoppage of leaks and misuse could be of some help.

b) **Low pressure at tap outlet:** A bucket takes an irritatingly long time to fill. A partial pipeline block or a partially open valve could be the reason.

c) **Low pressure at tap outlet when another tap is opened:** This indicates an inadequacy of pipeline carrying capacity and is difficult to overcome without carrying out changes in the distribution system.

d) **High pressure at tap outlet:** Water splashes all over and wastage results. A pressure reducing valve or restriction should be intentionally introduced into the pipeline to reduce the pressure.

e) **Muddy water issues from tap:** A common occurrence during monsoon period and if the storage tanks are dirty, this condition calls for effective filtration of water. On-line filters could be incorporated in the pumping mains. Pipelines should also be investigated for leaks through which outside water is probably entering the system.

f) **Chlorine smell in water:** Result of over-chlorination especially during monsoon period, this water becomes unpalatable to people. If it is a result of unintentional over-dosage in the treatment plant, the chlorinator can be suitably adjusted to reduce chlorine dosage. Otherwise, dechlorination by chemical or physical treatment may become necessary.

g) **Leaky tap:** The drip-drip tapping noise could be most annoying especially to the sick. This condition should never occur if the maintenance staff is alert.

Hot water is essentially required in patient areas like wards, operation theatres, intensive care units, laboratories, kitchen, laundry and such other departments. Basically a hospital requires hot water at two temperature levels – the lower level not exceeding 43°C (110°F) for patient washrooms with about 38°C to 40°C (100°F to 104°F) for showers, and the higher level of not less than 71°C (160°F) for physiotherapy, kitchen, cafeteria and laundry. Dietary requirement could be hot water at a minimum temperature of 49°C (120°F), and surgical and similar department may need it at about 40°C to 43°C (104°F to 109.4°F).

Electric storage type water heaters (generally called geysers) can be provided at required places for spot heating and supply of hot water. The thermostat temperature control could be set to obtain hot water at the desired temperature. But the sheer number of such units in a hospital places a heavy demand on maintenance and they could prove to be dangerous in case of failure of the safety devices when they may even burst spewing steam and hot water all around. Since the quantity of hot water requirement is considerable in most hospitals, a centralised hot water generator system would prove to be convenient, safe and beneficial. It could operate on electricity or fuels and could be mounted on the roof top of the hospital

building. Hot water could be distributed through down take vertical pipes with tee off arrangement at every floor. The entire hot water system should be well-insulated throughout.

A peculiar situation occurs which invariably leads to a huge wastage of water. The vertical pipes hold a good amount of hot water which will cool off during the night time stagnation condition. A person requiring hot water later on in the night will get cold water first which will need to be run to waste till hot water reaches the outlet. This wastage has to be avoided by installing a small pump at ground level which will continuously return a small quantity of hot water back to the hot water storage tank. This will ensure presence of hot water in the pipelines at all times so that wastage can be avoided.

It is difficult to assess the requirement of hot water in case of hospitals, because hot water is mixed with cold water before use. The mixing proportion depends on the particular desire of the actual user.

However the information provided in the table given below could be useful:

Possible Hot Water Requirements	
Patients	30 litres per bed per day
Operation theatre	As required basis, but likely to be 5 litres per bed per day
Physiotherapy	Nominal, say 500 litres per day
Laboratories	As required basis, but likely to be 1000 litres per day
Kitchen	10 litres per bed per day if disposables are not used (water at higher temperature)
Laundry	As required basis, depending on equipments requirement to be decided with equipment supplier. It could be 50 litres per bed per day
Attendants and visitors of patients	Depends on the policy of the hospital about permitting their presence. If permitted, then the following could be adopted: Attendants–15 litres per bed per day Visitors–3 litres per bed per day

It may be noted here that the quantity of hot water is not an additional requirement, but is drawn from the total quantity of water used daily by the hospital which is covered in subsequent sub-section 4.10 of this unit.

Cold water supply is needed for processing tanks in film developing room and perhaps by some machines which may have their own water chilling units. Cold drinking water is also essentially required and could be obtained by the use of storage type water coolers. Their installation should serve maximum number of people conveniently and be such as not to create wet floor alround. Wastewater from the water coolers need to be drained. Notice should be displayed prominently that the water is for drinking purposes only and not for washing or brushing teeth. Spitting into the waste drain in the cooler should be discouraged. It is advisable to install a spot water purification unit on the inlet water pipeline of water coolers. Water coolers must not be placed against walls which will deny adequate ventilation to the chilling equipment, and also not near a toilet for hygienic reasons and to prevent the misuse for washing purposes after toilet.

1.2.6 Public Health Services

Adequate toilet facilities should be provided and an excellent level of maintenance ensured to have hygienic conditions so vital in a hospital. Lack of water supply is the common cause for dirty toilets, the other very serious and common problem being line blockages caused by misuse and abuse. Flushing cistern should be functional at all times as it generates the requisite rush of water strong enough to keep the water seal near the toilet seat free of faeces. Otherwise stagnant faeces in the water seal will soften into a slime and form a coating on the pipe surface, ultimately choking it. Manual flushing with bucket of water is never equally effective and is very wasteful. Back flow is a serious condition and should never be

allowed to occur. This occurs more frequently in monsoon periods. The load on toilets is always increasing. With time more people coming to the hospital and original line size may prove to be inadequate to handle the increased sewage. This aspect needs careful attention and planning.

Sewer line blockage is a frequent occurrence and a major problem in a hospital. The clogging process occurs gradually and is difficult to detect till the blockage is complete and the toilet gets flooded causing the greatest inconvenience. Locating the point of blockage is as difficult as it is to clear it and make the line functional. Clearing operation is a nuisance whether it is inside or outside the building. Organised energetic regular maintenance of the entire system is the only practical answer to this malady.

Most urban hospitals discharge the waste into the municipal lines without checking the bacteria level which is likely to be high. This situation is one that is fraught with danger. In case of danger signs, hospital sewage should be pre-treated to make it safe and to conform to the general standards notified under the Environment Protection Act as applicable for discharging into the municipal system having terminal treatment plant. Rural hospitals may not have the benefit of municipal sewage lines in which case they will need septic tanks and soakage pits. These require a large area and are messy to maintain. Greater attention will be needed in this case. Hospital effluents which are discharged into sewers without terminal sewage treatment facilities or are not connected to public sewers should conform to the following norms:

pH	6.5 to 9.0	BOD	30 mg / litre
Suspended solids	100 mg / litre	COD	250 mg / litre
Oil and grease	10 mg / litre	Bio-assay test	90% survival of fish after 96 hours in 100%effluent

This may necessitate sewage treatment by the hospital itself to comply with the regulations.

1.2.7 Lightning Protection

Due to paucity of land space, vertical spread of hospitals is the order of the day. These tall buildings are vulnerable to lightning strikes which could cause serious damage to the building and costly equipment inside it. Therefore protection against lightning strikes is to be provided. This system simply affords to the lightning an easy resistance free metallic path to earth so that the building does not have to bear the brunt of providing a passage to the massive electricity. Vertical finials on top of the building are connected to down conductors running along the wall surface of the building which are earthed effectively into the ground to accomplish this task. A break in continuity of the conductors nullifies the effectiveness of this system and it is mandatory to check the continuity and the earthing system resistance at regular intervals. Lightning protection system should be totally independent and separate from the electric supply and distribution system.

1.2.8 Lifts and Dumbwaiters

All hospitals with more than one storey must have lifts for vertical transportation of patients, staff, visitors and supplies. Hospitals have passenger lifts, bed (or stretcher) lifts and sometimes goods lift. They are electrically operated with automatic controls, but are provided with manual controls also. A lift room houses the machinery of the lift and is generally located on the roof of the building. Material used for inside finish of the lift cage should be washable. The recommended speeds for bed lifts as per IS are as follows:

Speeds of Travel for Bed Lifts		
Travel	**No. of Storeys**	**Car Speed, metre/second**
Short travel lift	2 or 3	0.25
Medium travel lift	4 or 5	0.50
Long travel lift	6 and over	1.00

Passenger lifts should be easily accessible and preferably located near staircases. Hospital lifts should be placed near the wards and operation theatre department entrances.

Lifts should have power supply from mains and from stand-by generating sets. The normal practice is that, in case of fire, only one lift is to be in operation for use exclusively by fire personnel and all other occupants have to use staircases. This would not be acceptable in case of hospitals and therefore suitable understanding will have to be arrived at with the fire authorities. Controls, alarm push buttons and telephones in lifts should be so placed as to be within reach of wheelchair patients. Alarm system and emergency light are battery operated. All lifts, except the goods lifts, should be equipped with a special two-way switch to be used by the hospital staff to by-pass all landing buttons and travel directly to any desired floor. To prevent the lift doors from closing automatically even as a passenger is entering or exiting, an infra-red sensing device is fitted which keeps the door open. The lift should never move unless the doors are properly closed. Many accidents can take place due to unexpected movement of the lift with the doors open. Doors should never be forced open. The general practice is to have a lift attendant operating the lift during hospital working hours and then to put the lift on manual operation during the night.

Lifts should be subjected to load tests and a thorough inspection, and certified to be in conformity with safety regulations and codes before it is taken into service. Thereafter they should be maintained at the highest degree of perfection and got inspected at regular intervals.

Dumbwaiters are small box type elevators used for transporting stores from one floor to another. Separate dumbwaiters should be earmarked for vertical movement of sterile items and non-sterile items. These are electrically operated with the machinery suspended from the roof and have a travel speed of about 0.25 metre per second. Load carrying capacity is about 250 kg. The car size could be 1000 mm x 1000 mm x 1200 mm. "In Use" and "Car Here" indication lights are provided at all floors.

1.2.9 Structured Cabling

Not more than a few years back, low voltage telephone lines were the only ones provided in hospitals apart from internal electrification cables for lighting, ventilation and power supply. The next to join in were the lines used in nurse call systems in wards and patients call system in OPDs, piped music system in wards and selected hospital areas. PA system, pagers and lately cellular phones have come into use for communication nowadays. IS:10905 (Part 3)-1984 lays down that the communication system should be adequately designed for alerting all persons charged with patient care and all employees who are within the building in an emergency. The alerting system should be capable of operation from telephone switch boards and administrative offices. With the advent of computers within financial reach of individuals and institutions, a new dimension in cabling has been introduced. Use of computers in health care has increased phenomenally all over the world and their applications are bound to increase even more in future. Hospitals of today are facing heavy loads not only due to population explosion, but also due to a deluge of information. Computer aided management system has become inescapable as it has the following attributes:

- System is accurate and error free.
- System can process and analyse a large volume of data in a short time and present the results in the desired way or format.
- It can do the above from a single or multiple source of information stored in the memory bank.
- System can retrieve any data in a short time.
- Operators at different work stations have direct access to all information through remotely located terminals.
- System can store and transmit large volumes of data at high speed.

A good management information system and a constant evaluation of hospital activities are essential tools for managing a hospital effectively and efficiently. This system pertains to the network developed within the hospital for collection, storage and use of information to control various activities and events within the hospital.

Today any hospital needs a formidable communication network with more and more users sharing peripherals. This is essential to accomplish critical and complicated tasks for which faster access to information of a varied type is another requirement. It is therefore necessary that communication cabling be capable of supporting and sustaining a variety of

applications simultaneously—be it telephone, music, TV, computers or any other. Structured cabling is claimed to be capable of meeting all these requirements.

Structured cabling system can use the following types of media:

- Unshielded twisted pair (UTP), which is a 4-pair, 24 gauge, 100 ohm copper cable. This resembles the telephone cable, but its performance is enhanced.
- Shielded twisted pair (STP), which is a 2-pair 22 gauge, 150 ohm copper cable. Shielding gives the capability to perform well.
- Single-mode and multi-mode optical fibre cable, which is a thin glass transparent strand of material for transmission of modulated light to carry signals. The cable is flexible and consists of three distinct regions — a core, a cladding and a sheath. This gives a very high performance structured cabling system and a single pair of fibre cable can handle the same amount of voice traffic as 1400 pairs of copper structured cabling emanates from the telecommunication centre and extends to each outlet location passing through walls, floors and ceilings on the way. Any number of outlet points can be provided and only the necessary ones used at any time. This is very much similar to socket outlet points in internal electric supply wiring.

Modern hospitals are concerned with global telemedicine applications. Simply stated, this is a means of providing the highest class of medical services to remote locations worldwide through highly sophisticated telecommunications technology. Physicians at leading hospitals all over the world can deliver a range of most modern medical specialities to virtually every city in the world. Telemedicine holds the chance of revolutionising the provision of health care services by assuring medical access to remote locations and by enhancing medical dialogue. The telemedicine workstation provides a desktop system interactive or asynchronous multi-site multimedia (audio, video and data) medical information transmission with particular attention to clinics, hospitals and remote medical facilities. This system can conduct and manage remote consultations. Some of the capabilities are:

- Transmit and store medical images and X-rays.
- Capture images from video cameras, digital medical instruments or still cameras.
- Concurrently display patient data, audio/video conference.
- Share image, patient records and supporting data.
- Store and forward single item or entire multi-media patient folder.

The structured cabling system can fully integrate all wiring systems that are concerned with information traffic, voice, data videos, building controls and security systems. This is a stepping stone to intelligent buildings.

1.2.10 Intelligent Buildings

It is no longer enough for a building to be just beautiful. It will have to be intelligent also if it wants to be modern with a futuristic outlook. With the power tariffs going up and up, and with labour costs soaring, any building of considerable size and varied usage will have no choice but to "act intelligently" at all times, even when it is vacant. An "intelligent building" is one that is designed to anticipate the needs of the owner and the occupant, and possesses the ability to "learn", "think fast", "apply knowledge" and "act fast".

The concept is just a decade old, but is catching up in the corporate buildings and will surely find its place in hospitals very soon as it can beneficially use all its capabilities. A few of the functions can be explained as follows:

- Switch on or off lights, start or stop fans and air-conditioners depending on the presence or absence of the user.
- Balance artificial lighting level with natural light infiltrating into a space to provide the desired illumination level.
- Adjust air-conditioning effect based exactly on load conditions.
- Operate and monitor security systems like closed circuit cameras and activate motion detection system only at night.
- Switching on or off security, perimeter or area lighting as programmed.

- Controlling access by identifying personal access card.

Enabling demand based energy usage, the system cuts down on energy costs appreciably. Simultaneously manual labour and effort are also reduced so that further savings accrue. A basic building automation system may cost less than a sophisticated sprinkler fire fighting system. Coupled with the pay back that it offers, this goes to prove its viability.

1.2.11 Hospital Roads, Pathways and Drains

Hospital roads should be wide enough with sufficient turning radius at bends so that delivery trucks, fire engines and tenders can use them. Hospital roads should fulfill the requirements specified by the local fire authorities. They should be planned to make traffic movement safe and less noisy. Traffic control should be easy. Blind corners are very dangerous and should be avoided. Direction signs should be prominently displayed to reduce traffic confusion. Access road to emergency department should be well marked right from the point of entry to the hospital and no person or vehicle should have any difficulty in reaching the doors of the emergency without loss of time. Other vehicular and pedestrian traffic should not find it necessary to use this access road. Entry and exit directions should be clearly marked and well defined. Water-logging should not occur at any point in the roads and pathways, especially those leading to emergency. Roads, footpaths and pathways should receive due importance in maintenance and upkeep, especially soon after the monsoon period when they are most likely to have suffered extensive damage.

Roadside drains should be very well planned, executed and maintained to ensure speedy disposal of rain water and to prevent water-logging which will become a source of mosquito breeding and rotting matter that could generate cross-infection problems. Covered drains should be preferred in hospitals against open drains which could cause injuries and accidents. Broken or damaged covers should be promptly replaced. Roadside drains and the hospital grounds should be thoroughly cleaned and cleared of silt and rotting matter before onset of monsoon. Simultaneously portions of drains that have sunk and are upsetting the slope should be repaired.

1.2.12 Horticulture, Arboriculture and Landscaping

A good hospital should have pleasing surroundings which present a welcoming appearance to the patients and visitors. Horticulture is the art of garden cultivation resulting in a variety of flowers, and arboriculture is the scientific cultivation and management of trees and shrubs which includes varieties such as forest timber trees, fruit trees and ornamental woody plants. Horticulture and landscape elements enhance the comfort conditions inside the hospital building. Maintenance of gardens, flower beds, trees and hedges, and lawns should be a concern of hospital authorities and it is best to have a master plan prepared in consultation with the specialists in the field. Long gestation periods can be expected and the project may have to be executed in planned phases. In any case, tree plantation should be a feature on special occasions and annually at any rate. Trees are a great asset in reducing dust and noise. Tree felling and vandalizing or misusing for playful purposes and nailing posters or advertisements should be strictly prevented. Visitors are likely to eat food on the lawns and are sure to leave litter and trash at the place, to remove which a mechanism should be created by the authorities. Sprinkler systems for watering lawns and gardens could reduce man-power. Stores for seeds, manure, pesticides, instruments and implements etc. should be provided. Since most hospitals are multi-storeyed, a terrace or roof garden at mid-level on an intermediate block will break the height effect for those in higher floors of adjacent buildings.

Check Your Progress 1

1) Number of lights and fans in one electrical circuit should not exceed:.....

2) Incandescent lamps have the following drawbacks:

   a) .....

   b) .....

   c) .....

3) Wastage of hot water is avoided by:

.....

.....

.....

.....

1.3 ELECTRICITY SUPPLY

Electricity in the service of mankind knows no bounds. The extreme cleanliness accompanying the use of electrical energy has made it possible to use it in every nook and corner of the hospital premises. No other form of energy enjoys this status. In the realm of lighting, electricity is unrivalled in convenience and cheapness. In the power field, electric motor rules supreme because of flexibility, ease of manipulation and of course cleanliness. Electricity transmission is convenient, clean, cheap, flexible and eminently practicable. While every attempt has been made to make the explanation simple, this topic has to be slightly technical out of necessity and you should make your own efforts to gather more background knowledge to supplement this.

1.3.1 Sources of Supply and Standard Voltage

Ideally, electric power should be obtained from State Electricity Board (SEB) as own captive generation of full power requirements will be prohibitively costly. In case of hospitals, where power failures are unacceptable, power should be obtained from at least two independent sub-stations of SEB. This increases reliability. This is called as the "mains supply". An agreement with SEB for obtaining power will have to be entered into. Payment for electric power consumed will have to be made.

In single phase two-wire system, the standard voltage is 240 V. The standard voltages in three phase systems are 0.415, 3.3, 6.6, 11, 22 and 33 kV. It is unlikely that a hospital will receive electric power at higher voltages than 33 kV.

Hospitals require a great amount of power. This could be as high as 6 to 8 kVA per bed depending on the size and status of the hospital. This quantum of power cannot be supplied at lower voltage levels and the tariffs will be very high. Supply voltages for different loads are given below:

Power, kVA	Upto 100	1001 to 1000	1001 to 2000	2001 to 3000	Above 3000
Supply voltage, KV	0.415	6.6 or 11	11	22	33

1.3.2 Electric Sub-station

When the supply voltage level is above 415 V, the voltage will need to be stepped down before electricity can be used. Transformers of the distribution category will be necessary for this purpose.

Transformers upto 250 kVA capacity can be mounted on a two-pole structure which will be convenient and cheap. Bigger transformers upto 750 kVA will need a four-pole structure. But it is rather difficult to pole mount a transformer above 500 kVA due to its weight. Big transformers can be placed on a suitable concrete base whose height is above the flood level. Fencing will have to be provided to prevent unauthorised access. These transformers are of outdoor type and will work at higher temperatures due to absence of shade.

Indoor type transformers need suitable covered accommodation. Multiple units should be segregated by a wall of four hour fire resistance. As per IS:1869-1967, the clearances should be as follows:

Wall on	One side	Two sides	Three sides	Four sides
Clearance	0.50 m	0.75 m	1.00 m	1.25 m

Good ventilation enables the transformer to dissipate heat and thereby perform better.

Substation is the electric power receipt and dispersal point which keeps the hospital ticking at all times. Hospitals need a distribution sub-station for stepping down the supply voltage to the level of 415 V and for distributing the power to the various departments of the hospital. Electric sub-station should be a protected place.

This sub-station generally houses the incoming and outgoing HT switch gear, incoming and outgoing LT panels and the stand-by generating sets. Hospital power consuming equipment degrade the power sector substantially leading to power problems and higher energy bills. Therefore power factor improvement with a bank of capacitors is also carried out in the sub-station. Improvement to 0.95 pf level is ideal.

Sub-stations can be of the totally outdoor type, or be of the totally indoor type. Even partial indoor-outdoor design is possible. Totally outdoor sub-station is adopted for voltages higher than 33 kV. While transformers can be of outdoor type, it would be desirable to house their controlling and metering switchgears properly in a building where they can perform better under shaded and dust protected conditions. Excellent lighting and ventilation should be provided in the sub-station with adequate space for the operators to work and keep the maintenance items safely. It is always wise to have extra space for future expansion.

1.3.3 Switchboards and Power Distribution

A hospital distribution system is likely to have the following:

- HT side of sub-station (6.6 kV and above)
- LT side of sub-station (about 433 V)
- Main LT distribution panel(s)
- Distribution Boards (DB) and Sub-Distribution Boards (SDB)
- Points of consumption

The LT switch board in the sub-station disperses a huge quantum of power to several panels placed at judiciously located load centres. These further distribute the power to numerous distribution boards (DB) and their sub-distribution boards (SDB) located nearest to the zone or area that they serve. They are almost always placed in niches in the walls and possess miniature circuit breakers (MCB) to control the several load circuits.

Hospital sub-stations distribute considerable amount of electric power and for this purpose distribution cables or solid bus bars are used. Electric cables are the common choice because they are relatively easy to lay and are cheap. But their numbers multiply with increasing loads and management becomes problematic. Moreover, having a good content of PVC material, the fire hazard potential also increases which is undesirable in case of hospitals. A single bus bar trunking system can convey any amount of power without enhancing the fire risk. This system is costly to install and consists of aluminium strips which are the conductors placed inside a metal enclosure. Insulating separators ensure that the strips are spaced correctly. The enclosure can be made dust and waterproof.

1.3.4 Load Segregation

Continuity of power supply is essential in several cases in a hospital, common examples being the ventilator and the monitor, operation theatre, ICU and so on. Equipments are costly and cannot be allowed to remain idle for long periods. Some loads are not so critical, examples being lights and fans in waiting areas, passages etc. Therefore hospital loads are generally identified as being essential or non-essential. Essential loads are powered by stand-by generating sets in the event of mains failure at which time the non-essential loads do not get any supply. By doing so, the generator capacity is reduced to a manageable level and the expenses of own generation is also lowered. In this arrangement, essential and non-essential loads will have to be on separate circuits to enable power supply from the generator to reach only essential loads.

1.3.5 Spot Power Improvement

Many equipment are extremely sensitive to voltage variations and even burn out due to erratic voltage supply. Computers and electro-medical equipment are examples. These equipment need to be protected against voltage fluctuations by providing voltage stabilizers at their places of use. Some equipments and machines lower the power factor and lead to draw of excess currents from the lines. They may even malfunction or get damaged due to this effect. MRI is one such equipment. In this case, spot power factor improvement will have to be resorted to. The supplier himself will provide the power factor improvement apparatus. Low voltage is as dangerous as high voltage. Hence the supply voltage should remain within limits tolerated by the equipment.

1.3.6 Stand-by Power Supplies

Interruption of electric supply would be intolerable in many places in a hospital. It could prove to be highly dangerous and can cause loss of life, computer data and even property. This break in power supply may occur due to non-receipt of power from the supplier or a fault in the distribution system of the hospital itself.

Therefore there should be several types of additional power supplies in a hospital. Examples are given below:

- Stand-by diesel engine-driven generating sets (DG sets) supply
- Emergency batteries supply
- Uninterrupted Power Supply (UPS) system

1.3.7 Stand-by DG Sets

This is captive or organic generation of electricity by using diesel engine-driven generating sets working at 415 V. This alternate supply should be capable of meeting the essential requirements of the hospital which should be identified with extreme care. In addition to medical equipment and so on connected with patient care and health delivery systems, the National Electric Code recommends that following loads should also be on stand-by DG sets:

- Water supply pumps
- Fire fighting pumps, smoke extraction and damper systems
- Fire-alarm control panel
- Fire lift
- Security lighting
- Obstruction lights
- Lighting in common areas such as lift lobbies, stair-cases, entrance hall, common toilets, corridors etc.
- Any other functional and critical loads

To this list, we could add the following:

- Lights in auditorium, seminar and conference hall
- Lights in important offices and cashier counter
- Burglar alarms and secured places

Stand-by sets are generally installed in the sub-station so that power distribution can be done easily. These sets can be made to start automatically by using an automatic mains failure (AMF) panel. With the provision of AMF panel, the set will come on load within a few seconds of mains supply interruption. Two or more sets are installed to collectively take care of the load and also meet the eventuality of one set failing to start. They need fuel supply for which a fuel tank of adequate capacity will have to be installed. Diesel engines make considerable noise and emit pollutants in the exhaust. Effective silencing and emission control measures will have to be adopted. The generating sets should have ample space all around and more roof height to permit installation of exhaust piping and to reduce the noise

Moreover, good ventilation is necessary to dissipate the heat from the engines. A few details of the larger capacity sets are as follows:

Diesel Engine Generating Sets					
Capacity, kVA (kW)	Current, A	Engine HP	Approx. fuel consumption litres/hr	Size, L x W x H mm	Weight kg
500 (400)	695	614	108	4510 x 1460 x 2400	6200
600 (480)	834	700	129	4510 x 1460 x 2400	6300
750 (600)	1042	890	154	5070 x 1780 x 3200	8800
1000 (800)	1390	1180	203	5635 x 1894 x 3200	11500
1250 (1000)	1737	1470	225	5635 x 1894 x 3200	1244

Generating sets need permission and approval from SEB for installation and use. After installation, the Electrical Inspector will inspect the installation and check the kWh meter which will then be sealed. Certificate will be issued by him and the hospital will be charged for the units of power generated by themselves.

1.3.8 Uninterrupted Power Supply (UPS)

Sudden disappearance of electric power is a totally unacceptable situation in all critical areas and functions of a hospital. Take the case of operating room or the ICU or the pathological laboratory as examples. In the present day situation of power supply which is full of aberrations, the UPS system offers a viable solution. A well designed and excellently maintained stand-by genset will take as much as 5 to 8 seconds to come on load and even this short period of blackout is dangerous to a critical patient.

The UPS system depends on a fully-charged battery bank for instant power supply in case of mains failure. These batteries are on continuous charge from a powerful battery charger unit in the UPS. When mains power disappears, these batteries supply DC power to an inverter in the UPS which changes the DC voltage to AC voltage at the correct level. Backup power period depends on the number and capacity of batteries and can be for an hour or two. But batteries are costly and occupy lots of space. Therefore this duration of UPS use should be judiciously decided upon. The UPS system provides uninterrupted and clean AC power with closely regulated voltage and frequency. An UPS system will fail if the inverter which converts DC voltage to AC voltage fails. For this reason two inverters of full capacity are used, out of which one will be on ready stand-by status to come on as soon as the working inverter fails. Using three inverters of full capacity will increase reliability.

When the inverter is the only source of power supply to the critical loads, the arrangement is called as "single source configuration" or "on-line UPS". In the "two-source configuration", there is provision for two sources of supply to the critical load, one of which is preferred source and the other the alternative source. This is further divided into the "off-line UPS" and "on-line UPS". In the "off-line UPS" system, the preferred source is the AC mains supply and the inverter output is the alternative source. The batteries are not loaded always and therefore will have longer life. In the "on-line UPS" system, the preferred source is the inverter power supply and the alternative one is the AC mains supply. In this system, the batteries will be in continuous use and will also be getting charged continuously from the AC mains supply except when the mains power is off. This is the correct system of power to operating rooms.

Because of frequent interruptions in power supply, many homes have gone in for an "inverter". You can easily make out that this is actually a "off-line UPS" apparatus, but of small capacity sufficient to power a tube light or two with one or two fans. Sometimes it is referred to as an "electronic generator". This can be conveniently used for isolated loads in a hospital which cannot be connected to a central UPS system and therefore a few details are given in the table below:

Load Calculation and Typical Inverter Details				
Load Calculation		Details		
Equipment	Load	Capacity	Battery	Back up time at 60% load
Tube light	50 to 60 VA	300	12 V / 120 AH	4 hrs
Fan	60 to 90 VA	500	12 V 190 AH	4 hrs
Lamp	Watt rating	500	24 V / 120 AH	6 hrs
TV	60 to 80 VA	750	24 V / 180 AH	6 hrs
Computer	500 VA	1000	24 V / 180 AH	4 hrs
Telex	150 to 250 VA	1000	48 V / 180 AH	8 hrs
Fax	50 to 100 VA	2000	48 V / 180 AH	4 hrs
Desert cooler	300 to 500 VA	5000	48 V / 180 AH	1 hr

1.3.9 Earthing

You would have noticed that some plugs used at home have three pins. The top pin is for connecting to the earth wire. This is to protect persons from receiving a shock from the body of the apparatus being used. Equipment earthing is the connection of non-current carrying metallic parts of the equipment with the mass of the earth using a metallic conductor of negligible resistance. This path will ensure an immediate discharge of energy to earth without causing harm or posing a danger to persons at any time. The parts which are not supposed to carry any current under normal working conditions could be the body of a motor, switch, metal enclosure, conduits used in wiring, steel structures, electric poles, portable equipment such as electric iron, grinders, mixes and so on. It would be better if medical equipment such as X-ray machines, MRI and so on are provided with earthing by the suppliers themselves. Provision of double earthing enhances safety. Earthing is a requirement as per Indian Electricity Rules, 1956, and have to be tested at specific intervals and results recorded.

Earthing of electric supply system should be totally independent of and separate from the earthing of lightning protection system.

1.3.10 Electrical Inspection

All electric installations have to comply with the provisions in Indian Electricity Rules, 1956. Moreover, the installations will be inspected by Electrical Inspectors duly appointed for this purpose before the installation can be commissioned and taken into service.

1.3.11 Future Expansion

Invariably there will be a build up of load in the years to come necessitating greater power intake and distribution. This aspect should not be lost sight of at the initial planning stage and sufficient space should be left free to enable expansion of the system.

Check Your Progress 2

1) A unit of electricity is.....

2) Hertz pertains to.....

3) State the necessity for dividing the hospital electric loads into essential and non-essential categories.

.....

.....

.....

.....

4) The three types of stand-by power sources are:

a) .....

b) .....

c) .....

1.4 WATER SUPPLY

Provision of an adequate supply of water of suitable quality constitutes one of the first important essential requirement vital for the life and health of human beings. Hospitals need supply of cold water, hot water, soft water, distilled water and ultra pure water for medical purposes. Water is also required for the cooling systems of equipment, for steam generation, for plants and gardens and for fire fighting when it strikes.

Water is a potent universal cleansing agent, but it is susceptible to contamination easily when it turns into a conveyor of diseases. Therefore, water is invariably subjected to suitable treatment before use. Use of raw water even for gardening and area beautification through fountains and waterfalls is not to be advocated as it may be inadvertently consumed by workers and ignorant visitors which may prove to be harmful. In addition, it will involve a cumbersome system of parallel pipelines, one for treated water and another for raw water.

1.4.1 Sources and Nature of Water

Sources of water supply could be a local civic body (like Municipality, Corporation or Board), or own bore wells or dug wells. In most cases, hospitals obtain their requirement of water from the local civic body. Water supplied by them will be pre-treated and safe for human consumption. In some unusual circumstances, local treatment of a simple nature may become necessary. Water supply is based on an agreement between the parties and water bills are to be paid as per the stipulated terms.

When the civic source is non-existent or the supply therefrom proves to be inadequate, the hospital has to resort to winning underground water by drilling deep wells. These wells are executed by machines which drill upto 100 metres or more below ground level. The deeper the well, the greater the chances of obtaining high yield of water with less chances of contamination. Borewells should be protected against contamination. For this purpose, they should be sited away from sources of pollution like surface drains, underground sewers and chemical effluent discharge nearby. There should be a wide enough concrete cover around the bore just like plinth protection (say of 1 metre radius) and the place protected against unauthorised intrusion. Water quality should be got tested at frequent intervals.

Sometimes existing dug wells or shallow wells at the hospital site are retained, but their water should be used with utmost caution. These are highly susceptible to surface contamination and could start water-borne diseases. These wells should have a dependable wall with a wide concrete or stone paving protection alround on the ground and a strong steel mesh cover on top. Cleaning, washing and other acts likely to cause water pollution should be prohibited in the near vicinity of the well. Their yield is likely to be poor, but they store a good quantity of water because of their large size.

1.4.2 Hard and Soft Water

It would be childhood knowledge for you that hard water requires more soap to form lather than soft water. Water hardness depends on the presence of bicarbonates, sulphates, chlorides and nitrates of calcium and magnesium. For convenience, hardness is expressed in terms of calcium carbonate ($CaCO_3$) salt. Temporary hardness is removable by boiling the water, but this is possible if quantity of water required is small. Permanent hardness cannot be removed by boiling. Hard water is quite wholesome for drinking, but it is objectionable for boiler, laundry (washing) and industrial (equipment cooling) uses. In their case soft water should be used because it is free of scaling tendencies. Soft water is preferable for use even in sterilizers, TSSD and medical instrument cleaning purposes. Water with hardness in excess of 300 ppm is considered as very hard. Water for human consumption should have a

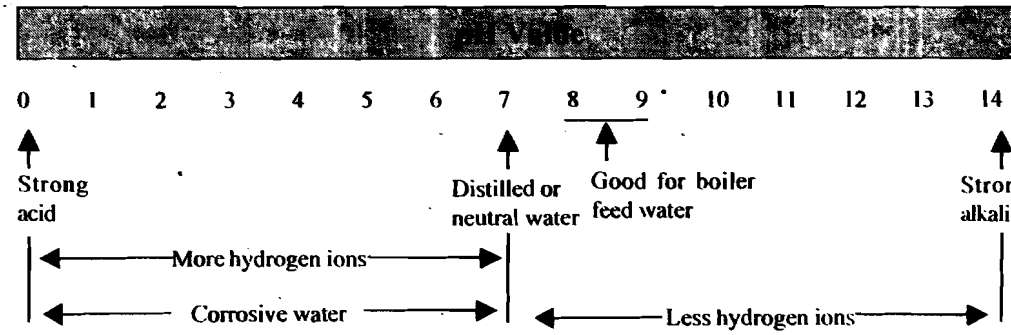
hardness not exceeding 200 ppm. Salts commonly found in natural water and their effects are given below:

Salts in Natural Waters		
Sl.No.	**Ingredient**	**Remarks**
1	Sodium chlorate (Common salt), NaCl	Most likely to be present in all potable water. renders water unpalatable if present in large quantities.
2	Sodium bicarbonate, $Na(HCO_3)_2$	May be present from 20 to 500 ppm. Harmless to health.
3	Sodium sulphate, Na_2SO_4	Causes purging action.
4	Magnesium sulphate $MgSO_4$	Causes permanent hardness and purging action.
5	Calcium Chloride, $CaCl_2$	Causes permanent hardness.
	Magnesium chloride, $MgCl_2$	
6	Calcium bicarbonate, $Ca(HCO_3)_2$	Causes temporary hardness.
7	Calcium sulphate (Gypsum), $CaSO_4$	Causes permanent hardness. corrosion of iron and steel.
8	Potassium salts	Small quantities cause no harm.
9	Silica, SiO_2	Not harmful.
10	Ferrous bicarbonate, $Fe(HCO_3)_2$	Causes brown colour, encourages organisms growth imparting unpleasant odour. Can cause blocking of pipes.
11	Copper, manganese, zinc, lead, arsenic salts	Lead and arsenic salts are poisonous and must be removed. Other metallic salts impart unpleasant taste and colour and be health hazard if insufficient quantities.
12	Nitrites	Being present in sewage, presence in water should be taken seriously. Proper treatment becomes inescapable.
13	Nitrates	Harmless but make origin of water suspicious.
14	Ammonia, free and saline	Presence indicates serious pollution.

1.4.3 pH Value of Water

Acidity or alkalinity of water is measured on the "potential hydrogen" or the hydrogen ions (or particles) present in water. Chemically neutral water, which is neither acidic nor alkaline, is taken to have a pH value of 7. Water with pH values lower than 7 is acidic whereas water with pH values higher than 7 is alkaline.

A simple representation of pH scale is given below.



In water treatment, acidic water (pH value less than 7) will not permit alum to form "floc" and sodium carbonate may have to be added to increase the pH value to 7 or more. Boiler feed water should be neutralised if acidic and be made alkaline with a pH value between 8 and 9. The pH value of water decreases as water temperature increases. Water for human consumption should have a pH value between 7.0 and 8.5, and is not fit for human use if pH value is less than 6.5 or more than 9.2.

1.4.4 Physical and Chemical Standards

An abridged tabulation is given below. Figures under column "acceptable" are limits up to which water is generally acceptable to consumers. Figures under column "cause for rejection"are limits beyond which water has to be rejected. Figures in excess of those under column "acceptable" render the water not acceptable, but still may be tolerated in the absence of alternative and better sources but upto the limits indicated under column "cause for rejection".

Physical and Chemical Standards of Water		
Characteristics	**Acceptable**	**Cause for rejection**
Taste and odour	Unobjectionable	Unobjectionable
pH	7.0 to 8.5	< 6.5 or > 9.2
Total dissolved solids (mg/l)	500	1500
Total hardness (mg/l) (as $CaCO_3$)	200	600
Chlorides (mg/l) (as Cl)	200	1000
Sulphates (mg/l) (as SO_4)	200	400
Fluorides (mg/l) (as F)	1.0	1.5
Nitrates (mg/l) (as NO_3)	45	45
Calcium (mg/l) (as Ca)	75	200
Magnesium (mg/l) (as Mg)	30 or less	150
Iron (mg/l) (as Fe)	0.1	1.0
Manganese (mg/l) (as Mn)	0.05	0.5
Copper (mg/l) (as Cu)	0.05	1.5
Zinc (mg/l) (as Zn)	5.0	15.0
Mineral oil (mg/l)	0.01	0.3
TOXIC MATERIALS		
Arsenic (mg/l) (as As)	0.05	0.05
Cadmium (mg/l) (as Cd)	0.01	0.01
Chromium (mg/l) (as hexavalent Cr)	0.05	0.05
Cyanides (mg/l) (as CN)	0.05	0.05
Lead (mg/l) (as Pb)	0.1	0.1
Selenium (mg/l) (as Se)	0.01	0.01
Mercury (mg/l) (total as Hg)	0.001	0.001

1.4.5 Bacteriological Qualities

Standards for bacteriological quality of water distinguishes between piped water supplies, unpiped water supplies and emergency water supplies. The guideline values specified are generally for faecal califorms and caliform organisms. The virological quality of drinking water should be such that water is free from any viruses infectious to man. This can be ensured by using water from a source free from wastewater and faecal contamination, and by effective treatment of water under all adverse circumstances.

1.4.6 Analysis Report

A complete water analysis report should generally include the following information amongst others:

a) Physical characteristics, i.e. turbidity, colour, odour

b) Chemical characteristics like the following:

   i) Chlorine absorption — ppm

   ii) Reaction (acid or alkaline) — pH value

   iii) Total solids — ppm

   iv) Ammonia (free and saline) — ppm

   v) Ammonia (albuminoid) — ppm

   vi) Nitrites—if present, water should be condemned unless it can be positively proved that the nitrites are a result of reduction of nitrates by inorganic substances

   vii) Nitrates—ppm

   viii) Chlorine as chlorides—ppm

   ix) Oxygen absorbed from acid permanganate—ppm

   x) Hardness (temporary or permanent) — parts of $CaCO_3$ per million

   xi) Presence of poisonous metals

c) Bacteriological — Bacterial content, number of B Coil present per millilitre of water following incubation at 37°C (98.8°F) for 24 hours in MacConkey broth.

d) Finally a statement that the water is or is not fit for drinking without further treatment. If treatment is required, it would help if the nature and type of treatment required is indicated.

1.4.7 Disinfection of Water

Disinfection of water is commonly achieved by the process of Chlorination. Chlorine gas can be injected directly into the water to be treated or can be dissolved in water to form a strong solution which can then be forced into the water under treatment. Gaseous chlorine is greenish yellow in colour and is about 2.5 times heavier than air. Under heavy pressure, it becomes an amber coloured oily liquid. Chlorine gas is supplied in liquid form in steel cylinders and the liquid evaporates by absorbing heat from the surroundings. The ambient temperature should not be less than 18.3°C (65°F). Evaporation causes the cylinder to become cold and this reduces the rate of gas formation. Dry chlorine is non-corrosive, but moist chlorine is highly corrosive. Chlorine gas is a powerful irritant to the lungs and eyes. For these reasons, cylinder leaks should not be allowed to occur. Chlorination does not alter the pH value of water. The apparatus used for administration of chlorine gas is called "chlorinator". It is very important to ensure adequate ventilation of the room housing the chlorine cylinder and chlorinator apparatus.

Administration of adequate chlorine dosage is of utmost importance to ensure complete destruction of bacteria and the correct level of residual chlorine at the user's end. Also destruction of organisms increases with the contact period available for disinfection. This contact period should not be less than half an hour or the chlorine dosage may have to be increased. Excessive residual chlorine gives an undesirable odour and taste to water. Residual chlorine levels are difficult to predict, but a free chlorine level of 0.5 mg / litre for one hour is considered sufficient to inactivate virus and make the water safe.

Water disinfection can also be achieved by ultraviolet irradiation. Disinfection effectiveness depends on the following factors:

- Water is free from suspended and colloidal substances causing turbidity.
- Water is free of light absorbing substances.
- Water is flowing in thin film or sheet pattern.
- Water is exposed to ultraviolet rays of adequate intensity for sufficiently long time.

Advantages of ultraviolet irradiation are that no foreign matter is actually introduced, no taste or odour is produced and period of irradiation is quite short. The disadvantage is that there is no residual effect which will ensure that water remains safe after treatment unlike the residual chlorine effect. Hence treated water should be used before long. Moreover, the apparatus is rather costly, but its application in small spot-treatment units has been successful.

1.4.8 Reverse Osmosis Process

You know that sea water is salty to taste as it contains excessive dissolved salts and is called brackish water. Even ground water could be brackish and unfit for human consumption. But brackish water can be treated by Reverse Osmosis (RO) Process which is capable of a high degree of filtration. This process employs cellulosic polyamide and specialty polymer membranes to rid water of dissolved salts, bacteria, pyrogens and organic. Proper pre-treatment of water is most important without which poor salt rejection and irreversible damage to the RO membrane can occur. This is however a costly process needing extra care, skillful operation, attention and maintenance/replacements.

1.4.9 Ultra-pure Water

Water used in certain situations such as in dialysis need to be specially treated for purity. This involves water softener having cation (positively charged ions) resin to remove hardness and render water free from scaling tendencies. An activated charcoal filter then removes chorine, chloramines and dissolved organics. An efficient sediment filter down-stream traps carbon and other particulate matter. An ion exchange or similar unit then removes all dissolved impurities and has on-line conductivity meter and water temperature indicator. Even for scrub-up in operation theatres and for laboratory use, water should be of high purity. Ultrafiltration and microfiltration machines are available which use special cartridge filters to remove particles in the range of 0.05 to 2.0 microns (one micron is one-millionth of a metre or one-thousandth of a millimetre).

1.4.10 Quantity Assessment

Assessing the daily water requirement for a hospital is an intricate and difficult task because of the quantum and nature of population load. This exercise finds its basis in specified norms which are as follows in case of hospitals and a few interrelated loads:

Hospital Water Requirements			
a)	**Hospitals (including laundry)**		
	i) Categories A&B (25 to 100 beds)	—	350 litres per bed per day
	ii) Category C (101 to 300 beds)	—	400 litres per bed per day
	iii) Categories D & E (301 to 750 beds)	—	450 litres per bed per day
	[Based on IS:10905 (Part 3)-1984]		
b)	Hostels	—	135 litres / head / day
c)	Nurses Homes and Medical Quarters	—	135 litres / head / day
d)	Day Schools/College	—	45 litres / head / day

Note: Mr Ervin Putsep, an eminent expert on hospitals, in his book titled "Modern Hospitals" has stated that the general estimate of water supply requirement is about 400 to 650 litres per bed per day which is a significant increase from the age old scale of 300 litres per day.

The provision shown above for hospitals does not include the water requirement for attendants, relatives and casual visitors of the patients, and a suitable allowance has to be made to this inescapable necessity based on the social and climatic conditions.

Air-conditioning plant is another huge consumer of water. Once the plant capacity is assessed on reasonably accurate data and working hours are known, water requirement can be estimated. A provision of 200 litres per day per ton of plant capacity should suffice for this purpose. Stand-by generating sets and some bio-medical equipments also need water for cooling purposes, but their requirements are not likely to be large.

Water for horticulture, arboriculture and beauty spots like fountains is another unavoidable necessity, but the requirement has to be anticipated on case to case basis. Need of water for lawns will be considerable.

Other water allowances pertain to evaporation and leakage losses, fire fighting practice drills and the like. An enhancement of 3% to 5% should be adequate for these purposes.

Accurate assessment of water requirement for a hospital is a difficult task, but should be done with utmost care to ensure that the hospital does not suffer from inadequacy of water and the projected requirement is not outside the capacity of the supplying agency.

1.4.11 Water Supply System

A hospital water supply system will generally comprise of the following major items:

- An underground storage sump to receive water during the periods of supply
- Pumps to pump stored water to overhead storage or service tanks through rising mains
- Overhead tanks located atop the hospital block
- A vast distribution network of pipes

Some knowledgeable authorities have advocated that 3 to 5 days water requirement should be stored, but this may prove to be too huge and impractical in case of large hospitals. However, the storage capacity should suffice for at least two days requirement as per IS:10905. Water is generally received into an underground storage sump which should be divided into two compartments to facilitate cleaning one by one without disrupting the water supply. Cleaning frequency is dictated by the clarity of water received into the sump. It is important to ensure that stored water is not allowed to stagnate, but is turned over. There should be no possibility of surface water from outside leaking into the storage tank.

Centrifugal surface pumps are the common choice for pumping water. However, submersible pumps can also be used under certain conditions to pump water from sumps. These pumps are a natural choice for winning water from deep bore wells.

External water supply distribution system is likely to be limited in a hospital unless the hospital has teaching and training facilities, hostels and residential accommodation. Pumps draw water from the storage sumps and pump it through delivery or rising main into elevated storage reservoirs or service tanks on top of the buildings. The distribution then takes place by gravity.

Mostly cast iron (CI) or galvanised iron (GI) pipes are used in external water supply as they are strong and are able to sustain pumping pressure as well as any vehicular load combing over them. While laying, it is best to keep these pipes away from sewer mains and places of contamination which could prove harmful. Water line should be well above any sewer line at least by a metre at the crossing point. It would be prudent to avoid a water pipe joint at this crossing point. Anchorage of pipes at bends is essential to prevent the joints from opening up. A proper up-to-date record should be kept of all the pipe routes to assist in easy location for maintenance and repair purposes.

Check Your Progress 3

1) Water hardness is caused by the presence of

.....

2) Without looking at the pH value chart, state whether a pH value of 8 indicates that water is acidic or alkaline.

.....

3) Reasons for chlorination of water

.....

.....

4) A hospital should have a minimum storage capacity of

.....

1.5 STEAM SUPPLY

Hospital kitchen and laundry need supply of steam. Even the Central Sterilisation and Supply Department (CSSD) needs steam for sterilisation purposes.

1.5.1 Hot Water and Steam

When normal tap water is heated, its temperature goes up which can be measured by a thermometer. The maximum temperature attainable by water at atmospheric pressure is 100°C (212°F). Under higher pressures like in a boiler, water can reach higher temperatures. At this point, addition of heat does not increase the water temperature, but boiling starts and water changes its form from liquid to vapour which is steam at the same temperature. This heat is called latent heat of evaporation and cannot be measured by a thermometer. Thus steam contains both heat of water and latent heat of evaporation. It means more heat can be made available through steam than hot water. Steam produced from boiling water contains minute water particles and is called "wet steam".

1.5.2 Steam Boilers

Steam boilers produce steam from water. Heat source may be fuel oil or electricity. Boilers using fuel oil will need fuel storage and supply back-up and a flue gas chimney. Electric heating is cleaner and may be by resistance wires or electrodes. Electrode boiler is costly. These boilers achieve virtually instant steam generation from start. Some of these boilers do not come under the purview of Indian Boiler Regulations (IBR) and are classified as non-IBR boilers. They can be installed at ground level or on higher levels, but basement installation is not preferred. They are provided with necessary safety and control devices.

Their rating is based on weight of steam produced per hour with water from and at the boiling temperature corresponding to the operating pressure. Since the actual feed water temperature is bound to be lower, and this water will consume heat to reach boiling temperature, the weight of steam produced will be less than the boiler rating. Therefore, selection of boiler capacity has to be done carefully based on the feed water temperature. Preheating feed water using waste heat of any other source will increase the steam output. Laundry requires steam at a pressure of 10.5 kg per sq cm (150 lb per sq in).

1.5.3 Steam Distribution System

Heavy grade steam pipes convey steam to the points of use and these pipes are adequately insulated to reduce heat loss. Traps for collecting water particles condensing out of steam are provided and these need to be emptied at intervals and the condensate water drained out.

1.5.4 Boiler Feed Water

Clean, soft and alkaline water with pH value between 8 and 9 should only be used for steam generation. Best quality feed water will inhibit scale formation in boilers and will result in better quality steam which is preferable for sterilisation processes.

Check Your Progress 4

What is a non-IBR boiler?

.....

.....

1.6 CENTRAL MEDICAL GASES, AIR AND CLINICAL VACUUM DELIVERY SYSTEM

Centralised medical gas supply and pipeline distribution system has proven merits as an effective tool towards better patient care in hospitals. The system as a whole is efficient, economical and a highly dependable life support service that conveys oxygen, nitrous oxide, compressed air and vacuum facility to patient spots in wards and operation theatres. The service provided by the system is uninterrupted and uncontaminated with reliability doubly assured by the use of safety and alarm devices.

1.6.1 Boiler Feed Water

Some of the benefits are tabulated below:

Benefits of Centralised Medical Gas Delivery System		
Benefits to Patients	**Benefits to Staff**	**Benefits to Administration**
Supply is uninterrupted, uncontaminated and reliable	Delivery of gases is reliable, continuous and safe	Rationalization of ordering, storing and transporting procedure
Supply is aseptic and safe – no apprehensions	Instant availability of service with reduced manual labour	Ease of purchase at favourable terms due to bulk orders
No distressing sight of gas cylinders	Minimum cylinder handling hazards	Possible reduction in damages, breakages and losses
No irksome noises from movement of cylinders nearby	No chance of mix up of gases	Improved management and control

Implementation of centralised system depends mainly on the size of the hospital and may not be viable if bed strength is below 50 unless it is a super-speciality hospital.

1.6.2 System Elements

The medical gas delivery system consists essentially of the following elements:

- Source equipment
- Distribution (pipeline and fittings) system
- Terminal units at patient's end
- Alarm system.

1.6.3 Source Equipment

Source equipment are described below:

Banks of medical oxygen and nitrous oxide cylinders with cylinder manifolds: Oxygen is extensively used throughout the hospital, but nitrous oxide is mostly required in OTs and surgeries. The number of cylinders depend on the number of outlets provided and the intensity of their use in the hospital. Cylinder banks are duplicated to ensure supply continuity when one bank approaches exhaustion level. Oxygen and nitrous oxide cylinders could be of about 7.1 cubic metre capacity capable of withstanding a cylinder pressure of 140 to 150 kg/sq cm. Nitrous oxide cylinders will be less in number compared to oxygen cylinders and nitrous oxide is administered with adequate quantity of oxygen. Bacterial infection through contaminated oxygen and nitrous oxide can occur particularly when the ventilator equipment is unclean. The colour codes for oxygen cylinder is black body with white shoulder and for nitrous oxide cylinder is Persian blue. The manifold system controls the duplexed banks of gas cylinders and has automatic changeover device which is set to function with both banks of cylinders opened for use. One bank will be in "running" mode feeding the pipeline while the other bank is held in "reserve" mode. The manifold system monitors the supply condition constantly and when the "running" bank nears exhaustion,

contents of the "reserve" bank will automatically commence feeding the pipeline. Visual warning signals are also activated to indicate that one cylinder bank is empty. As soon as bank of cylinders becomes empty, it should be replaced with a set of fully-filled cylinders. Normally a change-over two or three times a week is acceptable. More frequent replacement may indicate the need for a bigger manifold or leakage of gas. First stage high pressure, high flow regulator connects to a common second stage regulator controlling the line pressure to 4.22 kg/sq cm (about 61 lb/sq in). All manifold units are sealed by authorized personnel. Nitrous oxide control panel incorporates a heating system to avoid freezing or condensation of the liquefied gas. Drop in pressure of nitrous oxide is extremely rapid as the cylinders near exhaustion level. A 64-oxygen cylinders and 8-nitrous oxide cylinders installation requires a manifold room of about 12 m x 5 m size. The room should have excellent ventilation and lighting, and should never be used to house the compressed air or vacuum unit. Empty cylinders and cylinders which are filled (full) should be stored separately in places earmarked for this purpose and should never be mixed up.

Compressed air unit: Primary use of piped breathing air is for inhalation therapy and in operation rooms, surgeries, intensive care units and in some specially selected places. It is used to run the ventilators and operate dental and orthopaedic drills and other pneumatic tools. Air must be both oil free and clean. Compressed air unit consists of an electrically driven air compressor possessing an after-cooler, air drier, air receiver (storage vessel which could be 3 metres in height) and other adjuncts for delivering the highest quality medical air. The unit is duplicated for reliability of service. Water is required for cooling the compressor in a high capacity unit. A 15-hp compressor of a 500-bedded hospital may require 40 to 50 litres of water per minute and a cooling tower to cool this water. Air pressure could be about 7 to 8.33 kg/sq cm (about 100 to 118 lb/sq in) at the compressor and this is reduced to about 4.1 to 4.33 kg/sq cm (58 to 61 lb/sq in) for use at the patient's end. The permissible pressure drop is about 0.35 kg/sq cm (5 lb/sq in). The compressor unit starts and stops automatically to maintain the pressure in the air vessel.

Vacuum unit: Vacuum is extensively used in most patient treatment areas, OTs and surgeries and in laboratories. In the surgical, recovery and intensive care areas, it serves to remove fluids from incisions and body cavities and is used in post-operative drainage. Its use in laboratories is for filtering, cleaning delicate apparatus and transporting fluids from one container to other. The vacuum unit consists of an electrically-driven vacuum pump to create a pressure much lower than atmospheric air pressure in a reservoir tank which could be 3 metres in height. This vacuum creates a "suction" effect at the patient's end. The unit operates automatically starting or stopping as required by means of a negative pressure switch and the vacuum pump can create quite a high vacuum. The unit is duplicated to ensure reliability of service. The reservoir tank stabilizes the vacuum pressure in the pipeline system somewhere between 305 mm to 635 mm of mercury at all outlet points. Care should be taken to ensure that vacuum (or suction) unit is not used in case of flammable anaesthetic agents (for scavenging and such-like purposes) which are soluble in vacuum pump oils. This is especially the case with OTs and surgery areas. Vacuum system is susceptible to misuse and abuse as it is temptingly convenient to get rid of pollutants etc. Therefore, this system should preferably be over-sized to ensure reliability. Vacuum pump room should be clean, especially the floor which should not have even oil stains.

1.6.4 Distribution System

The distribution system consists of pipelines, pipeline fittings and valves. Cleaned and degreased, non-arsenical, deoxidized, seamless solid drawn, half hard copper pipe of appropriate grade and standard are used in the delivery system. The pipelines are surface-mounted on walls at a height not less than 2.13 metres (7 ft.) or underside of roof slabs for ease of inspection and defect detection, and extend to various floors and wings of the hospital. Where they cross over to other floors, they should be covered by metal or plastic sleeves for protection. All piping (except maybe control line piping) should be identified by painting, tagging or by painted sign-boards. It is best to lay the pipeline away from all electric cables and wires, and avoid long vertical runs. Jointing is done with extreme care using fluxless silver brazing to obtain a leak-proof condition. Branch lines are generally provided with stop valves to enable them to be isolated from the main system for repairs. All valves should carry identification tags and a valve schedule should be prepared for ready information of all concerned and for permanent record purposes. After erection, the pipelines are purged and tested for pressure drop at a high pressure of one and a half times the normal

line pressure, i.e. 6 kg/sq cm using an inert clean gas. The sizes of the pipes used range from 10 mm to 76.1 mm outer diameter. All pipes are to be colour coded by painting as given below:

Medical Gas Pipeline Colour Code			
Medical gas	**Ground colour**	**First colour band**	**Second colour band**
Air	Sky blue	White	Black
Oxygen	Canary yellow	White	-
Nitrous oxide	Canary yellow	French blue	-
Vacuum	Sky blue	Black	-
Nitrogen (Used for powering turbo surgical instruments)	Canary yallow	Black	-
IS : 2379-1963			

It is important to note that copper pipes are reactive to cement mortar. Prior treatment will become necessary if they are to be embedded. The supports should be of copper or brass, but never of steel. The pipes can be epoxy coated. They may be taped if insulation effect is to be obtained.

Alarm devices are invariably introduced into the medical gases delivery system at judicious points in different zones of the pipeline network. These monitor pressure of gases and generate audio-visual alarm in case of abnormal pressures. An abnormal situation is indicated when the green light goes off and red light comes on. Audio alarm is effective in catching the attention of the maintenance man and is mutable. Its location should however be such as not to alarm the patients.

1.6.5 Terminal Units

The pipeline network ends in terminal units, which could be wall outlets or ceiling pendents. Self-sealing valve at the outlet point is fixed to the wall at a convenient place and is encased in a small rectangular shaped box labeled and coloured for instant identification. Its use is established as soon as a non-interchangeable safety keyed plug connector is inserted into it. Its usage ceases no sooner than the plug connector is withdrawn. Wastage is thereby avoided. Gas outlet points should be at least 20 cm away from electrical fitments which can generate electric sparks any time for whatever reason. Ceiling pendent reduces floor congestion and delivers the service at the place where it is required. Especially in operating theatres, it overcomes the nuisance of gas hoses and electric cables on or just above the floor which would be the case with wall-mounted outlets. The ceiling pendent incorporates electrical sockets also from where power can be drawn conveniently. The hospital has numerous patient treatment and care areas spread all over and provision of terminal units has to be decided with due care and consideration.

1.6.6 Liquid Oxygen System

In a large hospital, consumption of oxygen gas could be so high that oxygen cylinder replacement could become an inconveniently frequent exercise. In such a case, cylinder oxygen can be replaced by liquid oxygen which economises on storage and space. Liquid oxygen system involves vacuum-insulated white coloured pressure vessels, vapourisers, regulating and monitoring equipment. The equipment is designed with sufficient safety to store cryogenic liquid oxygen, transform it to gaseous form and supply it at a pressure consistent with medical requirements. Liquid oxygen is replenished by tanker carriers. The storage vessel should be housed outside the building but should have covered accommodation and follow stringent safety regulations.

1.6.7 Maintenance Tips

Centralised medical gases and clinical vacuum delivery system is unique to hospitals and so a few basic maintenance hints to hit the high spots as given in the cage below would be appropriate:

Basic Hints for Maintenance	
Equipment	**Action**
Cylinders and manifold room	Permit entry only to authorized persons. Prohibit smoking and naked light or fire. Tolerate no oil or grease patches on the floor. Maintain the premises clean, tidy, well lit and ventilated. Air compressor and vacuum pump should not be housed in this room.
Cylinders	Store filled oxygen and nitrous oxide cylinders separately. Store empty oxygen and nitrous oxide cylinders separately. Change empty bank of cylinders with fully charged cylinders containing the correct gas as soon as the red warning light appears on the manifold indicating one bank is exhausted.
Manifold	Permit only authorized persons to handle apparatus. Check that Unit is sealed by authorized person and is not broken or tempered with. Prohibit use of oil or grease on any part of the apparatus. Check for leakage frequently. Check that the central pressure gauge on the panel indicates 4.22 kg/sq. cm. (61 lb/sq.in). Keep the apparatus clean and shining.
Vacuum pump	If units are duplicated, operate units alternately (say, after every 300 hours). Do not tamper with the vacuum switch. Check the vacuum levels at which the unit starts up or stops automatically. All adjustments / repairs should be carried out by authorized personnel / supplier. Never spill oil or drop grease onto the floor. If it happens, remove it immediately. Air compressor should not be located in the vacuum pump room. Prohibit smoking and naked lights or fire in the vacuum pump room.
Air compressor	If units are duplicated, operate units alternatively (say, after every 300 hours). Keep inlet air filter clean. Compressor should suck in only fresh, clean air free from pollutants and odour. Never tamper with the air governor unit. All adjustments and repairs should be carried out by authorized personnel / supplier. Maintain the cooling tower in clean condition. Ensure adequate water supply. Do not spill oil or drop grease onto the floor. If it happens, remove it immediately. Vacuum pump unit should not be located in the air compressor room. Prohibit materials that exude smell (e.g. paints, oil, grease, kerosene, petrol and diesel, even food and eatables etc.) from being brought into this room. Prohibit smoking and naked lights or fire in the compressor room.
Pipelines and valves	Check for leakages and damage to pipelines. Check presence of identification tags and colour codes. If any pipeline has been altered or augmented, keep the same under close observation for sufficiently long time to ensure satisfactory performance. Check if any valves have been tampered with.
Terminal units	Check for leakages. Coordinate with all users so that they observe due care in using this service.
Documentation	Ensure proper records are maintained of all activities connected with this service.

Check Your Progress 5

1) List the primary uses of the following in surgery:

   a) Compressed air.....

   b) Vacuum system.....

2) State the reasons for having two banks of cylinders.

   .....

   .....

1.7 LET US SUM UP

In this unit you have learnt that a hospital must have a building with spaces suitably planned in accordance with the requirements of the medical equipments and in compliance with the norms specified by several authorities, especially those concerned with safety. You also learnt that such an institution should have the fundamental facilities like reliable water and electricity supplies, dependable sanitation and drainage and so on. Further you learnt that the hospital has to deal with several government, semi-government and outside agencies to obtain water, electricity, fuel and gas supplies. Payment for these will have to be made as per prior agreements and these payments are high because a hospital is energy intensive. You would, therefore, appreciate the need for energy efficient functioning to cut down hospital expenses and make health care delivery system viable.

Towards the end you have learnt about various aspects of steam supply, Central Medical gases and clinical vaccum delivery systems.

1.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) 10

2) a) Poor efficiency

   b) Short life

   c) Gets stolen

3) Having a small pump at ground level to return the water in the down-take pipe to the storage tank and thereby keep up hot water circulation.

Check Your Progress 2

1) one kilowatt-hour.

2) frequency (cycles/second) of alternating current.

3) Essential load is supplied with electricity generated by the stand-by generating set and by segregating it from the total load the generating set capacity is reduced with savings in expenses. Non-essential load is connected only to the mains supply.

4) a) Stand-by generating sets supply

   b) Emergency batteries supply

   c) Uninterrupted Power Supply (UPS) system

Check Your Progress 3

1) bicarbonates, sulphates, chlorides and nitrates of calcium and magnesium.

2) Alkaline.

3) Disinfection of water to make it fit for human consumption.

4) Two days requirement.

Check Your Progress 4

A non-IBR boiler is one that does not come under the purview of Indian Boiler Regulations.

Check Your Progress 5

1) a) inhalation therapy and operation of pneumatic tools.

   b) removal of fluids from incisions and body cavities.

2) One bank is used at a time and the other is held as reserve to be used when the first bank nears exhaustion level.

1.9 FURTHER READINGS

Manual on Water Supply and Treatment of Ministry of Urban Development.

Medical Council of India publications.

National Building Code (as amended).

Relevant Indian Standard Specifications and Codes.

UNIT 2 ALLIED ENGINEERING SERVICES

Structure

2.0 OBJECTIVES

After studying this unit, you will be able to:

- explain the overall engineering services of a hospital;
- understand the need and the role of hospital engineering services department; and
- analyse the importance of maintenance and energy conservation.

2.1 INTRODUCTION

This unit is an extension of the previous Unit and you will learn about certain allied services which are basically engineering in nature and factors governing them.

While going through the preceding Unit, you must have become aware of the basis of the subject.

In this unit, you will learn about the engineering services department and how it can become the hub activity of all Engineering Services. In the beginning of the unit you will learn about the air-conditioning and refrigeration in a hospital. Thereafter you will learn about non-conventional energy devices for conservation of energy in a hospital set up. Further you will learn about the maintenance operations and stores management including workshop facilities and engineering service department.

2.2 AIR-CONDITIONING AND REFRIGERATION

Planet Earth is bestowed with seasons and weathers that change for the benefit of mankind. But they are not always favourable or comfortable to the sick and suffering patients. Moreover, bio-medical equipment used extensively in hospitals are sensitive to changes in the environment qualities and are likely to lose their accuracy or even fail. Therefore, there is a necessity to control the environment inside a building to suit the needs of patients and the equipment.

2.2.1 Air-conditioning

Air-conditioning is the act of creating an artificial climate by making the air just right for use in a building by making it colder or warmer, by drying or moistening it and by cleaning it. Air-conditioning therefore controls temperature, humidity, cleanliness and movement of air in such a manner as to assist patients in recovering and equipment in functioning satisfactorily with the desired accuracy. It is a common practice to refer to this activity as heating, ventilating and air-conditioning, or HVAC for short.

2.2.2 Air-conditioned Areas

It is certainly advisable to air-condition the entire hospital to achieve freedom from dust and high sterility conditions. But this is too costly a system and economic considerations often lead to curtailment of air-conditioning.

The following departments and wards have been recommended to be air-conditioned in IS: 10905 (Part-3)–1984:

- Operation theatre complex in emergency and casualty departments
- Intensive care units

- Radiography and radiotherapy rooms in radiology department
- All rooms in sterile zone of delivery suite
- Certain laboratories in pathology department
- Blood laboratory in bood bank of OPD
- Fracture-cum-casualty theatre, recovery, frozen section of clean zone and all rooms in sterile zone of operation theatre department
- Certain number of beds in wards, units of particular specialities
- Autopsy room in mortuary.

With advancement in technology and treatment procedures, many more areas may need to be air-conditioned. This is best decided in consultation with the equipment suppliers. Super-speciality hospitals will no doubt have maximum air-conditioning with a few areas like toilets excluded.

2.2.3 Temperature and Humidity

Temperature is the degree of hotness as measured by a thermometer. The normal body temperature is 37°C (98.6°F). If the air temperature is slightly lower than this, the human body dissipates heat at the correct rate and the patient feels comfortable.

Atmospheric air is never dry, but contains moisture always. Moisture content in air is measured in grains and 7000 grains make one pound (453.5923 grams). Humidity pertains to the presence of moisture as water vapour in air. Relative humidity (RH) is the amount of water vapour in the air expressed as a percentage of greatest amount that air can hold at that temperature. On cold mornings, there can be mist in the air, because air is unable to retain the quantum of moisture present in it at that low morning temperature and throws out the excess as mist. The relative humidity would then be 100%. Under these conditions, sweat from the skin can not evaporate into the air, because the air is already saturated with moisture. In humid weather, a person appears to sweat profusely because the sweat is not evaporating off the skin. The person feels uncomfortable. In dry conditions, moisture on the skin evaporates quickly making the skin dry and the most common experience is parched lips. If the relative humidity of air in an operating room is low, then there is every possibility that body tissues in the open cavity could dry up which would be dangerous.

Thus there is a relationship between comfort temperature and relative humidity. Comfort conditions for summer (cooling) and winter (heating) have been recommended in IS:659-1964 and a modified version is given below:

Inside Comfort Design Conditions			
Summer		Winter	
Temp. °C (°F)	RH %	Temp. °C (°F)	RH %
22.3 (74)	68.0	21.4 (70.5)	68.5
23.9 (75)	56.5	21.7 (71.0)	62.5
24.4 (76)	48.0	22.2 (72.0)	52.0
25.0 (77)	38.7	22.8 (73.0)	45.0
25.6 (78)	33.0	23.3 (74.0)	33.0
26.1 (79)	24.0	23.6 (74.5)	21.3

Note : It is difficult to obtain RH below 45% by air-conditioning alone.

Medical evidence has shown that proper air-conditioning is beneficial in preventing and treating many conditions. Some examples are the following:

- Better treatment of rheumatoid arthritis has been achieved in a hot (32°C or 89.6°F) and dry (35% RH) condition
- Burn patients may need treatment in hot (upto 32°C or 89.6°F) and humid (upto 95% RH) conditions
- Patients with chronic pulmonary diseases may need warm and humidified air to prevent dehydration

- Patients with thyrotoxicosis need cool and dry condition
- Those with hyperthermia need a cool room with low humidity level
- Dry conditions are not favourable to the ill and debilitated. It contributes to secondary infection.

In case of air-conditioning for equipment areas, the inside conditions should be decided in direct consultation with the suppliers of the medical equipment at the time of procurement.These conditions differ as the examples in the following table show:

Temperature and RH Environment Examples for Medical Equipment

Equipment	Make	Temperature Range	RH
Radiography/Fluoroscopy	Siemens	10 to 24°C (50 to 75°F)	30 to 75 %
	GE	13 to 24°C (55 to 75°F)	20 to 80 %
MRI 1.5 Tesla	Siemens	16 to 21°C (60 to 70°F)	55 to 65 %
	GE	10 to 21°C (50 to 75°F)	30 to 60 %
Linear Accelerator	GE	22 to 25°C (71 to 75°F)	30 to 70 %
	Varian	16 to 27°C (60 to 80°F)	15 to 80 %
CT Digital	Siemens	21 to 24°C (69 to 75°F)	35 to 70 %
	GE	20 to 28°C (68 to 82°F)	40 to 70 %
	Picker	20 to 24°C (68 to 75°F)	30 to 60 %

Ambient conditions at numerous cities have been recorded for several years and have been moderated to arrive at the values suitable for adoption in air-conditioning calculations. The following table is an illustrative example and highlights the necessity for air-conditioning when co-related with the conditions for human comfort and equipment operation:

Ambient Conditions adopted in Air-conditioning Calculations

Location			Summer		Monsoon		Winter	
	Place	Heigt above MSL, m	Temperature °C (°F)	RH %	Temperature °C (°F)	RH %	Temperature °C (°F)	RH %
Coastal (hot/sultry)	Calcutta	6	37.8 (100)	49	32.2 (90)	85	13.3 (56)	55
	Chennai	16	39.4 (103)	41	28.3 (83)	88	18.3 (65)	60
	Cochin	3	35.0 (95)	58	29.4 (85)	88	22.2 (72)	69
	Mumbai	11	35.0 (95)	60	29.4 (85)	88	18.3 (65)	65
	Thiruvananthapuram	64	33.3 (92)	59	29.4 (85)	80	22.2 (72)	69
	Vizag	3	33.3 (92)	64	30.6 (87)	80	18.3 (65)	60
Interior (hot)	Ahmedabad	55	43.3 (110)	34	32.2 (90)	82	15.6 (60)	60
	Bangalore	921	35.6 (96)	45	27.8 (82)	82	14.4 (58)	78
	Bhopal	523	41.4 (106)	20	33.3 (92)	69	7.2 (45)	50
	Delhi	216	43.3 (110)	20	35.0 (95)	60	7.2 (45)	70
	Hyderabad	545	41.1 (106)	28	29.4 (85)	82	12.8 (55)	60
	Lucknow	111	42.8 (109)	26	34.4 (94)	64	8.9 (48)	60
	Patna	53	42.2 (108)	26	32.2 (90)	78	10.0 (50)	60
Elevated (cold)	Shillong	1500	29.4 (85)	50	23.3 (74)	82	3.3 (38)	50
	Srinagar	1586						

2.2.4 Air-conditioning Load Factors and Design Parameters

Several factors contributed to the air-conditioning load. They are as follows:

- **Conducted load:** Heat from outside in case of summer cooling and heat from inside in case of winter heating is conducted by walls, floor and roof. This is greatest in case of exposed roofs.
- **Occupancy load:** Persons inside the air-conditioned space give off heat which depends on the degree of their activity.
- **Lights and user equipment load:** Lights emit heat and all equipment give off heat when in use.
- **Ventilation load:** All materials exude smell which should be expelled. Occupants need oxygen and fresh air. Therefore hot outside air is internationally inducted into the system which adds to the air-conditioning load. If a quantity of outside air whose volume is equal to the room volume is inducted every hour, then the number of fresh air changes would be one per hour. This is actually the practical minimum since opening and closing of doors results in outside air leaking into the air-conditioned space. In case of operating rooms, the number of fresh air changes could be 10 per hour or more. It could even be "all fresh air system", also called "blow through system". This imposes the greatest load on the plant.

Air-conditioning services design requires the following basic information at the very outset:

- Inside temperature and humidity with permissible drift thereon
- Number of fresh air changes per hour (or indoor air quality)
- Occupancy and their activity level
- Users equipment load and details thereof
- Number, wattage and type of lights
- Air purity level
- Working hours per day
- Necessity for warmth heating in winter

Further, the following additional information becomes essential in case of hospitals:

- Whether positive or negative air pressure is to be maintained in any particular space
- Whether re-circulation of air is permissible
- Whether all fresh air conditions is inescapable
- Whether inside air from a particular space needs to be exhausted to outside safely
- Whether air is to move into or out of any specified space
- Whether laminar flow conditions are required in any particular space.

Air-conditioning is vulnerable to too many factors having a direct and serious impact on its performance. One common factor is a half bright - half brown condition about the ultimate design burdens and the final resultant site realities including usage of space and equipment therein. More often than not, only rough details of equipment will be available in the beginning on which the air-conditioning design is finalized. Much later, the parameters get altered when the actual equipment to be purchased is finalized. It is important that the first step of defining the design parameters is taken with due care and finalized in great detail.

Based on the design parameters, heat load calculations are carried out for the summer and monsoon seasons. The higher capacity out of the two is selected. Sometimes the monsoon load is greater than the summer load.

2.2.5 Air-conditioning Plant

Major part of this plant consists of a refrigeration unit. The cold produced is transferred either to circulating air directly or to circulating water, which subsequently cools the circulating air. The former is called as Direct Expansion (DX) System and the latter as Chilled

Water System. In both cases, the cooling of air takes place in a part of the plant called air handling unit (AHU). The AHU houses the air filter, cooling coil and air blower which circulates the treated air through the air-conditioned space. Air ducts convey the air to and from the AHU. For best performance, the air duct length should be limited to 30 m (100 ft). The DX system plant can handle only one AHU whereas the chilled water system plant can have as many AHUs as necessary.

This limitation of the DX system plant to handle one AHU is a disadvantage in case of hospitals as they will then need several plants working in different places with increased plant operating manpower. On the other hand, one big central chilled water plant could serve the whole hospital through several AHUs placed judiciously near to the load points. It would be advantageous to place areas needing air-conditioning together in a group so that, inside conditions permitting, one AHU can serve them all effectively.

The air-conditioning plant capacity is specified in tons (or tonnes) of refrigeration (TR). This actually denotes the heat extraction capacity of the plant and has nothing to do with weight. One ton of refrigeration is equal to a heat extraction rate of 12,000 BTU (British Thermal Unit) per hour (3024 kilocalories per hour).

Room air-conditioners (generally called as window type air-conditioners) are a common sight and come in several capacities starting from a fraction of a TR and extending upto 2.5 TR. These are DX systems and give comfort cooling. A one TR unit can suffice for a room upto 12 sq m. Multiple units can be used for air-conditioning larger areas. They need electric supply and a little quantity of water in a small tank to increase their cooling effect. They condense out moisture from the air which has to be drained out properly. Latest units are technologically advanced with energy saving devices and attractive looks. Any MCB used in this electric circuit should be of "G series" with adequate rating. Packaged air-conditioners are also DX systems with a capacity ranging from 3 to 15 TR. They need electricity and water if the unit is water-cooled. Single units can air-condition much larger areas and multiple units can be used to advantage.

2.2.6 Central Chilled Water System

This is a versatile system and is best suited for hospital use. One single plant can serve the entire needs of the hospital, thereby cutting down the manpower. Even a big plant can work efficiently on part loads as low as 10% and offer huge energy savings. Chilled water pipes are adequately insulated and appear huge in size. Each AHU can be specially designed and selected to perform to meet the requirements of the spaces that it serves. In wards and common areas, fan coil units can also be used. These are small cooling units upto 2 TR capacity and are slung from the roof. Like room air-conditioners, these also condense out moisture from the air and the condensate will have to be drained out properly.

2.2.7 Testing of the Plant

After installation, the air-conditioning plant is tested on full load during the hottest days in summer and wet days in monsoon. These seasonal tests may last for three days as per prior agreement and the results are authenticated by the executing agency and the client.

2.2.8 Power and Water Requirements

Air-conditioning plants are power hungry and need huge power input. Since they work almost round the clock, the power consumption is rather huge. Big plants above 100 TR may take about 2 kVA per TR and the smaller ones in excess of it.

Water is required for condenser cooling. The resultant hot water itself gets cooled in cooling towers. A big plant could require as much as 200 litres per TR per day.

2.2.9 Fire Dampers

Air ducts offer excellent passage to fires for easy propagation and spreading to other areas. To prevent this catastrophe, fire dampers are inserted in the air ducts. These are actuated to close and block the air passage by fire detectors in the event of a fire. They could also be closed by fuse links which melt when the fire heat reaches them.

2.2.10 Air Filtration

This is one of the duties of the air-conditioning AHUs. Rough coarse filters prevent insects and large particles from entering the AHU. The next higher grade is the micro-vee filter which

is effective down to particulate size of 5 microns, one micron being one-millionth of a metre or one-thousandth of a millimeter. High efficiency particulate air filters (HEPA filters) can filter down to 0.3 microns with 99.97% efficiency. These are very costly and have to be installed with extreme care as even a pin point puncture will cause an air leak to upset its efficiency and effectiveness. These are mostly used in operating rooms to eliminate bacteria carrying particles. HEPA filters have to be replaced at frequent intervals which may not be longer than six months.

2.2.11 Air-conditioning of OT

This is an intricate task the details of which are described in Unit 3 on Operation Theatre, (Block 1, Course 4).

2.2.12 Caution and Common Mistakes.

Air-conditioning plants use a refrigerant gas belonging to the chlorofluorocarbon (CFC) family. This gas, when leaked, could rise up in atmosphere and deplete the ozone layer protecting the earth from harmful rays of the sun. Use of such a refrigerant gas will be discontinued in the near future. Alternative safe refrigerant gases are available. Therefore care should be taken to see that the air-conditioning plant selected for the hospital works with a safe refrigerant gas. This aspect is of utmost importance, as otherwise a costly plant will be rendered idle in the near future tantamounting to an unbearable loss.

Air-conditioning works will probably be the last to start. Being a "late comer" as it is, it is not likely to be completed when the user equipment arrives at site. This situation is common. Air-conditioning service should be taken up well in time and be ready in all respects with ducts vacuum cleaned and free from dust.

Some of the common mistakes are as follows:

- User requirements are not fully established and appreciated.
- Incorrect load estimation is done and plant capacity proves to be inadequate.
- An oversized plant may not perform satisfactorily if the individual components are not matched correctly.
- Finish of the plant is not upto the mark. Duct and air grilles works are shabby.
- Adequate spares backing is not provisioned. Technical and operating manuals are not provided.
- Operators are not trained properly.
- Electric works are not executed as per rules and standard practice. They are given secondary importance and even safety is compromised with unprotected cables near floor level.
- Summer, monsoon and winter seasonal tests are not conducted with due care and promptness.

2.2.13 Winter Heating

Areas like OT, ICU, Nursery, Emergency, selected wards, selected areas of pathological laboratory need heating in winter. This could be achieved by using a hot water generator and a pump to circulate the hot water through the AHU concerned.

2.2.14 Desert Coolers

Cost dictates that air-conditioning be restricted to essential areas. For other areas like general wards, waiting rooms and so on, desert coolers could be used to provide some degree of comfort. These are somewhat noisy and messy, but are cheap in capital cost and are economical to operate. They work best in hot and dry areas; and create very humid and damp conditions.

2.2.15 Refrigeration

Refrigeration produces cold, but is not primarily meant to circulate air like the air-conditioning plant. So also, the temperatures attained are very much lower than in air-

in pathology and cold storage plants in dietary department, pathology, medical stores and mortuary. They are sometimes called as "reach-in", "walk-in" and "under-the-counter" units. They work on electricity and some cold stores of bigger size may need water for condenser cooling. All these items should be maintained in spotlessly clean condition without any stains inside and outside. Bottle coolers also may be provided in kitchens and cafeterias. All electricity consuming apparatus and equipment must have a clear space of at least 60 cm (2 ft) all around to provide adequate ventilation and for ease of maintenance. Refrigerators and water coolers are no exception. Placing them closer than 60 cm (2 ft) to walls or in a close-fitting niches are not good practices and should be avoided. A walk-in cold room for storing medicines, vegetables, bread, eggs, kitchen left-overs etc. could have a temperature of 4 to 10°C (39 to 50° F).

Check Your Progress 1

1) Air-conditioning plant capacity is expressed as:

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2) What do these stand for — TR, AHU, RH, HEPA filter?

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2.3 NON-CONVENTIONAL ENERGY DEVICES

Prehistoric man must have basked in sunlight for warmth. Later on he learnt to light fires with wood and burnt leaves for cooking purposes. Then he discovered coal and petroleum fuel to obtain energy. Potential energy in water was harnessed in water turbines. Availability of energy made industrial revolution a reality, which in turn laid heavy demands on energy. But these natural sources of energy are not as abundant as they were once thought to be and their depletion rate has been phenomenal. The time left is too short, maybe 50 years, before coal and oil shall not be available at all. This has created the alarming prospect of life amidst dwindling resources in the near future. "No energy is more expensive than no energy", Dr. Homi Bhaba had prophesised. This frightening scenario has given an impetus to the search for new sources of energy that is not conventional, but renewable and inexhaustible– the non-conventional energy. This is an extremely advanced hi-tech field.

2.3.1 Conventional and Non-conventional Sources of Energy

The present day conventional sources of energy are wood and combustible wastes, coal, hydro potential, petroleum products and the like. Electricity is also a source of energy, but it is a secondary energy having been produced from one of the conventional sources. These are the sources of energy which need to be conserved by harnessing other forms of renewable energy.

Our country is bestowed with a smiling bright sun over most of its expanse for a major part of the year. It has a long coastline. The wind conditions are as good as anywhere else, if not better. Why then should we not harvest this renewable new energy from the wonders of nature?

Various sources of inexhaustible non-conventional energy for our consideration are the following:

- Tidal waves

- Micro and mini hydels
- Bio-mass
- Solar (thermal)
- Solar (electrical)
- Wind (electrical)
- Wind (mechanical pumping)

2.3.2 Bio-gas Plants

Alternatively called as Gober Gas Plants, these use cow dung to produce gas which can be directly used for cooking food or can be made to run modified diesel engines to power pumps or generate electricity. They consist of a huge-sized digester of masonry construction into which cow dung slurry is fed at intervals and a big steel drum resting over the digester pit to collect and store the released gas. Several plants have been installed all over the country, but their performance is in doubt. These plants need regular attention in collecting and preparing the slurry using ample quantity of water, and then feeding at the correct pace. Disposing off the muck after use is another exercise. Unhygienic conditions and mosquitoes nuisance are likely to result. In winter, the output drops by as much as 40%. Use of bio-gas plant is not a favourable proposition for any urban hospital due to the forgoing reasons. At best, they may be considered for the rural hospitals as a fillip to the local population to adopt this system whose end product can manure the fields.

2.3.3 Solar Energy

Sun is the most natural source of energy for this planet and even grand mothers are aware of this fact as they put out washed wet clothes (or even cow-dung cakes) and certain cooking materials to dry out in the sun. Heat from the sun evaporates surface water to shower rain over most parts of the globe and salt is gained from sea water using solar energy. Why, even in modern times, the sun provides energy to satellites orbiting the earth. In India, the density of solar energy is equivalent to 4.5 to 7.5 kWh per square metre per day on a sunny day. But the beneficial utilization depends on the number of sunny days and in practical tracking of the sun like a sunflower.

Solar energy can be harnessed for the following purposes:

- For producing distilled water
- For cooking food
- For space heating
- For heating water
- For generating steam to produce electricity
- For generating electricity directly

2.3.4 Solar Stills and Cookers

Solar stills are devices for evaporating water, generally brackish water, and then condense the water vapour to yield theoretically distilled water. The resultant water will be fit for industrial use (example battery topping up) and possibly for drinking also after conducting due tests. But the output is so meagre and the space occupied so large that its utility for hospitals is not recognizable.

2.3.5 Space Heating with Solar Energy

One method of heating buildings is by using solar thero-symphon air panel (TAP) collectors. This consists of toughened glass sheets, black chrome-coated copper absorbers, plywood and excellent insulation material, air ducts with dampers for controlling the air flow. Temperature control inside the building is achieved by changing the air flow rate. This system has been used in a few locations in India, but of course, they must be the predominantly cold places.

2.3.6 Solar Water Heaters

This is one field in which considerable experience and confidence have been achieved

oriented to face the sun to best advantage throughout the day. Banks of flat plate collectors connected in series and in parallel will have to be installed in case of hospitals and favoured sizes are those in the output range of 100 to 160 litres per day of hot water each at about 60 to 70°C (140 to 158°F) during peak sunshine and 30 to 40°C (86 to 104°F) during diffused sunshine hours. Water storage tank supplies water to the collectors at the bottom end and hot water is tapped off at the top end to be stored in a well-insulated tank. The flow of water takes place automatically due to the temperature gradient created by the heating process. Hot water storage tanks should have the capacity to store at least one day's requirements. Water should not be hard otherwise scaling and clogging of collector passages will occur. Performance of this system depends on the sun strength, rate of draw-off and quality of maintenance of the collector. To ensure adequate quantity of hot water at the correct temperature especially on cloudy days or excessive consumption in early morning hours, supplementary electric heating has to be incorporated into the system with thermostatically controlled heating elements. All these are generally mounted on roof top of the building and occupy considerable space. Hot water from the storage tank is brought down by vertical down-take pipes with a tee off arrangement at each floor. Entire hot water piping is adequately insulated. In one design, the heat collector and storage tank are combined into one modular unit which saves space.

In the system described above, water is directly heated in the flat plate collector. An advanced system employs indirect heating in which a specially developed fluid like propylene glycol, which is a food-grade, non-toxic heat transfer fluid, circulates in a closed circuit through the multi-flow collector and becomes hot. This fluid possesses better heat absorption qualities than water. This hot fluid then circulates through a jacket in the hot water storage tank and heats the water contained in it. The fluid does not cause scaling of the collector passages which water will do especially if it is hard. Two layers of protective ceramic coating line the storage tank to prevent corrosion. This system is costlier, but performs better.

You must go through the information on hot water supply system given in sub-section 3.5.2 of Unit 3 of this block wherein the arrangement for avoiding wastage of hot water is explained. The same is applicable to this case also.

Whilst their virtues of energy saving and causing no atmospheric pollution or usage of oxygen admit of no controversy, they still suffer from the disadvantage of greater maintenance effort and large space requirement. The inescapable need for supplementary electric heating is also a prominent minus point. Space heating can also be done with the hot water from solar water heaters, but this would be effective at best for a few hours during day time in small hospitals.

2.3.7 Electricity Through Steam

High-density solar heating can be achieved by using the thermo-syphon air panel (TAP) collectors to generate steam. This steam could then be used for electricity generation. However, this system is so intricate that a hospital can hardly be expected to devote their energies to operate it.

2.3.8 Electricity Through Photovoltaics

Photovoltaic cell was a remarkable discovery of converting light directly into electricity by two different materials in contact which produce electricity when light was incident on them. In modern parlance, the photovoltaic cell is a semiconductor device that converts light energy into direct current electricity. You would have noticed that most pocket calculators have photovoltaic cells which powers the calculator in day time to prolong the life of the normal battery inside the calculator. The power generated depends on the strength of the solar rays incident on the panel and therefore needs to be stabilized before use. Photovoltaic arrangements can be used to advantage for charging batteries, pumping water, domestic and street lighting and several other purposes. For best performance, they need an effective sun tracking system, and a huge and costly battery bank for storing electricity. They need careful handling and frequent cleaning. Their life expectancy is almost 15 years if they are not subjected to physical damage. But this is offset greatly by the shorter life of 3 years for the batteries. The tracking system also needs high grade technology and attention. The whole photovoltaic array will need considerable space without shadows. This is a very costly system, which goes to sleep at night and can be considered for ameliorating a situation where no other source of electricity is available.

2.3.9- Wind Power

Windmills in yester years were picturesque and were the source of power to pumps to irrigate the agricultural fields. Technologically advanced windmills of today can operate with wind speed of 16 km/hr and over, and generate a respectable quantum of electric power or pump water from deep bore wells. The present day metallic windmills are aerodynamically perfect and are attractive proposition for power generation provided they are used in large numbers in a "windmill farm" located in a large open area with good wind conditions for a greater part of the year. These are imported and are quite costly which hospitals will find to be most discouraging.

2.3.10 Final Picture

Solar and wind energies are two of the most abundantly available non-conventional energy sources and seem attractive for harnessing. Solar radiation could be used directly as solar thermal or be converted to electrical energy. Wind power could be used directly as mechanical energy derived from windmills which rotate slowly or can be converted into electricity in wind turbines which rotate at higher speeds. But all these are location sensitive, and need accurate wind chart and site data for taking proper decisions to make a success of the project. Induction of non-conventional energy devices in hospital projects is also dependent on whether the hospital is a rural or urban one.

For rural hospitals where electric power is either in short supply or is totally absent, organic power generation will have to be resorted to. This could be supplemented with electricity from photovoltaics and wind turbines. Pumping of water could be done by windmills, thus relieving the load on the generator. Bio-gas plant could supply fuel for cooking, as cow dung raw material is likely to be available in sufficient quantities. Solar water heater could supply hot water with resultant saving of electric power. Photovoltaics with battery endurance can ensure lighting even at night.

In urban hospitals, where space will be a major problem and pollution constraints are severe, it would appear that solar water heaters located on the terrace of the hospital building can only be used. Power generation through photovoltaics will be costlier than with captive generation and would therefore not be an attractive proposition.

All said and done, one has to accept the sad reality that alternative and renewable sources of energy possessing tremendous potential have not been able to make their presence felt for a long, long time.

Check Your Progress 2

List the non-conventional energy sources that could be considered for use in the following hospitals.

a) Rural : .....

.....

b) Urban: .....

.....

2.4 ENERGY CONSERVATION

All hospitals are energy intensive propositions. The more modern or super-speciality it is, the more the energy consumption. You appreciate that a hospital has to work 24 hours a day, seven days a week throughout the year, and therefore the quantum of energy consumed and its cost are phenomenal. Hospital's primary role is to render services to the patients economically and still be viable. Towards this end, energy savings or conservation becomes a dire necessity. You have already been introduced to this topic through intelligent buildings covered in sub-section 1.2.10 of Unit 1 and we can proceed to examine the ways and means of conserving energy.

2.4.1 Energy Saving Possibilities

Energy saving is the sure way to reduce expenditure and is essential for hospitals to be economical and stay competitive. We cannot escape the fact that energy saving is very much possible at every place and in every function of the hospital. Take a simple example to start with.

Leaking tap is a familiar sight. Water is reaching the tap from the storage tank placed on the building roof. It reached the storage tank because a pump pumped it using energy. Thus it is energy that is leaking to waste through the tap. Yet hardly anyone bothers to stop the flow and loss of energy even though it takes only a flick of the wrist. Remember— "Little drops of water make the mighty ocean".

2.4.2 First Steps to Conservation

The example highlights the important aspect of neglect, probably through ignorance. Energy conservation begins with awareness and personal involvement of one and all. Success depends on widespread and total co-operation from all the personnel. They should be made to realise the importance and be motivated in this effort by the management.

In case of hospitals, energy consumed is in the form of electricity and fuel oils. Cooking gas is also another source of energy. All these have to be obtained at considerable expense. Their end use is air-conditioning, stand-by power and steam generation, medical and other equipment, internal lighting and ventilation and so on.

Everyone in the hospital premises must spare a thought to many simple things that have been taken for granted or have been accepted over a long period of time. A few examples are as follows:

- Is the use of light really necessary? Is the fixture clean?
- Can the incandescent light be changed into a lower wattage fluorescent tube?
- Is the use of fan really necessary? Can its speed be reduced?
- Have the fan and regulator been maintained?
- Is the temperature in the air-conditioned room too low forcing the use of blanket?
- Are the doors and windows of the air-conditioned space properly closed? Any window glass is broken?
- Was it necessary to use the lift when the staircase could have been used?
- Are high-energy consuming items like heaters, sterilizers, etc. being used optimally and not unconcernedly?

Answers to these questions should prompt the person to take necessary action that is called for to stop the energy drain and help the hospital.

2.4.3 Other Issues

Many possibilities exist to facilitate energy savings. Some of them are as follows:

Electricity: Street and area lighting could be switched off selectively on a few days before and after the full moon day. On other days, some of them could be switched off after mid-night when the movement is not intensive. A good maintenance level in electric motors will reduce friction and heating effect which in turn will manifest in improved efficiency and lower power consumption. Water coolers too can be switched off during night hours to save electricity.

Stand-by generating sets: All hospitals will have stand-by generating sets and bigger ones have high power sets. Their fuel consumption is considerable and fuel costs are increasing regularly. Leakage and wastage of fuels should not be allowed to occur. The sets should be maintained well. Even cleanliness of the cooling and exhaust systems and good ventilation of the room will result in fuel saving. Only the essential loads should work off the generating sets with non-essential loads isolated from the supply.

Air-conditioning: The plant consumes huge amount of electric power made worse by prolonged duty hours. In a system which is well-designed and cared for, energy saving will be difficult without compromising on patient care. In this case, maintenance effort should not

only be in the plant room, but also in the air-conditioned spaces to ensure that no unnecessary loss of treated air and no unaccounted heat gains occur.

Water Supply: Leakage at the tap end has been mentioned, but consider leakages from sumps, reservoirs and storage tanks and delivery mains. Another common occurrence is the overflow from the storage tanks. All these fall into the same category of energy loss.

Compressed air, vacuum and steam: Leakages are generally overlooked or corrective action delayed as the systems cannot be shut down. Losses are considerable and mount minute by minute.

There are several serious areas of energy loss which should be tackled at the right time. Most of them concern planning, design and equipment selection. Simplest cases are the following:

Building and environment: Hospitals have considerable areas air-conditioned for technical and comfort reasons. Proper orientation of the building, use of materials having lower heat conductivity properties, limiting sizes of glass windows and positioning them where the sun is not incident on them and so on will reduce air-conditioning and ventilation loads. A good horticulture and arboriculture effort will also achieve the same results.

Equipment selection: Installing oversized equipment to play safe results in energy loss. Similarly economizing on pipe or cable sizes to reduce initial costs create eternal energy loss. Modern technology has many energy efficient items and machines to offer which should be taken cognizance of for deriving cost benefits.

Operation and maintenance: Machines should be operated as stipulated in their manuals by the manufacturers or suppliers. Incorrect operation is inefficient operation with resultant energy loss. Unnecessary operation is another huge energy drain. Improper or infrequent maintenance is an enemy of efficiency and should be avoided.

Life of equipment: Wear and tear is inevitable when an equipment is used. Depreciation is also inevitable even when the equipment is not used. But an old equipment continues to be used with a little extra expenditure on repair and maintenance because it is cheaper than the capital cost of energy efficient modern equipment. Specialist opinion is required in these cases as to when a more efficient new one best replaces an existing old item.

2.4.4 Energy Conservation and Maintenance

When we find that cycling is tiring more than usual, the first thing we do is to oil the chain and hubs and pedals hoping the cycle will run smoothly and we can save our energy. Give an example of a household item which gets the same treatment under the same condition. We can now recognize the relationship between energy conservation and equipment maintenance as the two go hand in hand. A simple tabulation will help in better understanding of this issue.

Energy Conservation with Maintenance	
Conservation aspect	**Maintenance action**
Equipment operating longer than usual	Check and repair control devices
Equipment overload	Check for unauthorized loads and/or leakages, blockages
Equipment drawing more power	Check for overloading, loss of lubrication, increased friction
Reduced receipt at end point	Check for leaks, blockages, physical damage of lines
Generating set draws more fuel	Cooling system defective, overloading, poor lubrication, poor ventilation
Generating set overheats	Cooling system not properly maintained, overloading, poor room ventilation
Excessive air-conditioning load, plant overloaded or operates longer than usual	Check for leakage in air-conditioned spaces, extra equipment load, cleanliness of cooling coils, closed dampers in ducts, obstruction to air grilles
Lighting load heavy	Clean light fittings which are dirty so that illumination level improves
Conservation insufficient	Keep eyes open and observe to spot fresh prospective areas

2.4.5 Conservation by Heat Recovery

Some plants reject lots of heat to the atmosphere during their operation. A good example is the generating set whose exhaust gases carry away considerable heat to the atmosphere. This heat can easily be used for heating water and the resultant hot water fed to the boiler. Heat, which would otherwise have been lost to the atmosphere, is reclaimed and put to good use. Another example is the hot water flowing out of some of the laundry machines which uses steam or electric heating while working. This heat in wastewater can also be profitably reclaimed. The hot flue gas from the incinerator is another possible useful heat source. Conservation by heat recovery is a specialized field and extensive studies are required before embarking on a heat recovery plan.

2.4.6 Energy Conservation Management

The question most difficult to answer in case of hospitals is – "Is the energy consumption appropriate for this hospital?" This can only be tackled if certain steps have been taken to collect detailed information from numerous action points in the hospital over the past years. Metering electricity consumption at all major points is the first step. Recording of operation parameters of generating sets, steam boilers using fuel oil and the like are a necessity. Fuel consumption figures should be available in detail. Induction of new bio-medical and other energy consuming equipment should be known. Details about purchase of medical gas cylinders should be available. Many others could be added to this activity.

In sum, an effective hospital MIS supplemented by cost accounting details will help in analysing the energy scenario. A log set up by month and type of expenses with columns showing the previous years figures against those of the current year will encourage a meaningful comparison and clarify exactly what is happening. This exercise can reveal the truth.

2.4.7 Caution

Hospitals can and have to reduce their energy consumption and thereby energy expenses through forceful management procedures. But this economy action should not lower the standards of health care delivery to the patients and should not compromise on comfort, security and safety. The main theme behind energy conservation is to reduce waste and losses, but not to reduce the functional aspects of the hospital.

Check Your Progress 3

List three actions which can save energy used in lighting.

a) .....

b) .....

c) .....

2.5 MAINTENANCE OPERATION AND STORES MANAGEMENT

All items that are produced or created invariably undergo deterioration while working or standing idle and will need maintenance for their upkeep. Maintenance is an integral part of efficient and reliable functioning of any item, be it a civil asset like buildings and roads or a mechanical or electrical or electronic one. Proper maintenance operations are vital in a hospital which depends heavily on its buildings, bio-medical equipment and engineering services in caring for the sick and in health care delivery. Maintenance can only be sustained by supply of quality stores on time. These two are therefore related issues. Let us consider them one by one.

2.5.1 Maintenance Categories

Consider the use of a scooter. The seat, handle bar and probably the body are wiped with a cloth before first use of the scooter on any day. This is routine maintenance. The scooter is handed over for servicing every month or so. This is planned maintenance. Before embarking on a long trip, the scooter is subjected to a thorough check and suitable action taken to replace weak and worn out parts to prevent a possible breakdown on the way. This is preventive maintenance. A puncture on the way renders the scooter unusable till the wheel is replaced. This is breakdown maintenance. Replacing of tyres after completion of a

certain mileage would be predictive maintenance. After a long use, the scooter engine is opened up for de-carbonizing and cleaning of internal parts. This is corrective maintenance. Thus we can easily visualize several distinctive maintenance actions.

Maintenance consists of those activities as are required to keep an asset in "as built" condition so that it continues to possess its original characteristics. Maintenance results in the asset being available for intended use at minimum cost, functioning at or near agreed standards with minimum waste. Importance of maintenance operations have been recognized as one of the main tools for efficient functioning of hospitals.

Maintenance functions can be considered as follows:

Routine maintenance: This is a procedure followed regularly or as a cyclic operation recurring periodically. Defects that develop gradually will be discovered and eliminated.

Planned maintenance: This is a pre-planned maintenance action carried out with forethought and with knowledge of the equipment. Mostly it will be based on the recommendations of the equipment supplier. Periodical services like white-washing and painting of building, cleaning of water storage tanks, touching up of road sign-boards and the like come under this category. Planned maintenance involves administrative approval and support, adequate budget and a systematic procedure for implementation.

Preventive maintenance: This pertains to critical system maintenance to reduce the possible risk of failures to a minimum. Parts and sub-systems which are suspected to be unreliable are replaced before they actually fail, thus ensuring high reliability but at extra cost.

Breakdown maintenance: This is also called as repair maintenance and the basic concept is not to do anything until the equipment ceases to function. No servicing is carried out and the unit receives attention only after it has failed. The result is wastage of time, energy and money.

Predictive maintenance: Keeping the unit under surveillance and continuously monitoring its operation, the health of the unit is gauged. Based on how well the unit is performing, and maintenance is carried out.

Corrective maintenance: A time will come when age catches up with the unit which affects its performance. At this stage, maintenance is necessary to restore the capability of the unit to perform satisfactory. Sometimes manufacturers recommend a major overhaul after a stipulated working hours. This tantamounts to corrective maintenance.

Emergency maintenance: This refers to work done on an equipment or facility that involves personnel safety, extreme material or monetary loss or severe deterioration. This is an unexpected and unplanned workload requiring prompt notification of occurrence, rapid response and immediate action. Subsequent action should be diverted towards ascertaining the cause and taking effecitve steps to prevent a repetition.

2.5.2 Comparison of Activities

The following table includes a few maintenance actions under planned and preventive categories:

Illustrative Maintenance Actions		
Preventive maintenance	**Item**	**Planned maintenance**
Spot minor repairs, cleaning and touching up	Exterior walls	White wash, snowcem, print, paint, resurface
Cleaning of roof, drains, gutters, rain water pipes, and getting rid of bird nests	Roof	Water-proofing, inspection of vent pipes, openings, redoing parapet finishes, repair to gutters
Spot painting, white washing, touching up, minor repairs	Walls, floors, ceilings	White wash, colour wash, paint, resurface, replace damaged ceiling portion
Replace broken panes, repair so that they close properly	Doors, windows	Paint, repair or replace
Clean strainers, bottle traps, filters. Repair leaky taps. Adjust and balance water flows. Check expansion tanks and pressure vessels. Check storage does not overflow. Stop pipeline leaks and ensure fluid flows	Storage tanks and plumbing	Replace dirty or damaged pipes, clean floor drains and screens. Drain and clean storage tanks. Adjust and operate all major control valves. Paint steel tanks and stop tank leakages. Stop leakage from inlet and outlet valves. Check overflow pipe.

Preventive maintenance	Item	Planned maintenance
Replace defective lights, clean and inspect. Check wiring and connections	Lighting	Check all lights. Modify if necessary
Check inside temperature and humidity. Set all control devices properly. Check gauges	Heating and cooling	Clean inside units, clean filters, check controls, check complete unit operation
Spot repair, paint touch up, clean, align kerbs, minor repair to pathways and roads. Clear drains and repair. Clean grilles and replace broken or missing ones	Roads, Pathways Parking areas, covered and Open drains	Check all roadside signs for correctness and necessity, repair kerbs, resurface damaged portion, paint as required. Check all drains for sinking
Water, weed, manure, trim, check tree guards, paint make beds, clean and area, mow and lawn	Trees, flower beds, lawns hospital grounds	Plant trees, trim trees and hedges, redesign if necessary, fertilize. Clear grounds of all rotting matter rubbish, garbage etc.
Eradicate stuffy or foul smell, clean bottom of shaft and shaft walls	Shafts inside building	Inspect and stop leakage from soil, waste and water pipes. Replace broken pipes. Ensure proper anchorage

The maintenance activity of paramount importance is the one carried out before the onset of monsoon. This one action is a major contributor to the smooth functioning of the hospital during the long period of wetness. Function of the pre-monsoon maintenance is to ensure that all provisions incorporated in the hospital building and grounds function faultlessly and that the equipment assets of the hospital are sufficiently protected to withstand the ill effects of the wet and humid months. Some of the basic deeds are given in the cage below:

Pre-monsoon Maintenance	
Building	
Roof	Clean, clear, water-proof, attend to expansion joints
Shafts	Clean floor, check manhole cover, check vertical stacks condition (breakage, leakage) and anchorage.
Chajjas	Clean top portion, repair cracks
Windows and Doors	Check proper closing, replace broken or missing panes
Rain water down pipes	Clear, check anchorage, damage and leaks
Lightning protection	Check condition and electrical continuity, earthing
Roads, pathways	Clean specially both edges, check berms, check access road to emergency and other critical departments
Drains	Clean and clear, replace damaged or missing covers, check inside surface and correct sunken portions
Signboards	Check anchorage and looseness, easy noticeability and clarity, paint and illuminate if necessary
Garden	Remove tree branches too close to overhead lines, allow no soft ground patches, no pits or holes in the ground
Grounds	Clean and clear out all rubbish and degradable matter, permit no water-logging or pits and pot holes, ensure no obstruction exists to natural run off of rain water
Public Health	
Manholes	Check and clean, replace missing or broken covers, clear ground all around to prevent rain water ingress
Underground sumps	Clear ground all around and prevent rain water ingress into the sump (pollution), ensure all covers are in place
Water tanks	Ensure covers are in place
Treatment	Ensure sufficient stock of chemicals and chlorine gas
Pumps	All dewatering pumps to be checked for operation
Electrical	
Equipment	All external equipment to be protected as necessary and painting done where necessary
Earthing	All earthing to be checked for continuity and fitness
Lights	All external lights to be checked for fitness & functionability
Lifts	Inspect the lift room and bring it upto excellent condition
Mechanical	
Vehicles	Monsoon protection carried out as necessary. Garages and sheds to be checked for leaks

2.5.3 Design Out Maintenance

An ideal situation is one where maintenance is totally eliminated. Near to such a condition is one where maintenance is minimized to a low level. This is similar to maintenance by disposal or eliminative maintenance. Modular construction enables maintenance by replacement and disposal. In ball point pens refill is replaced unlike in ink pens where the ink is to be filled in. There are maintenance free or nearly maintenance free batteries. A few other examples are the use of disposable items like plates, razors and syringes. This concept however has to be applied at the design stage itself.

2.5.4 Contract Maintenance

This is a system where, for an agreed fee; a contractor supplies skilled manpower including supervisory staff, necessary spares and tools and even equipment required to carry out the maintenance tasks. Adopting this system will result in a reduction of permanent staff of the hospital and a consequential reduction in the salaries and other expenses. Several other advantages are also attributable to this system, the most important one being that the contractor can mobilize manpower quickly and in sufficient number to work round the clock in an emergency. This will reduce down time of the equipment or system.

This system could be beneficial in maintenance and upkeep of certain items like computers, telephones, TV, projectors, fire detectors, fire fighting equipment, photo copiers, vehicles, fencing, perimeter lighting, cleaning and replacement of luminaries and chokes etc.

A very careful and considered decision is essential in adopting contract maintenance, because the other party tends to gain more and more control over maintenance, ultimately gaining a position strong enough to dictate terms to the hospital. Also the regular maintenance staff of the hospital may feel that they have been relegated to a second place and develop an inferiority outlook. In contract maintenance, care should be taken to ensure that control and supervision are retained by the hospital authorities. In addition to this, the hospital should have some skeleton staff to take over the works in case the contract maintenance agency is unable to function due to any reason.

2.5.5 Requirements

Maintenance services require technical literature which covers the following:

- Equipment maintenance schedules and instructions
- Equipment operating manuals
- Trouble shooting and fault analysis charts
- Drawings
- Specifications

Provision of adequate and quality spare parts, appropriate and dependable tools, instruments and gauges is also an essential requirement.

2.5.6 Walk Around Inspection

The four senses inspection tour will prove to be most revealing. See the table below:

Three Senses Inspection Points		
Sight–Observe	**Sound–Hear**	**Sense–Feel or Touch**
Deterioration, corrosion, discolouration	Unusual noise	Hot–bearings, shafts
Leaks – air, fluid, lubricant	Hissing – gas, steam or air leak	Cold–no hot water or steam flow
Loose or missing parts	Grinding – lack of maintenance	Breeze – air leak from ducts
Loose or damaged belts	Silence – machinery not working	Vibration – machine out of balance
Loose or dangling wires	Dripping – fluid leaks, roof leaks	Shaking – loose foundation bolts
Electric sparks.	Banging – door or window not secured	Draught – open doors, broken window panes.
Tree branches touching electric wires	Humming – machinery not working properly	
Missing gauges		
Garbage and refuse collection	Slapping – frayed or torn	

Sight–Observe	Sound–Hear	Sense–Feel or Touch
Incorrect or unnecessary signboards Wet floor due to roof or pipeline leaks Absence of staff from their place of duty Neglecting safety–not using helmets, goggles, gloves, boots, belt and apron etc. Negligence, frivolity of staff or sleeping at the switch	Barking – dogs on the premises Chirping – birds' nests	
Identify the fourth sense and tabulate on the above lines how it can enrich the inspection activity (sixth sense excluded)		

Inspection rounds provide an opportunity to have a systematic and orderly look at the state of the assets and status of maintenance as well. Special attention should be paid for a few items as follows:

- Areas or items biologically dangerous to humans. Check if security measures are adequate and whether emergency procedures for accidental exposure exist and are known to all concerned.
- Equipment parts that are mechanically dangerous to humans. Moving parts like flywheels, belt and chain drives need guards.
- All fire detection alarm and fighting appliances. They should be functional and in place.
- Standby and emergency power equipment. Standard emergency procedures should be laid down and make known to all concerned.
- Misuse of hospital grounds and premises, breach of security. Damaged security walls and vacant security posts should be noted.

2.5.7 Maintenance Spares and Stores

Any maintenance set-up must have the backing of basic material supply. Provision of spare parts and stores is a service function to maintenance.

Spare parts, which are consumed regularly, could be called as maintenance spare parts. These spare parts are mostly required to replace worn out or damaged parts on the machine or fitting. These are generally fast moving and repetitive in nature.

It is common practice to procure fast moving spare parts at the time of purchasing the capital equipment. In a few cases, the value of spares procured as initial provisioning could touch 20% of the equipment value. The temptation is strong to purchase more than the requirement so that subsequent non-availability will not be a hindrance. Original manufacturers exploit this to dump non-moving expensive spares which gather dust on the hospital premises.

Stocking policies and consumption norms can easily be established based on actual withdrawals of spare parts. This exercise should take cognizance of ready availability of the items in the open market.

Spares can be categorised as follows:

Maintenance	Overhauling	Commissioning	Rotable	Insurance

Maintenance spares are fast moving ones and are stocked in plenty. Overhauling spares are needed during overhauling of the equipment to give it a new lease of life and need not be stocked. They could be procured just before the overhauling operation. Commissioning spares are required only at the time of installation, testing and commissioning of the equipment. Thereafter their utility does not exist and these are declared as project surplus to be disposed off. Rotable spares are full assemblies which replace the defective one and the

defective one is repaired and retained in store as ready stock. Insurance spares are vital parts of the equipment whose life expectancy is equal to the equipment itself. These are held virtually as standby for use in case of a breakdown.

2.5.8 Requirement Analysis

The VED-VEIN analysis is used to classify the intrinsic value of a spare and is briefly explained in the table below:

VED–VEIN Analysis	
VED	**VEIN**
• Vital: if not readily available, complete closure of the plant for long periods with on sequent loss would result. Ready example is a spark plug of a car • Essential: Stock out would result in moderate loss • Desirable: Non-availability will cause minor disruption and nuisance for short period!	• Vital • Essential • Important • Normal

Spares cost a lot of money and represents the capital that is locked up. Their inventory level should be kept at a minimum for which minimum working balance should be established based on past experience.

2.5.9 Procurement

The six factors governing procurement are as follows:

Right quantity	Right time	Right price	Right quality	Right source	Right place of delivery

It is very important to maintain a category-wise list of dependable and trustworthy suppliers as also details of the original suppliers of all the equipment.

2.5.10 Storage and Preservation

All spares and stores should have a secured area and separated category-wise. They should be stored in the best possible way duly protected against the ill effects of weather, dirt, dust and damage and even static electricity in case of electronic items. They should be correctly inventoried and documented. Protection against fire should be a prime concern.

In order that they retain their qualities, they should be guarded against dampness, excessive humidity, dryness, heat and cold, wide temperature variations and from direct sunlight, attack by insects and termites.

Special categories like metals, corrosive items, explosives and hazardous items, acids, chemicals, paints, gas cylinders, cement, timber, leather goods, rubber items, tubes and tyres etc. have to be stored with utmost care and preserved properly.

Generally all ferrous materials are given a protective coat of paint or varnish or are wrapped in greased paper. Precision items like instruments, electronic items and spares, ball and roller bearings etc. must be placed in clean polythene bags enclosing a moisture absorbing agent like silica gel. Preferably they should be in a dust free air-conditioned room protected against direct sunlight and moisture. Expensive instruments should be delicately preserved in their original packing boxes with small cotton bags of dehydrated silica gel. Fasteners and screws must have a hard preservative film and kept in shelves. Electrodes should remain in their original packing and kept in a dry room.

Battery cells have low shelf life in humid or damp conditions. Rubber goods have low shelf life and are affected by sunlight, moisture, air movement and heat. They must be covered with tarpauline. They should not be placed near heaters or under bright lights.

Glass sheets should be stacked in upright position and protected from rain. They will disintegrate if they absorb moisture.

Cloth and paper should be protected from moisture, rats, moths etc. by using insecticides.

Check Your Progress 4

1) Explain preventive maintenance.

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2) Contract maintenance has two undesirable possibilities. They are:

a) .....

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b) .....

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3) How should precision items like electronic gadgets be stored?

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2.6 WORKSHOP FACILITIES

A hospital abounds in equipment, fitments, furniture, machinery, instruments and gauges and a host of other things. In course of time, all these are bound to get damaged, broken, worn out and will need maintenance and upkeep. It is not always convenient to depend on the facilities existing in the open market because it could involve delay and transportation problem. Moreover, any unserviceable or unusable item will occupy space and deteriorate further in idleness. The best solution is the creation of minimum, but adequate, workshop facilities in the hospital premises itself. It could even attend to minor repair and maintenance of hospital vehicles like ambulances, mortuary van and hearse, staff cars and light load carrying vehicles, motorcycles and cycles.

2.6.1 Workshop Sections

The first step is to identify the nature of work that the workshop is likely to be called upon to do. Consider an adjustable hospital metal bed. It may need painting, replacement of a damaged bolt or bent linkage, repair of castor wheels, welding of a loose part. A hospital trolley may also need similar treatment. The hospital will have hundreds of fans of all types, electric motors of various sizes, heaters, refrigerators, water coolers and so on. Certainly they will need painting, motor rewinding or replacement of bearings. Wooden items will need carpentry work, painting and polishing, and may be upholstery repair. Caning of furniture may also be necessary. Vehicle maintenance and repair portion could be a convenient part of the workshop with necessary gadgets and tools. Cutlery may need plating. Thus we can broadly list the following possible sections in the workshop:

- Mechanical Section
- Air-conditioning and refrigeration section
- Sheet metal Section
- Blacksmithy Section
- Welding Section

- Glass blowing Section
- Electrical Section
- Electronic Section
- Instrumentation Section
- Electroplating Section
- Carpentry and cane weaving Section
- Painting Section.

If the hospital has an artificial limbs department, then some more sections will also be necessary.

Workshop is coverd in IS:10905 (Part 1)-1984 dealing with recommendations for basic requirements of General Hospital Building.

2.6.2 Trades

The trades involved are given below, but not all may be needed in every hospital:

- Fitter
- Electrician
- Machinist (Lathe operator)
- Electronic mechanic (Radio, TV etc.)
- Refrigeration mechanic
- Motor winder
- Air-conditioning mechanic
- Instrument mechanic
- Welder
- Electroplater
- Tinsmith
- Painter
- Blacksmith
- Spray painter
- Hammer man
- Signboard painter
- Carpenter
- Vehicle mechanic
- Cane weaver
- Vehicle electrician
- Upholsterer
- Mates, muzdoors
- Glass blower

2.6.3 Tradesmen Strength

This aspect is not easily amenable to standardisation and each hospital has to evaluate the requirements on a realistic basis taking into account which tradesmen are necessary or unnecessary because of availability of outside facilities of reliable status. Hospitals of long standing and those with teaching and training facilities are likely to have heavier maintenance problems and may need extra work hands. Repair work on contract basis with reputable outside agencies can prove to be economical, trouble free and beneficial.

A possible staffing pattern for a 750-bedded hospital could be as follows:

- Workshop supervisor/foreman 6
- Blacksmith 1
- Carpenter 1
- Glass blower 1
- Mechanic 1
- Painter 1
- Electrician 1
- Khalasis 1

If teaching and training facilities, hostels and residential accommodation are attached to the hospital, then the above staffing pattern will need to be suitably augmented.

2.6.4 Tools and Work Materials

The very purpose of having a workshop with adequate staff will be defeated if necessary tools and materials are not provided. Proper storage facilities should be made available and correct accounting procedures laid down. Sufficient number of safety gadgets like helmets, goggles, gloves, belts, dungarees, uniforms and clothing etc. should be readily available for use by workmen.

2.6.5 Workshop Management

The workshop should be run on professional lines following the rules and regulations in force and with regular checks and balances and frequent auditing. Cost accounting procedures should be laid down and detailed records maintained.

Check Your Progress 5

List the tradesmen who may be involved in repairs of fans.

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2.7 ENGINEERING SERVICES DEPARTMENT

Hospitals used to be the domain of doctors and nurses long time back. Engineers had hardly any role to play in the functioning of the hospitals. With the advancements in the health care delivery mechanism and concurrent technological achievements, facilities like better buildings, electric and water supplies, centralized sewage disposal systems came into the picture. Steam and hot water supplies entered to make sterilization possible. This was followed by air-conditioning, comfort winter heating, laundry and kitchen mechanized equipment, incinerators and so on. Technological advancements in the field of electronics made its application to diagnostic, therapeutic, monitoring, and simple information and data bank possible in numerous ways. Thus health care facilities have become a home for engineering marvels which facilitate painless diagnosis and patients recovery and welfare to a very great extent.

You have already recognized the need for Workshop Facilities and learnt about its functions in the previous Section 2.6 of this unit. This facility is a fragment of the Engineering Services Department with which it is closely associated.

2.7.1 Types of Equipment

In the context of engineering services, the equipment in a hospital premises could be taken to consist of two types:

i) Bio-medical equipment in departments such as X-ray, CAT scan, Path lab, MRI, Linear Accelerator, Cardiac Catheterization and so on. Even monitors and ventilators, and a host of computerized adjuncts could be included in this category. In fact, all equipment and smaller items used in diagnostic and therapeutic fields of activity connected with health care delivery could be included in this group.

ii) Purely engineering services equipment involved in building maintenance, electricity and water supplies, air-conditioning and refrigeration, sewage disposal system, maintenance of roads and pathways and so on. We could even think of laundry and kitchen equipment, central manifold equipment and incinerator in this category with their base equipment distanced from the patients that they serve.

Thus, broadly speaking, we have two types of equipments – one closely associated with patients care, and the other supporting this primary equipment and providing amenities to every one inside and outside the hospital building. Bio-medical equipment are basically electricity operated and could also be considered as electro-medical equipment.

We can therefore consider the following two types of equipment and assets:

i) Building, roads and engineering plants and equipment

ii) Electro-medical or bio-medical equipment

2.7.2 Engineering Services Department

It is clear that hospital departments are varied in nature and must have the benefit of excellent accommodation, physical support services and properly functioning medical equipment. All these need constant attention and maintenance, and prompt repair and upkeep. To the extent possible, doctors and nurses should be relieved of the burden of actions associated with engineering services so that their full energies are devoted to their primary duty of patient care. Hospitals are labour intensive.

A hospital fails in delivery of health care if any department in it fails. This includes the engineering services department also in no less measure. In this way, the hospital engineering services department assumes a major responsibility and importance for efficient facilities management.

Information about Engineering Services Department is included in IS:10905 (Part 3)-1984 dealing with recommendations for basic requirements of General Hospital Buildings.

2.7.3 Functional Aspects

The growth of technology has increased the need for highly skilled, trained and experienced personnel to manage the intricate modern machinery and equipment. In advanced countries, a new specialist group of bio-medical equipment engineers and technicians look after the medical equipments which top class engineers who are not specifically trained can undertake.

A comprehensive services department may have the following functional areas:

- Maintenance and repair of bio-medical equipments
- Civil assets up-keep, maintenance and repair
- Electrical energy provisioning
- Water supply and sewerage systems management
- Management of air-conditioning and refrigeration services
- Responsibility towards fire protection system
- General safety and security systems
- Maintenance and repair of equipments, vehicles and instruments etc.
- Miscellaneous items as may exist in the hospital

Physical duties will broadly consist of the following:

- Maintenance of assets including periodical services
- Repair and renovation of equipment and systems

2.7.4 Engineering Specialities

This will consist of the following:

- Civil engineering – to deal with buildings including internal services, roads and pathways, grounds and horticulture and so on.

- Mechanical engineering – to deal with all mechanical equipments and vehicles, air-conditioning and refrigeration, medical and cooking gas supplies, steam plant and so on.
- Electrical engineering – to deal with all electrical equipment, sub-station and generating sets, UPS systems, area lighting and so on.
- Public health engineering – to deal with water supply, sewerage disposal, environment sustenance and so on.
- Electronics engineering – to deal with computers, communication equipment and systems, entertainment facilities like TV and music systems, and so on.

Almost all major medical equipment will involve several of the above specialities. For example, an MRI equipment needs electric supply and elaborate cooling arrangements which may need water supply, and has extensive electronic gadgetry.

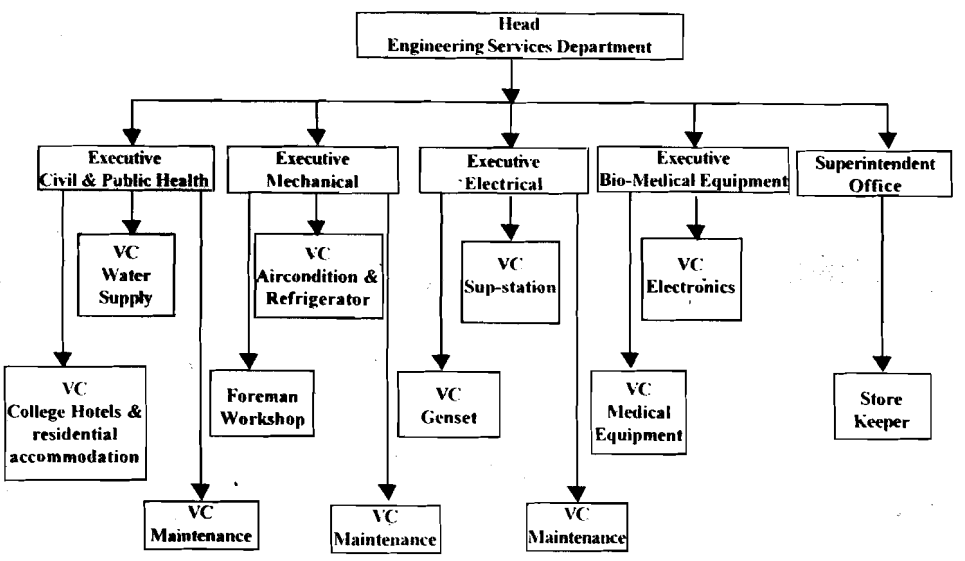
2.7.5 Structure of the Department

The importance of ready availability of skilled and trained staff to attend quickly to engineering tasks cannot be over-emphasised. Permanent engineering staff will become familiar with all the equipments and systems over a period of time, and will know the likely defects and the correct action to take in a crisis. They may even develop a sixth sense of impending failures based on past experiences.

No hard and fast rule can exist for the structure and size of the department due to numerous factors. The bed strength together with the speciality level of the hospital itself is a prime factor. Needs of a hospital with attached training and teaching facilities is another one. Availability of outside facilities nearby and readiness of dependable contractors of repute to undertake works on behalf of the hospital will influence this aspect substantially. Services of government agencies like the PWD, CPWD, Boards and Public Sector Undertakings could possibly be availed of and they have a huge manpower bank to rush to the assistance of a hospital in times of distress. Annual maintenance contracts are also entered into with external agencies in case of several items like lifts, specialist and costly medical equipment, computers and communication devices and others whose quantity is substantial.

A small hospital may have only a couple of mechanics, but not a department as such. Where the investment in buildings or equipment is considerable, creation of a department is a sound proposition. There will be scores of technicians working and even their supervision and control will be a big task. In case of super-speciality hospitals, creation of a department is always worth serious consideration even with low bed strength, because of the costly equipment and intricacy of support services. The prime function of the engineering services department is to provide a dependable base for rendering the best possible and economical engineering services of all kinds without shortcomings and failures.

Towards this aim, it is best to have a senior engineer with experience in all specialities of engineering heading the department. It could even be at chief engineer level and he should be responsible to the administrator or hospital apex body. Executives could work under the department head. A full-fledged, comprehensive and ideal set up for a hospital with training and teaching facilities and residential accommodation could be the following:



The structure should be viewed more from a practical need-based standpoint than in a cost effectiveness atmosphere. There should be close cooperation and coordination between the sections, and working in water-tight compartments should be discouraged. Medical equipment and electronics sections under Executive Bio-medical Equipment will be mostly working on the equipment in the places where they are installed and hence will carry out repair and maintenance also.

It would be prudent to associate the head of the engineering services in medical equipment purchase committees so that the services required for the forthcoming equipment can be appreciated and properly planned for execution.

2.7.6 Staffing Pattern

Hospitals consist of several multi-storeyed blocks with a vast array of internal compartments and passages. Travel time from one end to the other or from lower to higher floors is bound to be considerable.

Services like electric and water supplies, air-conditioning, sewage disposal, medical gas supply, lifts are to be kept functional on 24-hour basis and staffing should cater for three shift working. A person in-charge of electric sub-station has to remain there and cannot attend to the problems with the distribution network for which a separate person would be required. Such is the case with water supply and air-conditioning. Moreover, there could be more than one sub-station or plant room. Provision of staff for operation, and maintenance and repair will have to be made on different lines. Another important factor is the identification of essential services in an emergency in consultation with heads of the hospital departments and making adequate staff provision to meet this eventuality.

Because of these factors and several others, any staffing norm laid down could suffer from practical inadequacies and be misleading. Staffing pattern should be evaluated on case-to-case basis making due allowances for inevitable leave reserves. For preventive and planned maintenance activities, the staff needs should be closely related to the planned programmes so that each tradesman has an amount of work allotted which will keep the person steadily and effectively employed.

The most common category of staff would include pump attendants (for pumps operation), switchboard attendants (to look after distribution board and panels), linemen (to attend to overhead lines, if present), lift attendants (for operating the lifts), boiler attendants (for operating the boiler), AC plant operator (to operate AC plant and cold stores) and a horticulturist (to look after the grounds).

2.7.7 Control and Responsibilities

At any given time, there will be scores of technicians and tradesmen working on the hospital premises. For better control and effective supervision, the engineering services department should be the centre point for all activities. This should be the reporting and dispersal point for the staff. This will facilitate proper work allocation and issue of tools. It will help in effective supervision since the location of the workforce and nature of work will be known beforehand. Proper accounting and maintenance of records will be possible.

Effective daily management by the engineering services department is essential to achieve optimum utilisation of men, materials and money. Productive control and economical use o the tradesmen is possible if the following actions are taken:

- Prepare a work programme for maintenance tasks and minor works.
- Prioritize the above programme according to their importance (consult department heads).
- Evolve realistic time schedules for the different tasks based on local experience and factors.
- Maintain accurate job cost records for effective control and future reference.
- Prepare the works programme in sufficient detail to ensure even flow of work throughout the year to every tradesmen. The annual programme could be broken down into monthly and then weekly programmes.
- Maintain clear cut records for computing costs.
- Learn by experience — the best teacher. Avoid maintenance or repair as crisis management.

- Prepare a long term forecast of works such as foreseeable renovations and expansions, replacements and improvements, repair and the like.
- Carry out a monthly study of works carried out and expenses incurred on each work.

Role and responsibilities of the engineering services department should be clearly laid down. So also the responsibilities and duties of each and every person at all levels should be defined. Division of responsibility should be clearly established with no overlap or duplication between departments and the staff. A striking example is one where the maintenance of batteries in an emergency system became a point of dispute between the services department and the OT department staff. The dispute was amicably settled with a decision from the appropriate authority, but the batteries could not be saved as they were already damaged. Check lists and repair codes should be prepared and made available to the technicians. Safety measures and emergency procedures should be given prominence. All these should be displayed in such a fashion as to attract the attention of the staff and be available to them in any emergency. There should be a close interaction between the services staff and the heads of all departments of the hospital at all levels.

Check Your Progress 6

List the branches of engineering involved in Service Department.

a) .....

b) .....

c) .....

d) .....

e) .....

2.8 LET US SUM UP

This topic of Engineering and Allied Services presented would have made you aware of the diverse activities of the engineering services as are involved in modern and specialist hospitals and with which an administrator is bound to be closely associated. You have accordingly been kept in touch with all branches of engineering services in sufficient detail to enable you to grasp the issues as they come up and take a positively active part in discussions in a meaningful way. Certainly this information will stand you in good stead in planning and progressing of new proposals, renovations and augmentation of hospital facilities.

The invasion of electronics into the medical field has diversified the medico-technical equipment to a very great extent. The need for an electronics engineer is now firmly established to look after these equipment which are so very costly that their down time will prove disastrous to the patients and the hospital.

The importance of maintenance and a workshop in the hospital are established facts. So many trades and tradesmen are involved in the upkeep of the hospital and even then some contracting with outside agencies is inescapable to keep the number of staff within manageable limits.

The hospital will have to deal with several agencies to obtain water, electricity, fuel and gas supplies. Payment for these will have to be made as per prior agreements and these payments are high. You appreciate the dire need for energy conservation to reduce hospital expenses and bring health care delivery systems within reach of one and all. Affinity between energy conservation and maintenance has been highlighted by examples of a cycle and a household item to be identified by you.

Prominent technological advancements have been mentioned at appropriate places. Combined with this information and pointers in the unit, your own ability to gather supplementary information will assist you in moving up the learning curve and tackling any issue on end-to-end basis. Remember – No issue is settled until it is settled right.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Tons Refrigeration (TR)

2) Tons Refrigeration, Airhandling Unit, Relative Humidity, High Efficiency Particulate Air filter

Check Your Progress 2

a) Bio-gas plant

Solar water heater

Solar photovoltaic

Windmill

Wind turbine

b) Solar water heater

Check Your Progress 3

a) Cleaning of light fixtures

b) Switching off lights when not required

c) Changing over to modern energy efficient lighting systems.

Check Your Progress 4

1) This is critical systems maintenance to prevent possible breakdowns to a minimum. Parts which appear to be weak or worn out or likely to become defective are replaced before they actually fail or breakdown.

2) a) Other party gains a strong foothold and gets bargaining power.

   b) Employed staff may get inferiority complex and feel neglected.

3) They should be put in plastic bags with a small sack containing silica gel. They should be protected against effects of static electricity. Air-conditioned space would be ideal for storing them.

Check Your Progress 5

Electrician, Motor Winder

Check Your Progress 6

a) Civil

b) Electrical

c) Mechanical

d) Electronic

e) Public health

2.10 FURTHER READINGS

Criswell, John W., *Planned Maintenance for Productivity and Energy Conservation.*

Gopalakrishnan, P. and A.K. Banerjee (1991), *Maintenance and Spare Parts Management*, Prentice-Hall of India (P) Ltd.

National Building Code (as amended).

Relevant Indian Standard Specifications and Codes.

UNIT 3 ENGINEERING HAZARDS

Structure

3.0 OBJECTIVES

After reading this unit, you should be able to:

- know the various aspects of hospital planning and problems associated;
- identify the physical environment for healing and their metriculours provisioning to avoid hazardous conditions;
- get acquainted with the various building elements and materials which are used in hospital;
- identify the problematic areas leading to engineering hazards or even health hazards;
- know the general standards of planning and design with particular attention to details and finishes; and
- take effective steps and safety measures in case of contamination.

3.1 INTRODUCTION

Modern hospitals rely heavily upon engineering services for their efficient functioning. Any dislocation of these services, even for a short period, leads to hazardous situations and even loss of life. The problem, in fact, is accentuated by the large number of potential hazards

arising out of engineering services which have to be used in a hospital and diverse background of its inhabitants, patients, visitors and staff.

In this unit, you will learn about the problems associated with hospital planning and design, physical environment, materials and building elements, and hospital installations which may lead to Engineering Hazards if proper care is not exercised.

You may be aware that planning of hospital engineering and utility services is a vital aspect in the design of hospitals, because on this aspect alone, depends their functional efficiency. At any time without warning, any of the services can become critical in a hospital. The planning of engineering services has to be based on "zero failure" concept.

Engineering hazards are mainly due to faulty planning, unsoundness of structure to withstand natural calamities like cyclones, floods, earthquakes, high winds and man-made disasters like blast etc. Failure caused on account of absence of proper coordination in laying of services, installations, feeders, their up-keep and proper maintenance of engineering services like electric supply, water supply, ventilation system, communication, fire protection, traction, medicinal gas supply, artificial environment, noise control, glaring effect results in engineering hazards.

You will appreciate that in order to reduce the chances of engineering facilities failure, it is essential for each and every hospital to look into the various causes of engineering hazards to arrive at the correct solution to prevent its occurrence. Suitable corrective, preventive and breakdown maintenance programme are essential to ensure safety and smooth functioning of hospital. Special attention to prevent slip and fall by patients, employees and visitors is essential.

3.2 HOSPITAL PLANNING AND DESIGN

Hospital in a way is a House Of Sick People seeking Investigation, Treatment either Ambulatory or Lying in bed.

Responsibilities of the hospital to patients, to staff and to the community for general safety, soundness of design and emergency programmes are shared by clinical services and engineering services including general administration and hospital installations. While planning a hospital all aspects of general safety must be taken into consideration to avoid uncontrollable situations. However, it requires constant thought and vigilance by all if the hospital is to be prepared to serve its proper role in the circumstances which may vary from simple hazard to catastrophic situations. It is at this stage of hospital planning and design that close co-operation and coordination among the architects, engineers and hospital administrator is extremely desired.

The design, construction, renovation, expansion, equipment, and operation of hospitals and medical facilities are all subject to provisions of several environmental pollution control regulations set by Central Board for prevention and control of pollution, in National Building Codes, Indian Standards and Local Municipal Bye-Laws. Many states and municipal bodies enacted stringent regulations for air quality related to incinerators and gas sterilizers, underground storage tanks, hazardous materials, waste storage, handling and disposal, storm water control, medical waste storage and disposal, and asbestos in building materials.

3.2.1 Hospital Layout

The best possible layout for a hospital building would be a group of isolated buildings dispersed over a wide area. In the event of one of the buildings getting damaged from a disaster like blast or fire, the other buildings survive and hospital remains operational. Such layout has proved costly to construct and maintain and also lacks functional efficiency.

Paucity of land particularly in the urban areas primarily necessitated multi-storeyed construction for hospitals. A single high rise building, however is not a welcome proposition for a hospital in the context of accumulated risk from disasters, making the services fully non-functional. Such high rise building is also subject to other natural calamities like cyclone and earthquake.

The most satisfactory approach from the point of view of maximum safety against man-made or natural disasters for a hospital at present will be a group of structurally isolated multi-storeyed buildings. The isolation is achieved by a number of separation joints, stairs and passages

3.2.2 Design Soundness

The design of a hospital building should be such that:

- It shall be serviceable under normal loading, including fire and floods,
- The building should survive minor emergency loading on account of designed high wind, earthquake and blast without any sign of distress, and
- The building should survive extremely severe emergency loading of a near miss blast, hurricane or major earthquake with visible damage without collapse.

3.2.3 Hospital Safety

The various aspects that are to be looked into by a structural engineer in design of structure (hospital building) keeping in view the functional utility of the hospital as paramount in the event of a disaster are:

- Fire
- Deluge and flood
- High wind and earthquake
- Blast

It is necessary to look into the safety requirements of each of them to arrive at the correct solution to prevent or overcome them:

Fire

A hospital being a public building with multifaced utility is particularly susceptible to fire. The aim in design shall be early detection of fire primarily for life safety and thereafter containment of fire. Provision of emergency exit is one of the prime requirements for a multi-storeyed hospital building. The escape routes should be fire protected and smoke free by means of horizontal and vertical passageway and ramps for physically handicapped. A hospital building coming under Group C-1 (Industrial) for fire safety as per National Building Codes should have a fire rating of 2-4 hours (maximum), depending on the actual occupancy. The role of structural engineer is therefore:

- To select and design structural members of sufficiently high rating, so that they do not collapse within the specified times.
- Judicious use of fire walls to compartmentalise the building to limit spread of fire. Fire protection of emergency exit passageway by walls of suitable rating and housing of fire escape stairways in the smoke proof tower.

We will learn more details about hospital fire safety plan in Unit 4, Block 3 of Course 5.

Flood

Flood can be a routine annual phenomenon in reverine areas or a flash flood due to a sudden cloud burst. In either case, functioning of hospital should not get affected. The hospital building shall be sited above the highest flood level with raised plinth for eventual safety from getting submerged. A hump at the direct entrance to the basement will be necessary to prevent ingress of floodwater. The basement should be made fully waterproof through proper treatment.

Non functioning of sewage and storm water disposal system can be another difficulty consequent to flooding of sewer manholes and storm water chambers. This can jeopardize the normal functioning of a hospital. Solution can be the use of high discharge pumping coupled with a high-level captive disposal system.

High Wind and Earthquake

All multi-storeyed buildings are required to be designed to withstand the effect of strong gale and seismic forces as applicable.

High wind damage to buildings is caused by severe straight wind. The high wind strikes a building in gusts imposing dynamic loading. The design wind load for a building is a function of many factors like terrain, building shape, height to width ratio, building use, etc.

Building use governs the frequency of maximum wind force called " mean recurrence interval" which is a key factor in calculating the total wind force. National Building Codes, and the Indian Standards, recommended a higher "mean recurrence interval" for a hospital building on account of its importance to society. IS: 875 (Part-3)-1988 for wind loading recommends a "mean recurrence interval" of 100 years for a hospital building compared to 50 years for a normal building.

The Indian Standards also recommend the use of equivalent static method to arrive at the wind force upto a height of 40 metres and adoption of height to width ratio less than 5 to reduce dynamic effect.

Earthquake

Earthquake-induced ground movement subjects a building to a three dimensional dynamic force. The quantum of horizontal seismic force at each level is a function of mass, height and the coefficient of seismicity. The importance of a hospital building has been considered by the Indian Standards for earthquake loading in IS: 1893-1964 by introducing an important factor for assessment of coefficient of seismicity ('alfa').

The effect of earthquake also produces oscillations of the structure and consequent reversal of stresses in the structural components. The Indian Standards recommend a length to width ratio not exceeding three.

Blast

The effect of blast on a building or structure is for a very short duration over-pressures followed by negative pressure. The magnitude of the over-pressure depends on the intensity of the blast and the distance of the epicenter from the building. Instantaneous rise of pressure followed by negative pressure subjects the building to a dynamic force which may be many times greater than those experienced under the severest of hurricanes.

Check Your Progress 1

1) What should be the simple objective in the design of the hospital premises?

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2) Why a single high rise building is not a sound proposition?

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3) Name the conditions for design soundness of hospital building.

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4) What are salient aspects of disaster safety which needs due consideration by a structural engineer while designing the building structure?

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3.3 PHYSICAL ENVIRONMENT

Many man-made environments are seldom wholly satisfactory for human beings.

Frequently the human body is placed in thermal neutrality and uniform illumination is provided. The widely spread concept of so called optimum conditions for physical environment, meaning that fixed sets of environmental conditions for so called perfect comfort are implied, is definitely suspect. Often a minor change within the comfort range of temperature, humidity, air movement, illumination and sounds checks the feeling of monotony and thus acts in a beneficial manner. As today's patient is more knowledgeable about medicine and more conscious of his surroundings than his counterpart in the past, the quality of hospital built environment, particularly in the patient areas, require careful attention.

A physical environment must satisfy three conditions:

- It should do no harm. It should be safe in configuration and material usage, in providing adequate temperate, clean air, adequate safe sound and light levels.
- It should facilitate medical service. It should provide efficient layouts for staff, support family participation, provide effective colours, light and sound levels for the task being done.
- It should contribute to healing. It should balance adequate stimulation with over stimulation, induce positive physiological responses, and enhance patient control and participation in the environment.

The principal aspects of architectural design, building form and detail, are also important factors in the physical environment. The building form must evoke positives, reassuring responses both from recall of reassuring forms but also from aesthetic pleasure. There is ample evidence that exposure to nature through interaction or access to views and landscape has a positive healing effect.

Some of the key environmental issues essential to a physical environment for healing are light, colour, sound, climate, and ventilation.

3.3.1 Light

Not only vision requires light. Light is an environmental factor as much as air, water and temperature. Day light has perhaps several hundred important effects on human bodily functions. Many of them have a 24-hour rhythm following the daily cycle of light and darkness. A nice view through window is preferred when the choice is between having sunshine into the interiors and an unpleasant view through the window and no sunshine indoors. For an in-patient who is away from his familiar environments, the visual comfort in supporting his self-confidence is a factor of paramount importance.

For the majority of ordinary occupations, the desired lighting intensity, based on visual acuity tests is about one hundredth of the normal out of door midday lighting intensity. 700 Lux of balanced light will be just as good for visual clarity as 1000 Lux of cool white light. The general room lighting level should not exceed 750 Lux. A higher level is considered to be a stress factor.

In order to avoid occurrence of hazardous conditions, design strategies for a healing lighting environment should accomplish the following:

- Provides artificial light from sources that have high colour rendering indices and are in the 3500° K temperatures range.
- Provides general illumination from indirect sources, at reasonable intensity for most uses.
- Provides intensity variability in general illumination so that spaces may be adjusted for active outward activities (high levels illumination) or for more passive inwardly focussed activity (lower levels of illumination)
- Add sparkle point and focal glow for variety and object rendering.
- Relate general illumination temporal patterns closely to diurnal pattern.
- Ensure access to unfiltered day light for long term patients. (access to outdoor)
- Provides for patient control of light within their territorial spaces.
- Provide nonglare visual access to outside wherever possible from spaces occupied continuously for any significant length of time.

3.3.2 Colour

Colour is a sensation, which creates an instant impact. Colour is an essential element of visual stimulation in environment. A human eye does not respond equally to all colours. The response is more to green, yellow and orange than to red or blue. The individual variations are considerable. Colour can delight and soothe, provoke and disturb. A very personal sensitivity to colour is active from the moment of birth.

Reds, dark browns, deep purple and black should be avoided in hospitals altogether. The colour red in paint and drapes of a patient's room is said to retard rather than speed up the getting well.

The choice of colour should make it easier for the cleaners to discover dirt and substances capable of transmitting infections. Frequently white is used in a hospital widely as this colour carries the message of cleanliness. However, ophthalmologists have warned about interiors with large areas of bright white which may cause an effect similar to snow blindness

To make the environment free of hazardous conditions, design strategies for a healing colour environment must include:

- Variety of accent within an acceptable field colour framework;
- Balance between under stimulation of extreme unity and over stimulation of extreme complexity;
- Selection of warm or cool colour related to appropriate activity level intended for space;
- Use of colour contrast techniques to reinforce figure ground definition in environments for the elderly; and
- Use of cueing and coding to aid way finding and understanding.

3.3.3 Sound

Sound generated by the environment with no specific human purpose is also a noise, which can be positive, for example sounds from nature, such as birds or breezes, and negative, as it often is with man-made sounds such as machine or intrusive activity noise. Noise is meaningless sound. As the world becomes noisier, it becomes less meaningful. Specific noises may evoke fears. However, many reactions are highly individual.

Most likely the hospital staff is in great need of noise control information; much noise arises from lack of consideration of the patient's comfort. Many of the annoying sounds in the patient areas could be eliminated if the employees and visitors would observe the rules of common courtesy, i.e., walking and talking more quietly.

When the noise is measured in the dB, is increased from 0 to 20 dB, the true increase of noise is 10 times, to 40dB it is 100 times, to 60 dB it is 1000 times, to 80 dB it is 10,000 times and 100

dB it is 1,00,000 times. An average noise level of values 30 to 40 dB in hospital is acceptable.

Health facility design strategy should set goals for acceptable noise levels to avoid hazardous conditions and achieve them through:

- Source attenuation (location isolation, insulations, bumples)
- Source elimination (phone bells, intercoms, audio pagers, printers)
- General acoustic attenuation (adequate ceilings, walls, doors)
- Patient control (television, fans, doors)

Selective use of music with adequate concern for patient control, can also contribute positively.

3.3.4 Climate

Temperature, humidity and air changes are all key issues which are equally as important as light, colour and sound in physical environment. These issues are influenced by need for energy efficiency. The comfort and purity of the air provided are both critical to the healing process, as is also perceived control over the patient's territory by the patient. A balance in air change rates and energy consumption must be struck which heightens the importance of exhaust heat recovery.

Temperature

The body temperature-regulating center is located in the hypothalamus. Body temperature adjustments are made either by a fine regulating mechanism such as skin, blood flow or by coarse mechanisms such as shivering and sweating.

A generally preferred indoor temperature for healthy adults seems to be in the region of 21°C to 23°C. When the mean night temperature rises above 24°C, the percentage of those whose sleep is disturbed increases.

Humidity

The acceptable limits for relative humidity as regard static electricity and comfort are 45-60 percent. For new-born and premature infants, a 55-65 percent relative humidity has been considered to be desirable. Humidity in the operation room is believed to contribute to the prevention of dehydration of exposed tissues.

3.3.5 Ventilation

It is important that staff are able to control the natural ventilation easily. In clinical rooms with sealed windows appropriate speedy ventilation may be difficult to achieve, even with mechanical installations.

Ventilation installations has seldom met specifications. Air-conditioning equipment has been poorly maintained because there has been gross ignorance about its function and purpose. Air-conditioning is considered to be a health hazard in its present forms. Rapid cooling and direct draughts must be avoided.

Health Hazards

One factor contributing to the high frequency of nosocomial infections in modern hospitals may be transmission of infection via the ventilation system. Micro-organisms can be drawn into the building from outside and pathogens from within the building are taken up by the re-circulating air.

Lack of pre-commissioning cleaning can be contributing factor.

The damp conditions inside the humidifiers are particularly suitable for microbial growth. Humidifiers can provide a steady source of infected air to be circulated around the hospital. Humidifier fever is a recognized disease which possibly results, as its name suggests in high fever. Exposure to the slime that builds up in poorly maintained humidifier baffle plates has produced symptoms of illness among the sensitive individuals.

Specialized Cleaning

The engineers who design and install ventilation systems rarely appreciate the need to clean

them. As a consequence little provision is made for cleaning to be carried out. It is often necessary to employ a specialist contractor to do the cleaning.

The professional hygiene contractor provides fully trained staff with necessary equipment to carryout and maintain an effective hygiene maintenance programme for all water and ventilation system.

Check Your Progress 2

1) The visual impression may be influenced by the quality of .....

2) Colour for tranquilisation are ....., ..., ...; for coolness are ....., ...; and warmth are ....., ...

3) If the employees and visitors would observe the rules of common courtesy, hazard of annoying ..... in the patient rooms could be eliminated.

4) Indoor temperature for healthy adult is preferred to be in the region of ..... to ..... for comfort conditions.

5) Damp conditions inside the humidifiers can provide a ..... of infected air to be circulated around the hospital, it contributes to health hazards.

3.4 BUILDING ELEMENTS AND MATERIALS

Materials can also contribute positively to healing through stimulating and engaging the tactile senses. Selection of material is critical in a number of ways. First it is essential to select non-toxic, non-allergenic and non-bacterial harbouring materials for patient safety. Second, materials need to be selected and designed for safe use. This is particularly true for floors and stair.

Type and nature of walls, ceilings and shielding are the design issues, which have positive effect in judicious choice of building elements. Necessities of right size of doors and windows opening have significant role to play in contributing functional efficiencies of hospital building. Underestimating the utility values of these building elements will be adding to engineering hazards.

3.4.1 Slip Hazards—Floors

Over half of the slip and fall happen on flat surfaces that is floors. The problem of reducing the slip hazards is compounded by the variable in selection process.

No safety programme is complete without training and awareness for both employees and the public. Cleaning and maintenance duties are carried out by a diverse group of people with varying degrees of education. This highlights need for easy to use multi-lingual instructions that stress pictograms and icons wherever possible, robust formulations that are tolerant of misuse, and equipment to reduce errors whatever possible.

Flooring materials shall be easily cleanable and appropriately wear resistant for the location. Floors in areas used for food preparation or food assembly shall be water-resistant. Floor surfaces, including tile joints, shall be resistant to food acids. In all areas subject to frequent wet cleaning methods, floor materials shall not be physically effected by germicidal cleaning solutions. Floor subject to traffic while wet shall have a non-slip surface.

Flooring material in laboratories should be tested with strong acids, alkalies, water, solvents and stains. The floors should be of non-slip quality also when wet, easy to clean, hard wearing and fire resistant. In radiology units loads of 2000 kg./sq.m are installed, a fact to be observed when designing the radio diagnostic department flooring. By using flooring with readily removable tiles the laying or removing of low tension and high tension cables is simplified and an easier change over of equipment is achieved.

Flooring material in the operation rooms as well as anaesthetic and equivalent rooms, high demands are made. The floors should be non slippery, when wet, withstand intensive application of water and disinfectants, not absorb physically foreign molecules, have a high resistance to breakdown, be elastic and recover after the removal of heavy objects, be fire resistant, be colour fast, and not require treatment with wax or other preservatives. Coved

skirting with a minimum radius of 3 cm and minimum height of 10 cm should be used for all floors, thereby eliminating junction between skirting and flooring. Skirting shall be kept flush to wall surfaces.

Precaution against explosions must be maintained in the operation room and where flammable anaesthetics are stored. Requirement for conductive flooring may be omitted if no flammable anaesthetic agents will be used. The conductive floor finishes have to conform with the standards and requirements of national agencies.

The use of electrical and electronic equipment in direct contact with the patient and the introduction of electrodes into body cavities, particularly in the close proximity to or into the heart has increased electrical hazards.

Conductive floors in rooms where electronic equipment is used on patients are needed. No appreciable charge should be allowed to build up on the floor, which should have a resistance to limit the current from any defective equipment and simultaneously dissipate the energy through its conductivity.

In floor colours brown tending towards red and other brown tinges may give a feeling of safety and peacefulness. A dark green tinges may lead to association of moss or a soft lawn. Light and vague colours should not be used. They may be associated with slipping and falling and produce a feeling of insecurity.

3.4.2 Ramps, Steps and Stairs

If ramps are to be used by the ambulant disabled as the main means of entry, a minimum gradient of slope is best. The gradation of which may not be greater than 1:10. Pedestrian ramps must have handrails. A landing every 9 m is ideal.

Minimum width of the slanting level as 1.6 m could be accepted. All starting levels should be slip free and fitted with handrails, at a height of about 90 cm and another at the height of 50 cm for ease of patients and visitors in wheel chairs.

Many of the ambulant disabled find stairs easier to negotiate than ramps. Stairs in health care facilities should have not more than 15 cm as riser and not less than 30 cm as tread. Handrails should be positioned on both sides of steps.

Steps, stairs and handrails should not be made of slippery material. Hard, level, non-skid surfaces are essential. The nosing should be non-protruding so that people with stiff joints, braces, artificial legs or other leg or stability problems will not catch their toes as they climb.

3.4.3 Walls and Ceilings

Walls

Traditionally it has been regarded reasonable to propose that wall materials in the high hygienic standard areas like operation rooms should be hard, robust, impervious, jointless, non absorbent, easily cleaned and decontaminated. The wall finishes should be unaffected by colour change, staining and mildew. These requirements in perfection are held too high, as the hygienic hazards of the walls are extremely small.

Ceilings

The requirement of operation room ceiling has to meet a clean room application. Clean room is defined by class. A class 10 clean room will contain less than 10 particles per cubic foot (a particle is counted if it is larger than 0.5 micron). A micron is very small, putting this in perspective it is one thousandth of a millimetre.

The minimum ceiling height shall be 2.4 m with following exceptions:

- Boiler rooms shall have ceiling clearances not less than 76 cm above the main boiler header and connecting piping.
- Ceilings in radiography room, operating and delivery rooms, and other rooms containing ceiling mounted equipment or ceiling mounted surgical light fixtures shall be of sufficient height to accommodate the equipment or fixtures and their normal movement.
- Ceilings in corridors, storage rooms and toilets shall be not less than 2.35 m in height.

- Suspended tracks, rails and pipes located in the traffic path for patients in beds and or on stretchers including those in in-patient service areas, shall be not less than 2.15 m above the floor.
- Seclusion treatment rooms shall have a minimum ceiling height of 2.75 m.

3.4.4 Elevators

Elevators are needed for moving beds, stretcher beds and other wheeled carrier. No single elevator should be provided, they should be arranged in groups of two or three. Hospital type elevator cars shall have inside dimensions that accommodate a patient bed with attendants. Cars shall be at least 150 cm wide by 230 cm deep. Car doors shall have a clear opening not less than 120 cm wide 215 cm high. Additional elevators installed for visitors and material handling may be smaller within restrictions set by standards for handicapped access.

Elevators shall be equipped with a two way automatic level maintaining device with an accuracy. Each elevator except those for material handling, shall be equipped with a two way special service switch for staff use, for by-passing all landing button calls and travelling directly to any floor. Elevator call buttons shall not be activated by heat or smoke. If employed, light beam door activators shall be used in combination with door edge safety devices and shall be connected to a system of smoke detectors. This is so that the light control features will disengage or be over ridden if it encounters smoke at any landing.

The control system for a group of staff and visitors, elevators should be based on normal controls with call accumulating devices to shorten waiting times. Car start time should be less than one second.

Elevator doors protected with a rubber safety edge should strike with a minimum impact and should promptly reopen. Doors equipped with a light ray of electronic detector system should reverse before they strike a person or bed in their path. Door reversal should be gentle.

3.4.5 Shielding

Electronic measurement of a patient's heart, brain and other potentials generated by the body involves extremely weak electrical signals. As the recordings on the instruments are obtained by a high degree of amplification of these signals, the physiological recording may be seriously distorted or degraded by interference in the surrounding area.

Electromagnetic interference should be eliminated from rooms in which encephalographic (EEG), electromyography (EMG), or other equally sensitive equipment, but not electrocardiograph (ECG) is used or where the output of this kind of equipment is fed into a computer for comparison or analysis.

Among such rooms the following can be mentioned:

- Intensive care and monitoring rooms
- Operation theatres
- Rooms for catheterisation
- Rooms for angiographic techniques
- All rooms for measurement of bio-electric potentials

The shielding of a radiation room shall protect occupationally exposed persons as well as non-radiation workers. It must not be impaired by joints, openings for pipes, duct etc. passing through the barriers, or by conduits, service boxes etc. embedded in the barriers.

Permanent wall radiation screening in X-ray department rooms where the working capacity does not extend 150 KV and radiation is undirected, should comprise of a 2 mm thick sheet of lead or equivalent material such as 160 mm concrete or upto 250 mm brick masonry. In the X-ray department shielded floors will be necessary if there are rooms below the X-ray rooms, particularly if tubes pointing downwards are used. When examinations are made with the under coach tubes, shielding of ceiling will be necessary for rooms above. Concrete is considered to be the most effective shielding material.

Doors and other means of access to the X-ray room and observation windows also require special consideration to ensure adequate protection without sacrificing operational efficiency. The lead lining must also be sandwiched into the doors leading to the room.

For viewing openings between the operator and patient, at least 10 mm thick shielded glass containing barium or lead should be used. Similar requirements have been adapted on computer assisted tomography units.

In operation rooms where X-ray equipment may have the same capacity as that in x-ray department itself, it is essential to apply the x-ray department standards. The radiation protection relates also to the walls of the rooms in the emergency and in the intensive care unit where x-ray equipment is used frequently.

In nuclear medicine laboratories safety precautions are much more important in in-vivo than in-vitro studies. Shielding is required not only of the nuclides themselves but of the surrounding room, so that the floors, walls and ceiling adequately reduce radiation exposure.

3.4.6 Openings—Doors and Windows

Doors

Doorways should have 86 cm clear opening width to allow easy passage area for a wheel chair. In the operation department, staff dressed in sterilized garments needs a minimum door opening width of 90 cm. For operation room, a clearance of about 10 cm on either side of the hospital bed including special equipment is required to move it through an opening, a width of 150 cm for (two leaf) door openings can be recommended. If self closing operation room doors are used they should preferably be surface sliding, power operated and controlled by photoelectric cells. In the post operative recovery area the doorways should pass beds easily, a door width of about 145 cm is recommended. Any opening device adapted to the surgical department, doors must allow them to be operated manually or swung open in case the device fails. A device that holds the door open must be provided to simplify equipment moving.

In the ICU's handles can be omitted from doors, which can be pushed open. Also here the door width should be about 145 cm. In neonatal intensive care units, the door widths of 90 cm can be accepted.

X-ray room doors can generally be shielded by sheet lead, possibly in the form of a wood-lead-wood sandwich. Shielded doors may need an automatic closure to ensure that they are normally shut. Doors to fluoroscopic examination rooms should have no light leaks into the examination room. In laboratories, 120 cm is considered to be the minimum acceptable door width. For easy exit, doors should swing out from the laboratory. Secondary escape exits should be provided.

Emergency exits must be clearly labeled. Exit signs may be designed to flash when the emergency alarm is on. However flashing red lights can cause headaches, nausea and in extreme cases, epileptic seizures. Distance from farthest point from a room to the nearest exit should be less than 60 m, from a patient room less than 45 m. In Sweden this distance in the nursing units is reduced to 30 m.

There are fire codes and regulations that require that the doors on patient floors be kept closed or be self-closing to prevent smoke spread. Many patients feel isolated behind closed doors and many nurses feel that they must be able to see their patients from the corridor. As a compromise, the doors should be permitted to remain open, if so desired, but there should be provision for automatic or remote release and closing upon detection of smoke.

Windows

The ability to look out the window is extremely significant to the inpatient. Attention to the outer world is essential to relieve the sense of enclosure and to provide muscular relief to the eye by allowing it to focus at a distance. Window size is a compromise between the need to afford a satisfying view and the need to conserve energy and afford privacy. Satisfaction is generally achieved when the window area occupies 20 to 30 percent of the window wall.

1) What are variable elements worth considering in selection process of floor to avoid slip hazards?

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2) What are the characteristic for wall material in the high hygienic standard areas?

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3) What are the interface which are required to be shielded to safeguard the facilities against hazards?

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4) What type and size of door do you recommend for radiographic/fluoroscopic examination room to safeguard radiation hazard?

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3.5 HOSPITAL INSTALLATIONS

Hospital is one building type where maximum and varied number of services are required and that too, in any part of the building. It has been found that cost of these services viz. electrical, water supply, sanitary, communication, emergency power, medicinal gases etc. amount to almost over 30% of the total cost.

The working of almost all the hospital services and medico equipment are directly or indirectly depends upon a reliable continuous and stabilized supply system through network of hospital installations.

3.5.1 Electric Supply

Electricity could rather be called the life line of hospital working. Here we shall consider and discuss in brief the systems in the context of hazards, arrangements for providing reliable and continuous essential power requirements in a hospital and also some major causes of breakdowns in supply systems and ways to minimising them under following heads:

1) **Arrangements for Continuous Supply Systems**

The problems of perennial energy shortage, erratic power supply and to meet the requirements for the essential services like general lighting, water supply, lifts and life saving equipments in a hospital have to be overcome by installation of following standby systems.

i) Generating Set

ii) Portable Emergency Lights

iii) Un-interrupted power supply system

iv) Voltage stabilizers

v) Duplicate feeders

2) **Main Causes of Failures for Electrical Supply and Ways to Minimize Them**

i) **Cables:** Cables are not immune to faults; electric stresses, voltage fluctuations and surges, moisture penetrating through sheath and reaching core of cables cause insulation resistance to drop to a point where deterioration of cable insulation starts. Mechanical damages like abrasion, crimping, embattlement, cracking and shrinking caused by insulation aging also add to cable failures. Mechanical or physical pressures on cables can deform insulation and may reduce its ability to withstand voltage pressures.

Carelessness during laying of cables namely, not properly bent, pulled, squeezed or dragged, cable can be seriously damaged. Short circuit produces thermal as well as electro-magnetic stresses. Properly selected and laid cables have high reliability over voltage surges and overheating of joints and terminals. If a cable is not of appropriate size and it is overloaded, overheating of joints and terminals occur, thereby causing loss of continuity in either conductors or cable sheath.

External factors like ambient temperature, free moisture, soil acidity, insects plants, fungus also contribute to cause of cable failure.

However, sizeable portion of faults is attributed to bad workman ship, use of improper jointing material and incorrect process of jointing. These could be minimized by following the manual instructions and entrusting the jointing work to trained and skilled persons only.

ii) **Oil/Air circuit breakers:** Circuit breakers being static apparatus are usually not given the same care and attention as the rotating machinery. Proper and smooth working of mechanism of circuit breaker is equally important. Skilled and trained staff should attend periodical cleaning and adjustment of mechanism. Proper functioning of mechanism of circuit breakers is tested by means of automatic releases. The other controls and accessories like overhead trip coils, under voltage release, adjustable time lags, earth leakage relay etc., should be properly and regularly checked and their proper functioning ensured.

iii) **Electric Motors:** Electric motors form bulk of drive system of machinery and equipment. For smooth and reliability of drive systems the proper care and attention to electric motors is extremely essential. The abnormal working and mal-functioning of an electric motor can be due to Mechanical and Electrical failure.

The Mechanical failure can be predicted in advance to a great extent, such as vibrations caused by mal-functioning of various components. These faults should be checked properly and greasing done at regular intervals.

The Electrical failure cannot be easily predicted and in spite of good preventive maintenance schedule, electrical faults may take place without pre-warning. Mainly thermal stresses, electric stresses or even environmental conditions can cause these. Overloading of motor and voltage surges contribute heavily towards deterioration of winding insulation.

iv) **Electrical equipment:** Electrical equipment when put to use are subjected to stress and strains. It is therefore, necessary to minimize the nuisance of these factors by periodic and proper maintenance. Under wear and tear, avoidable damages to electrical installations and equipment can also be minimized by taking proper and timely care as follows:

- Electrical equipment must not be connected to the outlet points with loose leads or bare ends of wires.
- On one outlet point only one equipment should be installed.
- The capacities on the outlet points and connecting wires must be matching to take the specified load of equipment to be connected.
- Heating appliances, light and fans must be switched off when any room is to be locked or left unattended.
- All the electrical appliances, equipment must be properly earthed.

3) **General Maintenance**

Regular up-keep and proper maintenance of electrical installations, equipment and machineries is of utmost important. The maintenance of sterile areas like the operation rooms, intensive care unit, anaesthesia rooms and critical areas in a hospital need special attention and care. Slight carelessness can add to complications and infection problems. Delicate and sensitive equipment which require better and safe controlling devices, miniature-circuit breakers (MCBs) shall be provided.

Another aspect of the sterile areas is the quality of supply air from air-conditioning system where HEPA filters are used. These have an efficiency as high as 99.9% for particles up to 5 microns or less in size. Due to extremely fine filtration media they need proper maintenance and frequent replacements of MCBs and HEPA filters.

The maintenance activities must also lead to better and efficient performance. To minimize down timings, continuous and timely maintenance as follows is essential and unavoidable:

- Corrective maintenance: Helps in improving the equipment.
- Preventive maintenance: Up-keeps the equipment maintenance
- Breakdown maintenance: Keeps running or pushes the equipment.

3.5.2 Water Supply

Water is in inescapable necessity of hospital functioning. Here we shall be considering the problems and remedial measures of water supply systems in order to avoid hazardous conditions. Beside normal water supply system, hospitals also require a two-temperature range for hot water. Low temperature about 40°C is required for patient wash rooms. Higher temperature between 71°C to 90°C account for the majority of a hospital's hot water requirements including physiotherapy, kitchen and cafeteria requirements.

Laying and distribution of the water supply system shall be according to the provisions of Indian Standards IS:2065-1972. Cold and hot water supply should be run in concealed form embedded into wall with full precautions to avoid any leakage and seepage. Following needs to be kept in view:

- The temperature of hot water supplied to the surgical and similar departments should be regulated between 40°C to 44°C.
- Drinking fountains should project out from the wall rather than be fully recessed. It is useful to have both hand and foot operated controls.
- There should be an arrangement for emergency cold water supply, which, on the failure of normal supply can be turned on.

3.5.3 Sanitary Equipment

The nature of the work in hospital generally, and in the surgical and similar departments particularly, demands a very high standard of hand cleaning. Washing should always be done in running water. Warm water-approximately 32°C to 39°C is more comfortable than either hot or cold. In public facilities provision of only fixed temperatures water at approximately 43°C could be considered.

Wash Basins

The comfortable working height, when standing, can be set to about 96 cm, with the water source at about 10 cm higher. If the wash basin is used by both standing and sitting persons, the basin height has to be lowered to 80 to 85 cm. Wash basins used by wheelchair patients should preferably be kept at a height of 80 cm, and be 69 cm deep.

Water Closet

In the patient areas there is a general tendency to move in the direction of providing greater privacy for all personal hygiene functions. There should be no water closet without a wash basin. Containers for paper seat protectors as well as soap and paper towel dispensers should be provided. Grab bars next to water closet are some times needed.

3.5.4 Life Safety and Emergency Power

Life Safety

There is general agreement that smokes kill in hospitals more patients than flames do. A complete life safety system would include a fire rated construction, an early warning detection of smoke and fire to block the passage of smoke and confine the fire to its room of origin; an automatic sprinkler protection, a division of each floor into at least two areas or compartments, smoke control facilities, and a trained staff.

The main functions of a detection and alarm system are to alert staff to the malfunction or hazard and to enable staff to move to a place of safety. All diagnostic and therapeutic units must be connected to the Central hospital alarm system.

Emergency Power

When the hospital is suddenly plunged into darkness at the failure of mains, the major problem is probably the psychological shock. Few life support systems are fully dependent on main electricity. All life supporting facilities shall be provided with a general emergency power supply.

There are areas in which availability of emergency power is essential. The surgical department with its delivery section and post anaesthetic recovery area, and the intensive care units, come first. Heart, lung machines, lung ventilators, operation room lighting, pumps, apparatus & monitoring equipment should be connected to the emergency power supply which on failure of normal supply is automatically switched on. Also the laboratory should be connected to the emergency power system, all its loads that are essential for safety and preservation of research data.

Lighting in treatment rooms in the radio therapy units should be provided also the emergency power. Radio cobalt machine must be designed and installed to switch off in such an eventuality.

The function of safety lighting in other areas is to enable essential movements of staff and patients and to assist safe, unobstructed means of escape. Safety lighting is essential in all parts of the hospital.

It is desirable that one lift in each separate section of the hospital should be normally connected to the emergency installation having automatic change over facilities. These lifts, should be suitably indicated by markings at each landing. Suitable manually operated switching arrangements should be provided for other lifts to enable the standby supply to be switched from the emergency lift to each of the other lifts in the group in turn to eliminate the possibility of occupants being trapped.

In the operation department, the operation room light should be switched on within a half second in case of power supply failure, other equipment within 15 seconds. The degree and quality of emergency lighting should be equal to that of the normal lighting. Ample socket outlets connected to essential circuits should be available for portable light fittings to be used for tasks outside the critical working area which require a higher standard of lighting e.g., recovery.

The switch over the emergency power supply should be indicated on a control panel in the duty engineer's office. A local battery with about one hour capability should be automatically connected to provide uninterrupted power supply. Most batteries operate upto three hours. They are easily maintained and for installation upto 20 KW relatively in expensive. Measures shall be taken that batteries of a special emergency power supply will be recharged from essential circuits.

3.5.5 Communication System

Hospitals rely heavily on Communications. While hospitals have sophisticated medical equipment, less attention is often paid to the communication system. The communication system within the hospital and outside has an immense effect on patient care. This involves a number of subsystems, namely,

- Public address system to cover whole hospital
- Music system to provide piped music to selected areas

- Staff paging and calling system
- Telephone and intercom
- Close circuit television and master antenna television

Most of the above systems require an extensive network of cables and wires to be laid in conduits. This calls for detailed planning to locate the master control room, outlet points and routing.

Telephones and Intercom

Telephone facilities for internal and external calls are required in consulting rooms, nurses room, appointments and reception room, and for ambulance drivers. Connections to the hospital telephone exchange are also needed for duty rooms, changing rooms and staff lounges of the units belonging to the medical performance area.

There are voice communication systems (intercom) on the market which are especially adapted to the internal communication routine in hospitals. Use of these systems increases efficiency and improves safety for the patients. By intercom you communicate quicker than by telephone, you are more available, both for patients and for colleagues, and at the same time the telephone is free for external communications.

3.5.6 Medical Gases, Piped Air and Vacuum

Of medical gases only Oxygen (O_2) and Nitrous Oxides (N_2O) are used in quantities that justify a piped supply economically.

Supply pipes from the gas centre should terminate with self-locking stop valves. Gas outlet points shall be at least 20 cms from electrical components which, correctly used or in case of a fault, could generate sparks.

Gas should be released only when an apparatus for its administration is connected to the valve. Plug in for similar rapid connection plugs must be used. Gas connections must not be interchangeable. Gas pipes must be identified by colours according to national or international standards. Anaesthetic gas termination points should be clearly marked. Piped oxygen and other gases require the installation of warning lights to indicate when the bank reserve reaches a critical level.

Piped oxygen, nitrous oxide and compressed air are needed in the intensive care, therapy units, in all-anaesthetic rooms, operation rooms, plaster rooms and recovery rooms. X-ray screening rooms in the radiology department may require piped oxygen, nitrous oxide and suction. Alternatively mobile equipment may be provided.

Vacuum is used throughout hospitals in patient treatment areas, in laboratories, in the surgical, recovery and intensive care areas. It serves to remove fluids from incision and body cavities and is used in post operative's drainage. In the laboratory it is used for filtering, cleaning delicate apparatus and transferring fluids from one container to another.

Vacuum is generally supplied by two or more vacuum pumps operating through a suitable receiver. It is probably a much-abused service in the hospital. Frequently it is used for purposes for which it was never intended, such as anti pollution units on anaesthetic machines.

The use of hospital piped medical vacuum systems, though feasible, introduces several problems. They should not be used with flammable anaesthetic agents. Anaesthetic agents are soluble in pump oils.

Compressed air tubes or the installation of central compressors are required. Compressed air must be filtered and dry condensation moisture must be drawn off from the pipes. To obtain a reserve of air and a drying effect simultaneously, an air tank could be used. This reserve may provide a safety margin during power failures. The compressed air installation must not be placed in a room together with oxygen and nitrous oxide containers.

Check Your Progress 4

1) List out few main causes of electric supply failure leading to hazardous conditions.

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2) What conditions often found in neglected water supply are hazardous?

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3) What should be the desirable working height for a wash basin for a) standing use, b) standing cum sitting use, and c) use by wheel chair patients?

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4) What hazard free measures must be kept in view in the design of piped gas system?

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3.6 GENERAL STANDARDS FOR DETAILS AND FINISHES

- Hospitals with an organized emergency service shall have the emergency access well marked to facilitate entry from the public roads or streets serving the site. Other vehicular or padestrian traffic should not conflict with access to emergency station. Access to emergency services shall be located to incur minimal damage from floods and other natural disasters.
- Rooms which contain both tubs, shower and or water closet for important use shall be equipped with doors and hardware permitting emergency access from the outside. When such rooms have only one opening, the doors shall open outward or in a manner that will avoid pressing a patient who may collapsed within the room.

- The minimum door size for in paticnt bedrooms shall be 110 m wide and 210 m high to provide clearance for movement of beds and other equipment like mobile x-ray unit. Doors to other rooms used for stretchers and or wheel chairs shall have a minimum width of 80 cm. Door width and height shall be the nominal dimension of the door leaf ignoring projections of frame and tops. For that matter 10 cm. for width and 5 cm for height may be added to arrive at the door way opening.
- Patient rooms or suites intended for 24 hours occupancy shall have windows that can be opened from the inside to vent noxious fumes and smoke products and to bring in fresh air in emergencies. Operation of such windows shall be restricted to inhibit possible escape or suicide.
- Dumbwaiters shall not open directly into a corridor or exit, but shall open into a room with a fire resistance rating of not less than one hour.
- Thresholds and expansion joint covers shall be flush with the floor surface to facilitate the use of wheelchairs and carts. Expansion and seismic joints shall be constructed to restrict the passage of smoke.
- Mirrors shall not be installed at hand washing fixtures in food preparation areas. nurseries, clean and sterile supply, scrub sinks, or either area where asepsis control would be lessened by hair combing.
- Floors and walls penetrated by pipes, ducts and conduits shall be tightly sealed to minimize entry of rodents and insects. Joints of structural elements shall be similarly sealed.
- Ceilings, including exposed structure in areas normally occupied by patients or staff in food preparation and food storage areas, shall be cleanable with routine house-keeping equipment. Acoustic installation and lay in ceiling, when used, shall not interfere with infection control.
- In operating rooms, delivery rooms for caesarean sections, isolation rooms and sterile processing rooms, provide ceilings that contain a minimum number of fissures, open joints or crevices and minimize retention or passage of dirt particles. Wall finishes for such rooms shall also be free of fissures open joints, or crevices that may retain or permit passage of dirt particles.
- In psychiatric patient rooms, toilets and seclusion rooms, ceiling construction shall be monolithic to inhibit possible escape or suicide. Ceiling mounted air and lighting devices shall be security type. Ceiling mounted fire prevention sprinkler heads shall be of the concealed type.

Check Your Progress 5

Fill in the Blanks:

1) Patient toilet shall open ..... or in manner that will avoid pressing a patient who may ..... within toilet.

2) Dumbwaitors shall not open ..... into a corridor or exit, but shall open into a ..... with a fire resistant rating.

3) Mirrors shall not be installed at hand washing fixtures in clean and .... or other areas where asepsis control would be lessened by .....

4) Acoustic and lay-in-ceiling, where used, shall not ..... with infection .....

5) In psychiatric patient rooms, toilets and seclusion rooms, ceiling construction shall be ..... to inhibit possible escape or .....

3.7 PREVENTIVE MAINTENANCE PROGRAMME

Prevention is Better than Cure

The responsibility of upkeep and maintenance of hospital and engineering services, premises and structure including its elements mainly rest with engineering department and governing

body of the hospital. The responsibility of the hospital administrator is, however significant both morally and legally. Under the hospital administrator major department heads including chief engineer are delegated a considerable amount of responsibility.

To reduce rather avoid the chances of occurrence of engineering hazards, it is essential to chalk out a preventive maintenance programme and also appoint a hospital safety committee to look into its strict implementation. Following aspects needs to be part of the programme.

- Selective use of music, with adequate concern for patient comfort.
- Ensure patient control of light within their territorial space, access to unfiltered day light for long term patient.
- Select warm or cool colour appropriately to activity level intended to space.
- Maintain an optimal thermal condition for patient and staff.
- Ensure periodical change of filter to provide the correct level of temperature and humidity control.
- Periodical cleaning of air-conditioning ducts system through a specialist contractor preferably by deploying compressed air technique.
- Restore frequent cleaning of floors with devices like vacuum, mopping, brushing, machine cleaning, chemical cleaning, waxing or so on related to usefulness of flooring material related to function.
- Maintain high hygienic standards for walls and ceiling. Repainting and cleaning schedule must not hamper the working efficiency of adjoining area.
- Shielded surfaces must be checked and repaired against any damage or leakage to ensure radio frequency interference-proof environment and elimination of Electro magnetic interference.
- Effective working of builder's hard ware of doors and windows must be assured through periodical checks. Self closing device must work smoothly, emission of any sound in its working should be at once eliminated.
- Glass pans must be kept clean through an easily accessible means for cleaning. Broken glass must be replaced. Brushing up, not picking up of broken glass pieces is recommended.
- Building must be frequently inspected for loose slate, bricks, stone, plaster etc, Such repairs under no circumstances be delayed or kept in abeyance.
- Where there is a variation in floor level, sufficient illumination at all hours must be provided.
- Elevator call button's shall not be activated by heat or smoke. Elevator doors should strike within a minimum impact and should promptly reopen.
- Occurrence of rust, damp conditions, stagnation of water, leakage and seepage, corrosion, scale formation in water supply system should be avoided through periodical inspection.
- Water course must be dechlorinised, overhead tanks cleaning and good maintenance practices must be adhered to.
- Regular cleaning of cooling towers be undertaken. Water droplets produced by fans within the cooling tower should not be allowed to result in contaminated situation.
- Patient toilets must be cleaned at least twice a day to safeguard against risk of cross-infection.
- Gas connections must not be interchanged. Piped gas fault must immediately be attended.
- Avoid mechanical or physical pressure on cables, which may deform insulation and may reduce its ability to withstand voltage pressure.
- Select properly and lay cables on trays to achieve high reliability over voltage surges and over heating of joints and terminals.

- Ensure smooth and proper working of circuit breaker mechanism.
- Electrical equipment must not be connected to the outlet points with loose leads or bare ends of wires.
- To one out-let point, only one equipment should be installed.
- The capacity of the out-let point and connecting wires must be matching to take the specifled load of equipment to be connected.
- Heating appliances, light and fans must be switched off when any room is to be locked or left unattended.
- All the electrical appliances, equipment must be properly earthed.
- All electric, water supply, air-conditioning and other services involving use of plants and machinery must be maintained to remain good working conditions through periodical checks regular upkeep and proper maintenance drive.

3.8 LET US SUM UP

In this unit you have learnt about the factors of hospital planning and design, physical environment, constructional elements and materials, hospital installations providing support engineering services and general standards of concern. Neglect of these elements and services at the time of planning, execution, up-keep maintenance will result to engineering hazardous conditions.

Further you learnt that hospital engineering services installations which are considered to be life line for a hospital building needs proper attention in their siting, their network of distribution system through a well coordinated planning and construction system. And also these services include electric and power supply, water supply, sanitary equipment and plumbing, heating ventilation and air-conditioning, medical and laboratory gases, traction, telephone and communication system, life safety fire protection and emergency power etc. You have also learnt that any dislocation, wrongful planning, disruption and failure of any of the services will prove to be hazardous. You have also learnt that direct contact with potential electrical source, damp conditions, rusty, stagnant, leakage, seepage, corrosion, scale formation and micro biological growth in water supply, accumulation of thick coating of fluffy dry deposit on the inside of air-conditioning duct truncking and transmission of infection via ventilation system, non compliance of piped gas supply norms, occurrence of leakages are few of the hazards and these can be avoided through well planned system, effective maintenance programme and appropriate cleaning procedures.

3.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Design of hospital premises should meet fully the health services requirements with least amount of hazards. Building must be sufficiently flexible and robust to respond to changes in technology, demand and patterns.

2) Single high rise building makes the service fully non-functional in the event of accumulated risk from disasters and is also adversely subjected to natural disasters.

3) Design soundness conditions are:

   a) To be serviceable under normal loading including fire and floods.

   b) To survive minor emergency loading on account of designed high wind, earthquake etc.

   c) To survive extremely severe emergency loading of near miss blast, hurricane or major earthquake.

4) The salient aspects of disaster safety worth considering in design of building structure are: Fire, Flood, High wind and earthquake.

Check Your Progress 2

1) the light

2) green, blue, voilet; blue, green; red, orange.

3) sounds

4) 21° C, 23° C

5) steady source

Check Your Progress 3

1) Variable elements to be considered in selection process are mainly related to use base such as friction need, indoor - outdoor use, nature of area, durability, surface quality need, method of cleaning to be employed and special traffic need.

2) Wall material in the high hygienic standard area like operation rooms should be hard, robust, impervious, jointless, non absorbent, easily to clean and decontaminate.

3) Interference requiring shielding are:

   a) Electro-magnetic interference,

   b) radio frequency interference,

   c) emission of radiation by use of radiology devices,

   d) exposure to nuclide in nuclear medicine, and

   e) magnetic field in MRI

4) Door for radiographic/fluoroscopic examination room shall be light leak proof, shielded by sheet lead, automatic closing type, 120 cm wide and 215 cm high.

Check Your Progress 4

1) Main causes of failure of electric supply are:

   a) moisture penetrating through cable sheath,

   b) mechanical damages like abrasion, crimping, embrittlement etc.,

   c) physical presure on cables deforming insulation,

   d) carelessness during laying of cables, and

   e) short circuit.

2) Damp conditions often found in neglected water supply ares because bacteria causing legionnaires disease live in damp conditions any where, but do best in water that is warm, rusty and stagnant.

3) Desirable working height for wash basin for,

   a) standing use is 96 cm,

   b) standing cum sitting use is 80 to 85 cm, and

   c) use by wheel chair patients is 80 cm.

4) Measures which must be kept in view in piped gas supply systems are:

   a) supply pipes to terminate with self locking stop valves,

   b) gas out let to be at least 20 cm away from electrical out let,

   c) gas pipes must be identified by colours according to national standards.

Check Your Progress 5

   a) out ward, collapse

   b) directly, room

c) sterile supply areas, hair combing

d) interfere, control

e) monolithic, suicide

3.10 FURTHER READINGS

Bureau of Indian Standards, *Recommendations for Basic Requirements of General Hospital Buildings*, part 1 to 3 IS : 10905 (Part 1 to 3).

ERVIN, **PU TSEP** *Modern Hospitals International Planning Practices.* Lloyd-Luke Ltd., 49 Newman Street, London.

International Hospital Federation, *Hospital Management International,* 1988, 1994, 1995. IHF 4 Abbots Place, London. UK.

Isadore Rosenfield, *Hospital Architecture Integrated Compound*, Progressive Architecture Library, New York, USA.

The American Institute of Architects Committee, *Hospital and Medical Facilities.*

Guidelines for Construction and Equipment, The American Institute of Architects Press, Washington, USA.

UNIT 1 ORGANISATIONAL ANALYSIS

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the organisation, objectives and functioning of a hospital/health institution;
- enumerate the core variables contributing to organisational effectiveness;
- identify the important factors responsible for effectiveness of an organisation; and
- analyse the interaction of core variables and factors responsible for organisational effectiveness of a hospital/health institution.

1.1 INTRODUCTION

In this unit of practical manual you will learn about analysing hospital/health institution as an organisation so as to know its functions, structure, type of organisation hospital management has adopted, the role and charter of duties of each of the functionaries in this organisation.

You will also learn how to bring new dimension in organisation system and subsystem in a hospital set up. You should understand that for analysis of an organisation, one should first understand philosophy, aims and objectives and then clearly formulate organisational chart to define clear hierarchy. You also need to include the functions and operational aspects of the hospital/health institution.

1.2 CONCEPT OF ORGANISATION

An organisation comes into existence when there are a number of persons in communication and relationship to each other and are willing to contribute towards a common endeavour. Thus to achieve a common purpose people form groups and pool their efforts by defining and dividing the various activities, responsibilities and authority. The important characteristics of an organisation are:

- Communication
- Co-operative Efforts
- Common Objectives
- Rules and Regulations

You will appreciate that the persons who form the organisation must be in a position to communicate with each other. Further, they must also be willing to co-operate with each other for the achievement of their goals or objectives. The objectives must be

common for which the organisation comes into existence. Lastly, rules and regulations lay down the formal structure of an organisation and also define the authority and responsibility relationship among various individuals in the organisation.

Organisation can also be defined as the framework within which the responsibilities of management of an enterprise are discharged. According to this definition organisation is recognized as a structure, which means it will be viewed as something static. But an organisation as you know is a dynamic entity consisting of individuals, means, objectives and relationship among the individuals. In this sense "relationship" or "formal organisation" is only a part of the organisation.

Human organisations are organic in the sense that various parts are interdependent. Some of the basic pillars of the organisation are individual, groups and the work. Work place is one of the most important institutions for providing human satisfactions.

Organisation has also been known as a system of communication, a means of problem solving, and means of facilitating decision making. Organisations can be viewed as a social system and as systems of a group of interacting variables.

For practical purposes organisation can be simply defined as a process of:

- Determining what must be done if a given aim is to be achieved.
- Dividing the necessary activities into segments small enough to be performed by one person; and
- Providing means of co-ordination so that there are no wasted efforts and the members of the organisation do not come in each other's way.

Organisation can not be separated from the idea of purpose and is necessary whenever two or more people must continue their efforts towards the same and even if task is short-lived. It is not an end in itself but a means to an end.

1.3 ORGANISATION STRUCTURE

Organisation as you have already learnt is a group of people working together to attain the desired objectives. People in an organisation do not start working together automatically unless they are provided with some mechanism of co-ordination and control. One of the mechanisms is the organisation structure. It reveals who has authority over whom in the organisation. It provides an invisible framework to integrate all the people working together towards a common goal. Organisation structure is essential for exercising leadership. Organisation structure provides an indispensable sort of co-ordination in an organisation. Peter Drucker suggests that the three ways to the organisational structure are:

- Activity analysis
- Decision analysis
- Relation analysis

The areas of career planning, executive development, manpower planning, etc. are the major areas, which are gaining importance in a large size organisation. This is the reason that Personnel Departments are known as Human Resource Departments with the responsibility of salary, surveys, empowerment of people and far more emphasis on Human Resource Development. You have already read about Human Resource Management in Course-1.

Individuals can give their best to the organisation, but when it comes to working together as a group or as work team they need to be educated. The large size organisations need a special emphasis on the techniques of group dynamics. The structure of an organisation stems from the detailed study and application of organisation principles. The organisations are working on Mission Statements,

defining the values of the organisation and rebuilding organisation culture, which is self-driven and motivating.

Types of Organisation

Now you will learn about various types of organisation, which are:

a) *System Organisation*

As you know the organisation is a system with multiple functions involving multiple interactions between organisation and its environment.

You must also know that organisation is composed of many sub-systems, which are in dynamic interaction with one another. It involves the study of these sub-systems in terms of group behaviour, goals etc. These sub-systems are mutually dependent and change in one sub-system affects the behaviour of other sub-systems. Finally the organisation exists in dynamic environment which is also composed of other systems and sub-systems. The multiple links between the organisation and its environment make it difficult to specify the boundaries or limits of any organisation.

Organisational systems and sub-systems in turn interact with the systems and sub-systems of dynamic environment to bring about organisational effectiveness, organisational development, organisational growth and organisational change. Thus the environment within which an organisation exists is becoming increasingly unstable because of the rapid change of technology, the expansion of economic market and rapid social and political change. Every organisation carries within itself representative of external environment. The employees are not only members of the organisation but also the members of other organisations, groups and societies.

Thus the organisation is a complex system because of the complex interactions between how an individual is inducted into the organisation trained, developed and managed and the interaction between the formal organisations and the various informal groups which arise inevitably within it. As all organisations exist in an environment, which consists of the culture and social structure of the society in order to revive, the organisation must fulfil some useful function.

The formal organisation is a system of well-defined jobs, each bearing definite measure of authority, responsibility and accountability to enable the people of the enterprise to work most effectively in accomplishing their objectives and organisational goals.

In the formal organisation, the work that each individual does is part of a larger pattern; co-ordination proceeds according to a prescribed pattern in the formal organisation. It sets up boundaries and path, which must be followed to achieve the objectives.

b) *Project Organisation*

In this approach, group of individuals possessing the required skills is organised into an autonomous unit for a particular project. Project management is carried out by a director appointed to coordinate and motivate the people in various activities. Responsibility for the project is very well pinpointed.

c) *Matrix Organisation*

It is a form of organisation, which contains both the project structure and the traditional functional structure. Matrix management provides for specialized knowledge for carrying on a number of specific projects. The disadvantage may arise because of the dual accountability of personnel involved in the project.

Organisation Structure

The conventional organisational structure in the form of pyramid, with head of the institution at the pinnacle and the grassroots level workers at the bottom has been widely perceived as the ideal method of balancing the needs of the health sector as far as specialists and generalists are concerned. Thus at the bottom were the specialist managers, fleshly recruited from management. With the passage of time this manager gains experience, acquires additional knowledge and is ready to expand his sphere of

functioning, at which point he is considered fit to be promoted up to understand and specialize in an ever widening sphere of the organisation's activities and simultaneously is also forced to take a broader view of the business perspectives. The process is repeated time and again till the manager reaches the pinnacle.

The pyramidal structure presupposes the breaking down of the organisation into a series of manageable units work generally based on functional requirements. When integrated, these functional units form the core of the organisation.

Decisions are but interpretations of available information and the conventional organisation structure assumes that as one moves upwards in the organisational hierarchy, the decision makers automatically have access to more channels of information and hence are in a position to take better decisions. Thus delegation of authority is invariably designed to ensure that the more important a decision the higher authority who takes it. Thus the head of the institution is expected to take the most important decisions, and down the line, decisions of lesser importance are taken till we reach the very bottom where the most mundane things will be decided upon.

1.4 ORGANISATION EFFECTIVENESS

Organisations as you know are social systems with "Specific Purposes". Therefore, effectiveness of organisation is a measure of its ability for goal attainment. For example a sub-centre which has to provide MCH Services and has a high immunization coverage and low incidence of vaccine preventable diseases would be considered an effective organisation. Similarly a hospital which has provision of curative services as its goal and which successfully treats the patients, would be considered as an effective organisation.

You will notice that clarity of goals or objectives become important if one has to comment on the effectiveness of an organisation. Effectiveness says something about how well an organisation is doing in achieving its objectives.

You can recall a myriad of variables which implinge on effectiveness of an organisation. Variables, which may contribute towards effectiveness, include productivity, adaptability, flexibility, motivation, conformity etc. The variables or the determinants must tell us something on the present state of the organisation, the capability of the organisation to keep up with the changing environment, and the capacity of the organisation to meet unforeseen situations. Presence of these attributes in some measure or the other should determine the effectiveness of an organisation both from the view of the output and its ultimate potential.

Having known the objectives, you should familiarise yourself with the determinants of organisational effectiveness. The core variables, which contribute towards effectiveness, are:

- Productivity
- Adaptability
- Flexibility

Productivity: It deals with the present state of the organisation in terms of output. Effective organisations are those that produce more and higher quality outputs most efficiently. Thus, maximisation of output and minimisation of input will be a measure of the efficiency of an organisation. But the output must contribute towards goal attainment. The output or the product could be anything such as number of children immunized, number of deliveries conducted by trained health personnel or the number of patients admitted and discharged.

Adaptability: You will appreciate that no organisation operates under static conditions. There is constant flux in the environment. The ability of an organisation to monitor this change and keeping pace with this change would be a measure of its adaptability.

Survivability of any organisation depends on its adaptability. An organisation should be endowed with a structure, which can monitor the change in the environment and to

take suitable action to modify organisational activities to meet the change. Adaptability does not only mean coping with change but also anticipating change. You will agree to that in an era of competition, it pays to be pro-active than to be reactive.

Flexibility: Another important determinant of organisational effectiveness is flexibility in the structure to meet the challenge of unforeseen situations. Situations do not arise as expected. The future is uncertain. The arrival of unforeseen situations are stochastic in nature. Not only the arrival is stochastic, the very nature of situations may be different. When is the unusual demand going to occur, and what kind of demand would that be? Both would require the flexibility of an organisation to cope with unusual demand. If this flexibility is found wanting, naturally the organisation cannot keep up with its goal-attainment. Therefore, it is necessary to have inbuilt flexibility mechanisms within the organisational structure.

Thus the criteria for effectiveness can be summarized as follows:

a) Organising the centers of power for routine services (productivity) which includes:

- The quality of the product/service,
- The quantity of the product/service, and
- The efficiency with which it is produced.

b) Organising Centres of power to change routines (Adaptability) which includes:

- Anticipating problems in advance and developing satisfactory and timely solutions to them.
- Staying abreast of new technologies and methods applicable to the activities of the organisation.

Factors Influencing the Core Variables

An organisation high on productivity is meeting to some degree its goal-attainments. Similarly organisations high on adaptability and flexibility have the potential to meet the threats of the environment and thus contribute to organisational effectiveness on a futuristic basis. It can be said that productivity decides how well you are doing at present, but adaptability and flexibility decide whether you can survive or not i.e. can you cope with change and unpredictable situations?

Each of these core variables get further enhanced or reduced by impact of many other factors such as centralisation. Let us examine how is centralisation related to the core variables? Centralisation may be functional to productivity for routine jobs but dysfunctional in coping with unforeseen situations (flexibility). Therefore, many factors are functionally or dysfunctionally related to the three core variables discussed above. This issue can be further complicated, if we consider that centralisation, say for example, is functionally related to productivity and dysfunctionally to flexibility. Then, is a high degree of centralisation desired? Simply, which is more important productivity or flexibility? This would depend on the goal of the organisation. Ideally maximization of all the three core variables should lead to high organisational effectiveness, but the constraints of resources will limit the necessity to maximize all the three.

Some of the important factors often encountered in an organisation are as follows:

- Leadership
- Centralisation
- Conformity
- Motivation
- Communication
- Autonomy
- Mobility

Factor-variable Interaction

Now you will learn about step by step analysis of the factors vis-à-vis the variables.

Leadership

You have already learnt about various types of leadership styles. On one end of the continuum you have the high-task and low-people style. The high-task, low-people style obviously is suitable for short-term increase in productivity. Therefore, a positive correlation exists between high productivity and this style of leadership particularly for short term. In the long term, productivity is bound to come down as the morale of the workers is also likely to suffer under the influence of the high-task, low-people relationship. Hence the high task, low people have more dysfunctions than functions towards productivity in the long run. But this style may be suitable during high overloads of work. That means when overloads of work arise temporarily this style is likely to be functional. Any number of such arguments can be developed, and the style most suited will be determined by the organisation goals itself. For example, a high people, low task style will enhance motivation but unless that motivation leads to a spurt in enthusiasm to work more, it has very little to contribute to the effectiveness of an organisation.

Centralisation

A high degree of centralisation has been found to be positively correlated to routine type of jobs. That is, where the job is of a routine nature, a high degree of centralisation enhances productivity by optimizing use on resources. But, where the job is more contingent than routine, high centralisation becomes dysfunctional as the managers have very little flexibility in decision making. Thus centralisation affects flexibility. For example, in an organisation where routine jobs exist side by side of a research laboratory, high centralisation may be desirable in the former case but decentralisation is a must in the latter. Therefore, the degree of centralisation should be determined depending on the type of job people are doing. In the same organisation, this aspect may have to be varied, depending upon the level of the subordinates.

Conformity

Conformity implies the degree to which performance corresponds to norms. The implications are high degree of conformity at the activity level will result in higher productivity for routine jobs. Where jobs are specialised conformity will restrict independent action thereby depriving qualitative changes. Where qualitative changes are desirable, like research laboratories, specialised hospitals etc., the consequences would be dysfunctional to productivity. Similarly, at higher levels, conformity will breed 'yes men' rather than honest advisors. Not only the restricted field of action likely to cut into flexibility, adaptability is also likely to suffer. Conformity also tends to affect morale which in turn affects productivity. Nevertheless, in health organisations, conformity at the lower levels is a desirable trait. Further questioning of orders and instructions of superiors under emergency situations, will without doubt curb operational success. At the directional and conceptual levels, any kind of pressure to ensure adherence to norms is likely to frustrate individual opinion, and consequently growth of our organisation.

Motivation

Motivation as you have learnt in Course-1 may be defined as the degree to which individual motives are gratified. Rates of turnover, absenteeism and sick reports are common measures of motivation. Low motivation arises out of repetitive jobs and, therefore, dysfunctional to productivity when routine jobs are concerned. Its functional aspect relates to the dexterity and job competence that is developed by the worker. On the whole, dysfunction is more predominant where the job content is of a routine and repetitive nature. Low motivation essentially has dysfunction running through all the core variables, viz. productivity, adaptability and flexibility. The only time when low motivation gets positively correlated to flexibility during routine overloads of jobs when the manager has to resort to High Task-Low Relationship approach.

Communication as you know may be defined as the transmission of information with the intent of changing the recipients' knowledge, attitudes or overt behaviour. Free flow of communication gets negatively correlated to productivity due to information overload at the decision nodes. Communication which is spontaneous at the work place is found functional to the core variables. Organisational structures, which attempt to break the information overload at the decision nodes often, resort to vertical organisations. This also becomes dysfunctional due to the distortions at the many interfaces of the organisational hierarchy. It has been found that highly centralised organisations imbibe the practice of vertical flow of communication from "Top" to "Bottom". In such situations, you will notice communication gets positively correlated to productivity of routine kind of jobs. Also the flexibility for routine overloads of work increases. The dysfunction due to top to bottom approach of communication manifests itself in the area of flexibility for situational context. In such situations authority and responsibility needs to be delegated to the peripheries of the origination where lateral and vertical communication flow play a vital part. Horizontal communication on the other hand, is positively correlated to adaptability as it permits free and quick exchange of information. Open Organisation Systems permit a lot of lateral communication to react to environmental changes.

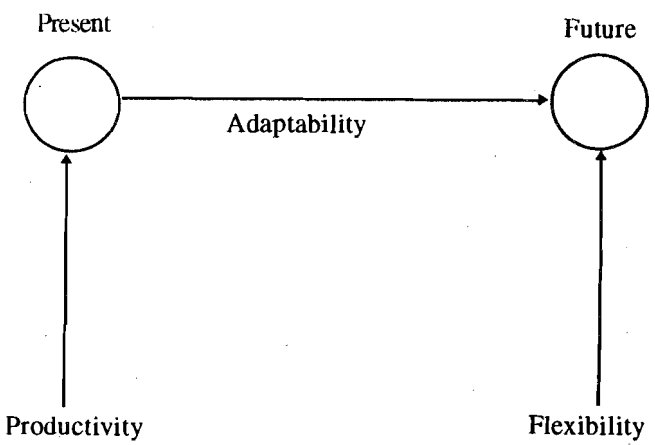
Autonomy

Autonomy may be defined as the degree to which a social system has freedom to make decisions with respect to its environment. The autonomy of an organisation is related to its centralisation. Whenever centralisation is high autonomy decreases. Therefore, autonomy is negatively correlated to productivity for routine jobs and flexibility on routine overloads. Autonomy is positively correlated to adaptability and flexibility for contingent situations. Predominantly autonomy at work increases productivity due to higher morale of the workers.

Mobility

There are two kinds of mobility. The first one involves changes of location coupled with change of job and the second one relates to change in location and continuation of the same job. The first type of mobility which we will call type A and the second type, the type B. Type A mobility is functional for semi-skilled jobs since shift in ability helps in contingent situations. However where jobs are specialized, type A becomes dysfunctional to all the core variables, type B mobility is functional. The degree, to which an organisation can mobilize itself to achieve the goals, is a measure of its organisational effectiveness.

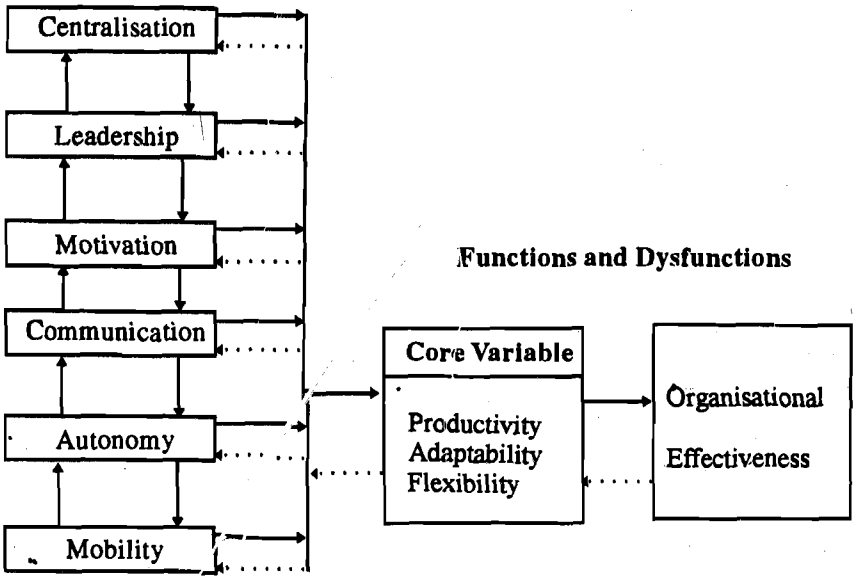
The effectiveness measure has to be seen from the point of view of the present state, the future and the potential to handle unforeseen situation. The relationship among the three core variables can be understood by the following model:



Productivity is concerned about the present state, flexibility is concerned about the potential of an organisation to handle unpredictable situations in the future, and adaptability is the line joining the present and the future adaptability would safeguard the very survivability of an organisation. The line demarcating adaptability and flexibility is indeed thin. Flexibility essentially is a special case of adaptability.

Flexibility implies temporary changes to meet a contingent situation, after which the organisation returns to its original state. Adaptability is seen as a long term change forced by the environment. You will agree that for hospitals, both adaptability and flexibility are essential if hospitals have to meet the people's expectations in changing health scenario and rapid advancements in medical technology.

The core variables determine the effectiveness of an organisation. But these core variables are affected by many factors like centralisation, motivation, autonomy etc. Therefore, the relationship between the factors, the core variables and organisational effectiveness is interdependent in nature. This will be clear by the following model:



The factors are functionally or dysfunctionally related to the core variables. A factor may functionally contribute to productivity but dysfunctionally to flexibility. Another factor may do quite the reverse. Therefore, the interaction among the various factors will finally shape the total effect on the core variables and consequently the organisational effectiveness.

The maximisation of the core variables should lead to maximisation of the organisational effectiveness. But constraints of resources will force a compromise in their mix from level to level in an organisation, depending upon whether the level is an activity, directional or conceptual.

1.5 LET US SUM UP

In this unit you have learnt about the existence of an organisation, types of organisations, organisation structure and its effectiveness. You have also learnt about the core variables and factors affecting the effectiveness of an organisation. You have also learnt how the intervention of core variables and factors affect the effectiveness of the organisation.

1.6 ACTIVITIES

To understand the organisation and functioning of a health institution and to fulfil the objectives of this unit of practical manual, you should perform the following activities.

- Enlist the aims and objectives of the selected hospital/health organisation.
- Enumerate the functions/services being provided.
- Ascertain from the staff members of the organisation, if they have defined job functions, do they have defined job responsibilities with them in the form of manual or guide book.

- ☞ Draw an organisational chart showing hierarchical relationship.
- ☞ Study the various factors responsible for organisational effectiveness.
- ☞ Identify the key problem areas and suggestions for improving the effectiveness.

In order to accomplish this task you should identify and select a hospital/health institution which has average performance. You may finalise the selection of institution/hospital in consultation with your academic counsellor at Programme Study Centre. After selecting the institution you may collect the relevant information through interviews, study of records and by direct observation.

UNIT 2 PATIENT'S SATISFACTION

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the importance of patient's satisfaction;
- enumerate the methods to determine the patient's satisfaction level;
- carry out the patient's satisfaction survey; and
- ensure that your patients in the hospital are satisfied and shall come back to you on a later occasion.

2.1 INTRODUCTION

In this unit you will get an outline about the assessment of patient's satisfaction in a hospital set up. You will learn about the importance of patient's satisfaction. You will also learn about the personnel responsible for patient's satisfaction and the ingredients of patient's satisfaction.

During the course of your working in the hospital you must have had some idea about satisfying your customers/patients. In this unit you will learn about the importance of patient's satisfaction in the modern age of quality assurance and total quality management. The number of repeat customer is very important in evaluating the reputation of the hospital. Advertisement by the word of mouth is also another tool very prevalent in the hospital industry. You will learn about the personnel responsible for patient's satisfaction and the ingredients of patient's satisfaction. You will also learn about various tools and techniques to assess the patient's satisfaction level of your hospital. The sample questionnaire is also given at the end so as to make it convenient for you to carry out the survey in the selected hospital.

2.2 REVIEW OF SITUATION

The goal of any service organisation as you know is creation of satisfaction among the customers. Customers are of two kinds—external and internal. External customers are patients, physicians or consultants, insurance agents/payers, vendors etc. Internal customers are the staff/employees and volunteers. The satisfaction of both these groups is equally important and are reciprocal in nature. Moreover, the concept patient satisfaction is rapidly changing to **customer's delight** which means the patient not only is cured of his ailments during the hospital stay but also is pleased with the amenities provided to him by the hospital and its staff during the stay which he fondly remembers after being discharged and longs passionately to avail the services on some other occasion.

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Two important aspects determining the level of ratio fraction are expectations and perceptions. Expectations are before being inside the hospital and perceptions are after coming out of the hospital. The reputation of any health care delivery system organisation is the dominant factor in determining patients preferences which in turn depends on their perceptions of the institution. The perceptions are based largely by personal experiences, word of mouth publicity and information shared by a close relative or someone from that organisation. Studies have revealed that these three factors constitute almost seventy per cent of the consumer's awareness about the hospitals. Rest thirty per cent are influenced by other factors like paid advertising which in turn creates expectations. The factors affecting patient's satisfaction in terms of quality of care are:

Appropriateness: The degree to which the care/intervention provided is relevant to the patient's clinical need, given the current state of knowledge.

Availability: The degree to which the appropriate care/intervention is available to meet the needs of the patient served.

Continuity: The degree to which the care/intervention for the patient is coordinated among practitioners, between organisations, and across time.

Effectiveness: The degree to which the care/intervention is provided in the correct manner, given the current state of knowledge, in order to achieve the desired/projected outcome(s) for the patient.

Efficacy: The degree to which the care/intervention used for the patient has been shown to accomplish the desired/projected outcome(s).

Efficiency: The ratio of outcomes (results of care/intervention) for a patient to the resources used to deliver the care.

Respect and caring: The degree to which a patient, or designee is involved in his or her own care decisions, and that those providing the services do so with sensitivity and respect for his or her needs and expectations and individual differences.

Safety: The degree to which the risk of an intervention and the risk in the care environment are reduced for the patient and others, including the health care provider.

Timeliness: The degree to which the care/intervention is provided to the patient at the time it is most beneficial or necessary.

In the absence of the above mentioned factors, patients could feel ignored and uncared for during their course of the hospital stay naturally tend to be upset and legally aggressive leading most of the times to consumer suits in the present day.

Staff Satisfactions

Human resource as you know is the greatest asset of any hospital. It is very vital to ensure that they are productive, satisfied and thoroughly involved in their respective processes of the health care delivery team. The hospital can't satisfy the customer unless it satisfies the staff. The role of the hospital administrator is very important in creating an environment conducive to all groups and employees so that they bring out the best in themselves and in turn increase productivity i.e. better service which is quantifiable.

Patient's satisfaction is built upon following service points/units:

1) ***Front office or Reception***

- Mannerisms and courtesy extended to the patients and relatives.
- Detailed information regarding various functionaries, timings, tariff etc.

2) ***OPD and Emergency***

- Promptness of the staff i.e. Doctors, Nurses and other paramedical staff.

- Sense of concern towards patient.
- Carrying out various examination and tests effectively and efficiently.

3) *Indoor Services*

- Ambience of the room
- Quietness
- Sense of privacy
- General cleanliness
- Housekeeping
- Safety and security
- Food services
- Behaviour of staff towards patients
- Sign posts, parking etc.

4) *Billing and Payment System*

- Timeliness of billing
- Accuracy
- Flexibility in form of payment e.g. cash, cheque, credit card etc.

Health care providers could be categorised into the following three types based on the culture and service of the place:

Factors	Type I	Type II	Type III
Attitude	Bureaucratic	Polite	Empathetic
Noise Pollution	Very destructive	Noisy	Low and quiet
Privacy	None	Reasonable	Concerned towards privacy
Information	None	Information given only to questions	Well informed through brochures and guides
Ambience	Institutional ambience	Comfortable surroundings	Caring environment
Service time	Long wait	Moderate wait	Prompt service
CEO commitment	None towards services	Minimises complaints	Top priority towards service
Patients impact	**Dissatisfied**	**Reasonably Satisfied**	**Completely satisfied**

2.3 MATERIALS AND METHODS

The various materials and methods in assessing the level of patient's satisfaction in a hospital are:

1) **Self assessment** is to be done by you to take stock of the situation in terms of patient satisfaction. Sample enclosed at Annexure 1. One can also review the total number of complaints received in the last one year.

2) **Interviewing hospital staff and patients**: A good range of the hospital staff (all levels) should be interviewed to assess the awareness amongst themselves towards the concept of patient satisfaction. The patients could also be interviewed during their stay. In this situation absolute confidentiality is

supposed to be kept and they should be reassured that the study is for a specific purpose designed to improve the services of the hospital. In a big hospital the sample size should be at least 100, in smaller places it should be 50. A pilot study could be performed on a sample size of 10. The data can be processed, analysed, and the results can be represented both in figures and graphical form. (Sample enclosed at Annexure 2.)

3) **Exit Interview or Survey of patient satisfaction:** By far this is the best tool to assess the level of satisfaction in any hospital set up. The patient had come with certain expectations and has gone with certain perceptions in his mind. The views could be of the patient, a relative who shares his views or a friend who was also accompanying the patient in the hospital.

   This should be an ongoing process and should be sustained if the hospital is keen to build up good guest relation programme. The results could be analysed every quarterly in excel and Epi-info and results to be formulated both graphically and in figures.

   It is the responsibility of the top executive of the hospital to see that the satisfaction graph rises and goes beyond all boundaries into "DELIGHT" zone. Sample enclosed at Annexure 3.

2.4 ACTION PLAN

The concept of customer's satisfaction and delight should originate from the top management and the idea should percolate down to the lowest member in the organisation.

However, the first step is to take stock of the situation and evaluate the existing scenario of patient relationship.

After assessing the level a detailed programme needs to be planned in a phase wise but time bound manner. Both the internal and external customers should be focussed but in the first step the internal customers need to be sensitised to this important issue. Its importance in terms of finance, quality and competition should be explained to the staff.

In phase 2, interviews should be carried out amongst the various members of the staff as well as the patients.

The results of the interview to be processed and analysed and kept as a baseline guide for future comparison.

Thirdly the exit interview or survey of patient satisfaction to be carried out as described and the results to be analysed and compared with that of phase 2. However, this programme should be sustained and ongoing because there is no end to win over our customer.

2.5 LET US SUM UP

In this unit you have learnt about the various facets of patient/customer satisfaction. You have also gained an insight into the concept of patient satisfaction, its importance and the various factors influencing it. You have been provided with the samples for the interview and survey which will serve as a ready reckoner to execute the programme in your hospital.

2.6 ACTIVITIES

You are required to carry out a study on patient satisfaction in a selected hospital and submit your comments on the following:

- ☛ Study the patient relationship in a local hospital, as per Annexure 1.
- ☛ Carry out a pilot study in medical ward (10-15 patients) in a local hospital as per Annexure 2.
- ☛ Go through the following case study and write the answers to the questions. You may discuss your answers/observations with your academic counsellor at Programme Study Centre and also with your peer group.

CASE STUDY

A middle-aged lady, a follow up case of carcinoma breast $T_3N_2M_1$, presently admitted for chemotherapy in one of the room of your hospital.

On the second day her husband complained that the patient couldn't sleep the whole night as there were rats in the A/C duct and the false ceiling. They were making such a noise that it was impossible for the patient to sleep.

Moreover, the bearer brought dinner at 7.30 p.m. and left in the room. By the time the cycle of chemotherapy was over it was 9.30 p.m. When the patient wanted to have her dinner they found cockroaches all over the food tray. The patient couldn't have her dinner because it was already 10 p.m. and the kitchen was closed and so also the shops nearby.

- ☛ How could rats and cockroaches enter the room without anybody's notice?
- ☛ Is someone responsible/accountable for the fact to see whether the patient has had her food or not?
- ☛ What would you do in such a situation?

Evaluation of Patient Relationship Programme

Given below are a total of 24 points wherein you have to tick **Yes** or **No**. If the total number of Yes is >20 then the programme is excellent, if >15 it is good but if it is less than 12, then it certainly needs improvement.

Section A : The need for improved patient relationship

1. Patients rarely complain about staff behaviour. Yes/No
2. The hospital's atmosphere is generally seen on very friendly. Yes/No
3. Employees speak good about the hospital to outsiders. Yes/No
4. If visitors to the hospital are lost then guide them properly. Yes/No
5. Generally there is a spirit of teamwork and cooperation among the staff. Yes/No

Section B : Awareness amongst staff

1. Employees understand the importance of patient satisfaction in achieving the hospital's goal. Yes/No
2. Staff at all levels are aware of the hospital's financial position and the competitive market. Yes/No
3. Employees are generally aware of their importance in attracting patients. Yes/No
4. Administrators give importance to guest relations and patient satisfaction in the culture of the hospital. Yes/No
5. All publications of the hospital carry features on guest relation issues, events and accomplishments. Yes/No

Section C : Accountability of staff

1. For the staff we have given instructions, clear, written expectations in specific terms. Yes/No
2. We punish/terminate staff who fail to meet high guest relation standards. Yes/No
3. Our top administrators are courteous, friendly and have a caring attitude towards patients and visitors. Yes/No
4. Guest relations behaviour has a prominent place in our performance appraisal forms. Yes/No
5. The quality of behaviour towards hospital guests affects employees pay increase and promotions. Yes/No

Section D : System for improving employee skills

1. Our organisation offers training programme to upgrade the guest relation skills of our employees. Yes/No
2. Our hospital conducts jobs specific guest relation upgradation skill training programme for:

   Security Staff Yes/No

   Parking Staff Yes/No

   Receptionist Yes/No

   Nurses Yes/No

   Technicians Yes/No

   Billing Clerks Yes/No

   Supervisors Yes/No

3. We offer training in handling complaints and complaints are seen as another chance to satisfy customers. Yes/No

PART-A

Dear Sir/Madam,

Our hospital is conducting a study to assess your valued opinion about the hospitality services provided in the hospital so as to identify areas where there is a need for improvement.

Please feel free to express your opinion objectively. You could withhold your identity if you so desire. You are also welcome to offer suggestions for the overall improvement of the services for which we shall be grateful to you.

Thanking you,

.....

.....

PART-B

Personal Particulars

a) Name (optional) Sex Age

b) Date of admission Date of Discharge

c) Diagnosis

d) Occupation
(If unoccupied please mention the occupation of the person you are dependant upon)

e) Annual Income <1 Lakh 1-2 Lakhs
2-3 Lakhs >3 Lakhs

f) Residential address
(Please mention only the city/state)

g) Who is bearing your hospitalization expenses
Government Employer (private or corporate) Insurance company Self

h) Have you been hospitalized before Yes/No
If Yes, Name of the hospital
If possible Govt. Hospital/Private Hospital/Nursing Home

PART-C

1. The reason you sought admission in our hospital:
   a) The medical care, rooms and environment are excellent.
   b) Our hospital is cheaper and has good treatment and room facilities.
   c) I was referred by my organisation/employer.
2. How was the behaviour of the booking clerk/Registration clerk/Receptionist?
   a) Polite and hospitable
   b) Indifferent/callous
   c) Rude
3. Once you got the admission to the ward how were you received?
   a) My relations/attendants took me to the room allotted.

b) Some one was there to guide and take us to the room (Hospital attendant/ Social guide/Nurse) {please tick}

4. If you were received by the hospital staff, how was the behaviour?
Very courteous/Cordial/Indifferent/Callous {please tick}

5. How is the room allotted to you in terms of size, layout and outlook?
Excellent/Good/Satisfactory/Poor {please tick}

6. What do you feel about the furnishings/furniture of the room?
Excellent/Good/Satisfactory/Not satisfactory {please tick}

7. If not satisfied, what additional things you recommend in the room?

a) b) c) d)

8. Were you briefed adequately about the functioning of the hospital either verbally/ written instructions.
Yes / No {please tick}

9. What was your first impression of the room after entering?
Very impressive/Satisfactory/Good/Poor {please tick}

10. How frequently is the linen (bed sheets, pillow covers, towels, curtains) changed?
Daily/Alternate day/Twice a week/On demand {please tick}

11. What is the quality of linen?
Good/Satisfactory/Poor {please tick}

12. What is the quality of laundering of linen?
Good/Satisfactory/Poor {please tick}

13. Is the quantity of linen provided sufficient for you?
Yes/No {please tick}

14. Do you bring additional bedding/linen from home?
Yes/No {please tick}

15. How often is the room cleaned and dusted (including toilets)?
Twice a day/Once a day/Once in two days/Once a day and on demand {please tick}

16. Are disinfectants/chemicals being used for cleaning rooms/wash rooms?
Yes/Occasionally/Never {please tick}

17. Is the room provided with adequate dustbins (for room and toilet)
Yes/No {please tick}

18. Are the dustbins emptied daily.
Yes/No {please tick}

19. Do you bring food from home or take hospital food?
Home food/Hospital food {please tick}

20. Are you being served food by your choice?
Yes / No {please tick}

21. How is the food preparation?
Invariably tasty/Spicy and oily/Bland/Not palatable {please tick}

22. Are you satisfied with the food timings (bed tea, breakfast, lunch, tea, dinner)?
Yes/No {please tick}

23. What is the state of crockery/cutlery?
Satisfactory/Good/Poor {please tick}

24. How is the food served to you?
Impressive/Homely manner/Unprofessionally {please tick}

25. What do you feel about the security/safety of the rooms?
Adequate/Inadequate {please tick}

26. What do you feel about the maintenance work?
Good/Satisfactory/Not satisfactory {please tick}

27. Is there any seepage from the walls or water dripping?
Yes/No {please tick}

28. Are you satisfied with the Air conditioning?
Yes/No {please tick}

29. Do you feel the need for a telephone in your room?
Yes/No {please tick}

30. What do you feel about the service of TV/cable.
Good/Satisfactory/Unsatisfactory {please tick}

31. When does the Nurse visit you in the room?
Only to give medicines/As and when called for/Comes frequently of her own {please tick}

32. How are the medicines given to you?
Always by the Nurse/Sometimes by the Nurse/Most of the times by attendants {please tick}

33. How would you rate the behaviour of the Nurses/Attendants/Sweepers?
Very good/Satisfactory/Indifferent/Rude and Callous {please tick}

34. What is your overall view about the service provided in the wards?
Very good/Good/Satisfactory/Poor {please tick}

35. What do you feel about the charges of wards?
Over priced/Reasonable/Very low priced {please tick}

36. Which are the areas in the ward that need improvement according to you?
a) Interiors b) House keeping c) Mannerism of staff d) Food services
{please tick}

37. As compared to other hospitals how would you rate our hospital wards?
a) Superior b) Comparable c) Inferior {please tick}

38. Would you like to recommend our hospital wards to your friends/colleagues etc.
Yes/No/Don't know {please tick}

Dear former patient

Recently we were privileged to serve you as a patient of our hospital. We would appreciate your assistance in evaluating our services by taking a few minutes to express your thoughts regarding your stay in our hospital.

Thank you for helping us to continue to improve and thereby serve you and others more effectively.

Sincerely,

Administrator

(Please tick the correct answer)

Admitting/Registration

1.	Waiting time before admission processing.	Poor	Average	Good	Excellent
2.	Thoroughness in answering questions, explaining forms and procedure.	Poor	Average	Good	Excellent
3.	Courtesy and efficiency of admitting process.	Poor	Average	Good	Excellent

Room Accommodations

4.	Docter of your room	Poor	Average	Good	Excellent
5.	Cleanliness of your room	Poor	Average	Good	Excellent
6.	Temperature of your room	Poor	Average	Good	Excellent
7.	Quietness of your room	Poor	Average	Good	Excellent
8.	Telephone service	Poor	Average	Good	Excellent

Nursing Service

9.	Was your admission to your room handled in a courteous,efficient manner?	Poor	Average	Good	Excellent
10.	Were you made comfortable within your first few hours here?	Poor	Average	Good	Excellent
11.	Did the nursing staff give prompt attention to your needs and requests?	Poor	Average	Good	Excellent
12.	Did the nursing staff explain your hospital routine adequately ?	Poor	Average	Good	Excellent
13.	Were you taught how to care for yourself after leaving the hospital?	Poor	Average	Good	Excellent

Special Tests and Procedures

14.	Were tests explaind to you so that you were prepared for what was going to happen?	Poor	Average	Good	Excellent
15.	Was enough time allowed for you to ask questions?	Poor	Average	Good	Excellent

Nutrition/Dietary Services

16.	Attractiveness and taste of food	Poor	Average	Good	Excellent
	Hot food served hot	Poor	Average	Good	Excellent
	Cold food served cold	Poor	Average	Good	Excellent

17. Variety and selection of food items	Poor	Average	Good	Excellent
18. Receiving the food items ordered	Poor	Average	Good	Excellent
19. If you received nutritional information from a dietician was it useful and meaningful?	Poor	Average	Good	Excellent

Visitors

20. Helpfulness of the hospital staff and volunteers to your visitors.	Poor	Average	Good	Excellent
21. Convenience of the visiting hours for family and friends.	Poor	Average	Good	Excellent

Signs and Directions

22. Signs and directions outside the hospital	Poor	Average	Good	Excellent
23. Sign and directions inside the hospital	Poor	Average	Good	Excellent

Parking

24. Convenience of parking	Poor	Average	Good	Excellent
25. Directions to parking	Poor	Average	Good	Excellent

Patient Billing/Credit Department

26. If you talked with the billing/credit department, were you given a satisfactory explanation of charges and insurance coverage?	Poor	Average	Good	Excellent
27. How were you treated by the other staff members you come in contact with?				
a. Physician	Poor	Average	Good	Excellent
b. Admissions	Poor	Average	Good	Excellent
c. Emergency department	Poor	Average	Good	Excellent
d. Physical Therapy	Poor	Average	Good	Excellent
e. Laboratory	Poor	Average	Good	Excellent
f. Respiratory Care Deptt.	Poor	Average	Good	Excellent
g. Housekeeping	Poor	Average	Good	Excellent
h. X-ray	Poor	Average	Good	Excellent
i. Transportation	Poor	Average	Good	Excellent
j. Volunteers	Poor	Average	Good	Excellent
k. Business Office	Poor	Average	Good	Excellent
l. EKG/EEG	Poor	Average	Good	Excellent
m. Hospital Telephone Operator	Poor	Average	Good	Excellent
n. Others	Poor	Average	Good	Excellent
28. Would you choose our hospital again?	Yes/No			

29. Please list the things you liked during your stay at our Hospital.

.....

.....

.....

30. Please list the things you liked during your stay at our Hospital.

.....

.....

31. Who completed the questionnaire:

1. Patient 2. Family 3. Friend

32. Additional comments or suggestions:

.....

.....

.....

33. Please complete the general information below:

Date of Discharge _____

Month Day Year

Room .....

Length of stay:

a. 1 day

b. 2–3 days

c. 4–6 days

d. 1–2 weeks

e. Over 2 weeks (14 days or more)

Your age category:

a. 18–24

b. 25–34

c. 35–44

d. 45–54

e. 55–64

f. 65–74

g. 75 and over

34. Do you want to be contacted by a hospital representative to further discuss your hospitalization?

1. Yes 2. No

If Yes, please note telephone number and best time(s) to call:

( )

35. Name: .....

Address: .....

.....

.....

.....

BLOCK INTRODUCTION

In the first block of this course you will learn about four important clinical service areas of a hospital viz. Out Patient Department (OPD), Accident and Emergency Services Department, Operation Theatre and Intensive Care Unit (ICU).

This Block contains four units.

Unit 1 deals with Outpatient Services. In this unit you will learn about the planning, organization and management of Out Patient Department (OPD) of a Hospital.

Unit 2 deals with Accident and Emergency Scrvices. In this unit you will learn about various administrative aspects of this department including planning consideration, equipment requirements, staffing, and policies and procedures governing this department.

Unit 3 deals with another important service area of the hospital i.e. Operation Theatre. You will learn about planning, organization and management of an Operation Theatre including the concept of zoning.

Unit 4 deals with another vital area of a hospital i.e. Intensive Care Unit (ICU). This unit deals with definition, types, staffing, physical facilities, planning, designing, and equipment requirements of ICU. The unit also discusses policies and proccdurcs, co-ordination and control mechanisms with regard to ICU.

UNIT 1 OUTPATIENT SERVICES

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- enumerate the role and functions of outpatient services;
- list the types of outpatient services;
- describe the physical facilities, layout, equipment and staffing requirements in planning of outpatient services:
- describe the policies and procedures adopted in organising and managing outpatient scrviccs; and
- list the activities and describe a plan for monitoring and evaluation of outpatient services.

1.1 INTRODUCTION

In this unit, you will learn about the planning, organisation and management of outpatient serviccs as an integral part of hospital services. Outpatient services in hospitals have evolved in line with patients' needs demands and expectations from a limited service offering basic and minor clinical services to a highly evolved and organised service. Outpatient serviccs when functionally integrated with the inpatient services of the hospital lead to continuity of carc.

In this unit you will learn about the roles, Functions and types of outpatient scrviccs. You shall further learn how through planned development of physical facilities, equipment and manpower the outpatient services could be integrated with the inpatient care. In addition, it shall be possible for you to understand the principles of devising policies and procedures for effective delivery ol'outpatient services. Finally. you shall be able to learn principles of monitoring and evaluation of outpatient services.

1.2 BRIEF HISTORY

Sir George Clark has suggested that outpatient department as wc know today originated in mid seventeenth century when at Hotel Dieu in Paris, six physicians were detailed for regular sessions on Wednesday or Saturday advising the poor individually. This

introduced the idea of outpatient clinic. The modern OPD began to emerge in 1850 in USA from the framework of dispensaries.

Historically, the family doctor or general practitioner (G.P.) referring his patient for specialist opinion had three options — the patient's own home, the specialist's room or the Outpatient Department of the hospital. In the later, the specialist saw the poor offering free or near free diagnosis and treatment, in his rooms he saw those who could pay and in the patient's home he saw only the very sick or the very very rich. Thus, the main function of the Outpatient Department was as a source of charity diagnosis and perhaps care and medicaments. However, in the 20th century with the growing dependence of the consultative specialist on the work of others such as radiologists and pathologists, with the continued growth of specialisation and refined and complicated techniques, and with the use of expensive medical diagnostic equipment it became increasingly convenient and in many cases imperative for the specialist to make use of Outpatient Department for both charity and paying patients.

The continued growth of the outpatient services was also seen as a dangerous threat leading to the reduction of the workloads and incomes of non-hospital doctors, a situation which still exists where the G.P. operates on a fee-for-service basis.

Despite unease in some quarters, about the trend, the functions of the outpatients service have gradually widened. Much of the investigational and diagnostic or even the therapeutic work that formerly necessitated admission to a hospital can now be carried out in a well-equipped outpatient department, with a saving of expense and avoidance of the disruption of family life that hospitalisation causes.

Check Your Progress 1

1) Enlist three alternatives that a General Practioner had while referring his patient for specialist opinion.

   a) .....

   b) .....

   c) .....

2) Write down three developments in the 20th century which have led to the specialist making use of Outpatient Department for both the charity and paying patients.

   a) .....

   b) .....

   c) .....

1.3 FUNCTIONS AND TYPES

Outpatient Department as you know is a very important department of the hospital which is visited by large section of community. It is also the first point of contact between patients, their relatives and hospital and its staff. The care provided in the OPD and behaviour of the staff determines the image of hospital and is aptly referred to as 'shops window of the hospital'. In a properly managed OPD the stay of the patients can also be considerably reduced, and the cost of care to the patient, hospital and the government can be brought down.

1.3.1 Role and Functions

Outpatient Department is one of the department of the hospital which cares for the ambulatory patient who come for diagnosis, treatment and follow up.

You must have observed that the roles and functions of Outpatient Services have gradually widened over the years. Now, the role and functions of outpatient services include:

1) To provide for the community a major source of specialist diagnostic medical opinion where the knowledge skills and resources of the specialist are backed up by the resources of the hospital. These include not only the physical resources but also the presence of a wide range of other specialists which facilitates early referral when necessary and of supportive paramedical staff of the allied health professions.

2) To treat on ambulatory and domiciliary basis all cases which can be treated in the Outpatient Department (for example surgery for hernia and varicose veins).

3) To refer patients for admission to the hospital of those who need it.

4) To carry out after care and medical rehabilitation, when necessary, after discharge from hospital.

5) To promote health of the individuals under care in the Outpatient Department by means of health education.

6) To train medical students, house physicians and other professional staff such as nurses and technicians with valuable and diversified clinical experiences.

7) To compile, collate and analyse records of patients using outpatient services for epidemiological, social clinical research and for periodic assessment of clinical outcomes.

8) To carry out preventive and promotive services through provision of immunization, screening, antenatal, well-baby, counselling, family welfare clinics etc.

1.3.2 Types

Outpatient Services could be of two types:

i) Centralized Outpatient Services: In centralized outpatienl services all the outpatient care relating to all the specialities are provided in a compact area which includes all diagnostic and therapeutics facilities also being provided in the same unit. Polyclinic in various hospitals is based on this concept.

ii) Decentralized Outpatient Services: In decentralized outpatient service, the outpatient care is provided in the respective departments. The same holds true for diagnostic and therapeutic services also. The speciality clinics are usually based on this concept.

Use of one type of outpatient service in a particular hospital depends on the size variety and workload of the hospital. Generally larger the hospital more centralized the outpatient services are, This also leads to economy as well as higher patient satisfaction.

Check Your Progress 2

1) List five important functions of outpatient services.

a) .....

b) .....

c) .....

d) .....

e) .....

2) List the three methods of providing preventive and promotive services in the outpatienl department.

a) .....

b) .....

c) .....

3) List the two types of outpatient services.

a) .....

b) .....

1.4 PLANNING CONSIDERATIONS

1.4.1 Physical Facilities and Layout

Location

The outpatient department should be conveniently located adjacent or in close proximity to vital adjacent services such as registration and medical records, admitting, emergency and social services. It should be near the main road and close to the main hospital entrance

but with sufficient space to provide for parking etc. and to prevent noise and dust pollution. It should be separate from inpatient wards and other departments but connected with them. It is preferable to have outpatient departments of all specialities in the same building so as to facilitate cross-references between various specialities.

Principles of Planning Layout

The following principles should be kept in view while planning layout of the outpatient services:

a) It should be ensured that patient flow moves in one direction, in logical sequence and there is no undue back traffic.

b) It should be able to share with the inpatient departments, all diagnostic facilities, such as x-ray, and pathology laboratory.

c) It should be amenable to expansion without serious dislocation of work.

Layout

Various designs or layouts can be used, such as:

1) The double loaded single corridor with rooms on each side of the corridor;

2) The double corridor for entry from the opposite sides of the room; and

3) The triple corridor which provides two rooms of examination treatment rooms on each side of a staff corridor.

Size

Bureau of Indian Standards has recommended the following space provisions lor various zones : 2 square metres per bed for entrance zone, 10 square metres per bed for the ambulatory zone, and 6 square metres per bed for diagnostic zone out of a total of 60 square metres per bed lor the total hospital arca.

Physical Facilities

The physical facilities may be considered under four groups:

a) Public Areas (Entrance Zone)

b) Clinical Areas (Ambulatory Zone and Diagnostic Zone)

c) Administrative Areas

d) Circulation Areas

You will now learn about each physical facility in some detail.

Public Areas

i) **Entrance:** It should be easily accessible, with wide door and have ramps and sleps.

ii) **Reception and Information: A** desk or a counter located within the public area for information and reception.

iii) **Registration and Records Area:** This area should be located near the entrance. Railings should bc provided for separate queues — new and old and male and female patients. A counter 300 cm high and with work surface 60 cm wide and with file drawers is necessary. One desk should bc provided for 20 palients per hours. Two sq. metres per bed should be provided for outpatient records.

iv) **Waiting Area:** Main waiting area should bc adjacent to Registration area and sub-waiting area should be provided in each clinical department. Waiting area is provided at the scale of 0.1 sq. metre per patient, with a minimum of 4 sq. metre The arca provided in sub-waiting areas adjacent to various consultation, diagnostic and therapy areas is 0.8 sq. metre per patient.

v) **Public Toilets and Washrooms:** For males and females at the scale of one for each 200 patients and visitors should he provided.

vi) **Snack** Bar: It should be located convenient to the main waiting area. It should be maintained in a hygienic manner.

Clinical Areas

An OPD includes Surgical, Dental, Ophthalmic, ENT, Obstetric and Gynaecological, Paediatric, Medical, Psychiatric, Dermatology and Venereology, Orthopaedic and

Emergency Departments. Depending upon the type of hospital there may be superspeciality clinics such as Cardiology, Neurology, Urology to mention a few only. In addition there arc ancillary facilities like treatment sections including minor operations, injection, dressing and dispensary and auxilliary services of pathology, blood bank and radiology. There is also a growing need for instituting health education programmes to educate the public in environmental hygiene, family welfare ctc.

General requirements for the above clinics are as follows:

a) **Sub-Waiting Area:** This area should not have more than one-third of the total number of patients visiting the clinic in a day.

b) **Consultation Room:** This room should provide for accommodation for a doctor's chair, table, patient's stool, follower's seat, wash basin, examination couch and equipment for examination. Area should be about 15-17 sq.mt. Each clinic should be able to handle 100 cases per day.

c) **Special Examination Room:** Certain departments will need separate room For special examinalions depending upon the type of equipment being used in the OPD.

Ancillary Facilities

i) **Injection Room;** It should have wailing area for about 10-20 patients at the rate of 06-0.8 sq. metre per patient. The area may vary from 12-40 sq. metre depending on the workload.

ii) **Treatment and dressing room:** About 12-16 sq.mt. shall be required for each treatment and dressing room.

iii) **Pharmacy:** The wailing area should be comfortable in the pharmacy as the patients are quite tired when they reach this place. The accommodalion should be sufficient Io contain about 5% of total clinical visits to the OPD in one session.

Pharmacy will require multiple dispensing windows, compounding counters with sink, drug storage cabinet and shelves, the details of which you will learn in Unit 4 of Block 3 of this course.

Auxilliary Facilities

i) **Laboratory:** It should be able to serve both inpatient and outpatients. A sample collecling station for urine, stool and blood specimens should bc provided separately in the OPD. It should have two (male and female) wash rooms and toilets (15 sq, metre) and a bleeding room (15-20 sq. metre) with two or more examination tables. You will learn more details of planning and organisation of laboratory services in Unit 1 of Block 3 of this course.

ii) **Radiology:** It should be able to serve both inpatients as well as outpatients, the details of which have been described in Unit 2 of Block 3 of this course.

iii) **Blood Bank:** This will include a reception-cum-waiting area, bleeding room, laboratory for grouping, recovery room, and a room for storage of blood and ancillaries like washing and sterilization room, office room and toilet facilities. The details of planning and organisation of Blood Bank Services of a hospital have been discussed in Unit **3** of Block 3 of this course.

iv) **Health Education Facility:** This should include an office for the health educator, conference and lecture room, and space all over the OPD for display of educational material. Minimum area required for this facility would be 15 sq. metre. Audio visual aids such as TV, Video player and health education cassettes should be made available in this area.

v) **Medical Social Service Facility:** This facility should be located in the OPD with suilable cubicle for each social worker/counsellor to provide privacy.

vi) **Screening Clinic:** This is specially required in a teaching/tertiary hospital. It should be located near the registration area. It should consist of one or more cubicles with examination table, stool, table and chair with 12 sq. metre for each cubicle. This reduces the workload on the speciality clinic and also increases quality of speciality services.

vii) Preventive and Promotive Health Facility: An office of size 15 sq. metrc is the minimum requirement for this facility. This Sacility provides advice on sanitation, control of communicable diseases, nutrition, home care, public health nursing. mental health, occupational hazards, immunization, family welfare counselling, well baby and well adult clinics in addition to morbidity studies.

Administrative Areas

a) Administrative Office: A room of 15 sq. metre for a hospital with 100 beds or more is required to function for housing administrator's office.

b) Business Office: The office for personnel section, requisitions, making reports etc. is required in OPD area in large and active OPD.

c) House Keeping: A janitor's closet for house keeping and cleansing materials is required with a size of 4 sq. metre.

d) Storage Facilities:

i) ***General Stores:*** It should be with the general stores area of the OPD.

ii) ***Drugs Stores:*** Pharmacy stores should be in the hospital drug stores in a central place.

iii) ***Linen Stores:*** Each floor of OPD area will require a closet with shelves, for storage of daily supplies of linen. An area of 2 sq. metre may be sufficient.

Circulation Areas

This includes corridors, stairs, lifts etc. This occupies about 30%of the total building area, elevators should be easily accessible specially for cardiac and obstetric patients. Corridors should be at least 1.8 metre wide. Security post should be provided at strategic ,locations. STD/ISD phone facility also should be made available.

1.4.2 Equipments

Equipments as related to the speciality examination should be available in the concerned room. Sufficient numbers of wheelchairs and stretchers in a conveniently accessible location should be made available. Each consultation-cum-examination room should have a work table, physicians desk, wall mounted cabinets, x-ray view box, revolving stools and chairs besides examination couch, wash basin, instrument trolley. All OPDs should have equipments Sor resuscitation of patient collapsing suddenly.

1.4.3 Staffing

Staffing levels for the outpatient services should be dependent on analysis of the objectives of the department and on the volume of the workload in each of its functional areas. There should be no separation of medical staff into inpatient and outpatient staff so as to ensure continuity of high quality care. The nursing staff consisting of registered nurses, ANMs and nursing or hospital aids in sufficient number should be provided in the OPD. Ancillary staff in OPD e.g. X-ray, Laboratory, EEG and ECG technicians also are required. The clerical staff carry out registration, patient's billing, cashiering, secretarial and medical record functions. In teaching hospitals, senior physicians have interns and residents assisting them in professional care of patients.

Many hospitals use volunteers in a variety of activities in the outpatient services.

The outpatient department will require an administrator in large hospitals for planning, organising, supervising, evaluating, co-ordinating and improving outpatient services.

Receptionists, who make the first contact with the staff are an important members of outpatient staff.

Check Your Progress **3**

I) Enumerate the three designs of outpatient service facility.

a) .....

b) .....

c) .....

2) Specify the area required for the following zones in a hospital as recommended by the Bureau of Indian Standards.

a) Entrance Zone : ..... sq. mt. per bed

b) Ambulatory Zone : ..... sq. mt. per bed

c) Diagnostic Zone : ..... sq. mt. per bed

3) List the Sour areas in the physical facilities in the outpatient services.

a) .....

b) .....

c) .....

d) .....

4) Write True and False :

a) Corridors in the outpatient area should be at least 7 ft. wide. (T/F)

b) Medical staff for outpatient and inpatient care should be separate. (T/F)

c) The outpatient department should have a full time administrator in a large hospital. (T/F)

d) There is no need to have sub-waiting area in each speciality clinic, X-ray. Laboratory, ECG, injection room when there is already a main waiting area available. (T/F)

1.5 ORGANISATION AND MANAGERIAL CONSIDERATIONS

1.5.1 Policy

The policy in the outpatient services should be to achieve continuity of high quality patient care with modern techniques and methods in order to have total patient satisfaction at all times with the willing co-operation of all the health care personnel working in the outpatient department as well as inpatient departments.

1.5.2 Procedures

There should be a manual of the procedures to be followed by all health care personnel working in the outpatient services. All the health care personnel should be trained and retrained in carrying out all or any procedure related to their work area. All the procedures carried out in the outpatient department should be carefully recorded and documented in a retrievable format so that the patient can be benefited in future as well as outcome of treatment could be scientifically evaluated.

It is better to implement appointment system to spread out the reporting time of patients. This can be either individual or block appointments. The block appointment system calls for a certain number of patients to be present at a given time so as to provide a sufficient pool of patients; thus the physician will at no time find himself idle and it limits the pool to the capacity of the waiting room.

Information graphics and signage system, name boards, pictorial representation of services provided, direction signs, colour coding of different service areas facilitate easy understanding of hospital procedures and routines by the patients.

1.5.3 Managerial Considerations

Public **Relations**

For many members of the community, the OPD will be their first point of contact with the hospital, Ideally, therefore, it should be something of a showpiece making evident from the first the warmth and humanity of the hospital, its respect for the patient and his dignity, its provision of the proper setting for good clinical care, and its good administration, Many of these things the patient can and will judge for himself and they

may influence unduly his future opinions of the hospital. All efforts must be made that the impression on the patient gets in the OPD is a favourable ones.

Overcrowding and Long Waiting Time

Many hospitals face the problem of overcrowding and long wailing time. Due to various reasons, patient after initial waiting for registration waits for consultations, diagnostics, treatment or even for collection of medicinces at pharmacy.

Adequate attention by all hospital administrations must be given to resolve this problem. A simple random study of waiting patterns since the arrival of patients through his final disposal and reasons thereof must bc carried out and bottlenecks removed. The queuing theory which has been dealt in Unit l of Block 4 of this course can be applied to resolve the problem.

OPD Timings

The timings should he decided to suit the local and organisational needs. General OPDs with basic specialities are usually conducted six days in a week may be from 0800 hr to 1300 hr or so. All registered patient must be seen irrespective of the timings fixed for OPDs. .Timings for ancilliary/supportive facilities must be kept at least one hour after the OPD timings so that no patient who has been seen in the OPD is denied the treatment, investigation or drugs. It also must be ensured by the administrator that the timings for OPD are rigidly followed. Increase in registration time, adequate number of doctors, separate queue for new or old cases may help in reducing waiting time in registration.

Screening clinics help in disposal of patients with minor illnesses thus leading to less crowding and waiting time in speciality clinics. Special clinics at different timings, specially during afternoon hours, e.g.,well-baby clinic, diabetes clinic, leprosy/TB, follow up, super speciality clinics etc. also prevent overcrowding. Increasing the duration of OPD services or operating evening OPD services can also prevent overcrowding. Synchronizing functioning of ancillary facilities with OPD workload such that the laboratory, radiology and pharmacy are open and adequately staffed during peak hours when patients referred from the OPD arrive for these services is a managerial technique to increase patient satisfaction. These departments should remain open for a longer duration as compared to OPD.

The patients records of indoor and outdoor services, investigations and treatment should be available in an easily retrievable form at each visit by the patient.

Management Structure

This may vary considerably among hospitals. In larger hospitals, the Medical Director or the Medical Superintendent may be directly incharge of outpatient department. He may have assistants in various units such as clinics, outpatient surgery etc. reporting to him. In smaller hospitals, there may be a co-ordinator to co-ordinate the work of various units of the department reporting to the Medical Director or the Medical Superintendent.

The nursing side of the OPD should be the responsibility of a well-qualified and experienced nurse whose primary function should be to see that the work, in the various clinics proceeds smoothly. She will direct the activities of the nurses and ancillary personnel who work permanently in the department.

Check Your Progress 4

1) Enumerate two types of appointment system for outpatient services.

   a) .....

   b) .....

2) List three methods of reducing overcrowding and waiting time in Outpatient Departments.

   a) .....

   b) .....

   c) .....

1.6 MONITORING AND EVALUATION

The quality of outpatient services need to be monitored and evaluated on an ongoing basis in order that areas requiring attention for improvement could be identified as well as results of efforts made for improvement of quality of patient care could be known. For this purpose, data need to be collected, compiled, collated, analyze and acted upon on a regular basis by a nodal officer in the hospital. The various data that is needed for such a process is as follows:

i) Volume

a) Clinic/department-wise statistics of new and repeat visits on monthly and yearly basis.

b) Percent changes in new and repeat visits over years in relation to availability of doctors and registration staff:

c) Fluctuation in visits by days of the week (or month)---average, high, low.

d) Determine adequacy and utilization of clinics from clinic schedules of preceding year to determine number of hours the clinic was in session. multiply number of session hours by number of rooms to arrive at number of scheduled hours, and divide this by number of patients seen or average service time to evaluate adequacy of rooms. Further, by estimating actual room hours scheduled and dividing by potential room hours, it is possible to determine the clinic efficiency rate.

ii) Utilization and Vital Statistics

The number of people who account for total annual visit volume determines utilization (average number of visits per person per year), This figure should be broken down by vital statistics of the population (age and sex). Such information helps in deciding staffing, programme planning etc.

iii) Visit Levels

New appointments---walk-in, scheduled, short follows-ups, annual physicals, well-baby, well-child check-up, immunization and complex treatments indicate whether utilization, staffing, distribution and amount of revenues need to be changed or kept at the same level.

iv) Cost and Revenues

The cost of each service should be matched with revenues from respective service. As far as possible, each service should be self-supporting, else cross-subsidy system be developed Direct patient care costs like salaries, cost of supplies consumed as well as indirect patient care costs like utilities, free-care should be calculated.

Check Your Progress 5

Answer in **True** or **False**:

i Monitoring and evaluation is a continuous process. (T/F)

b) Monitoring and evaluation of outpatient services is required to identify and punish errant health care persons. (T/F)

c) Cost of each service in the outpatient facility should be matched with revenues from respective services. (T/F)

d) Salaries and cost of supplies consumed are indirect patient care costs. (T/F)

1.7 LET US SUM UP

In this unit you have learnt that outpatient services are an important component of clinical services in a hospital. You have learnt the functions and types of outpatient services. You have also learnt how one can plan—physical facilities, equipment and staff—an effective outpatient department.

Further, you have learnt how problems of over-crowding, long waiting time, structural organisation and policies, procedures and public relations could be tackled. You have also learnt the methods of monitoring and evaluation of outpatient services. You have now come to know how patient satisfaction from outpatient services could be obtained.

1.8 KEY WORDS

Ambulatory Care : Outpatient care or services

Block Appointment : Calling for a certain number of patients to be present at a given time

Direct Patient Care Cost : Costs directly incurred or attributable to the patient care e.g., salaries, cost of supplies consumed

Indirect Patient Care Cost : Costs indirectly incurred or not directly attributable to the patient care e.g., free care costs, cost of utilities e.g., water, electricity etc.

Individual Appointment : Calling for a certain patient to be present at a given time

1.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) The patient's own home,
   b) The specialist's room, and
   c) The outpatient department

2) a) Continued growth of specialization and refined and complicated techniques.
   b) The use of expensive medical diagnostic equipment.
   c) Growing dependence of the consultative specialist on the work of others such as radiologists and pathologists.

Check Your Progress 2

1) a) To provide specialist medical opinion.
   b) To treat all cases which can be treated on outpatient basis.
   c) To refer patients lor admission to the hospital.
   d) To carry out after care and medical rehabilitation.
   e) To promote health of the individuals under care by health education.

2) a) Immunization Clinics
   b) Antenatal Clinics
   c) Well-baby Clinics

3) a) Centralised outpatient services
   b) Dccentraliscd outpatient services

Chcck Your Progress 3

1) a) Double loaded single corridor
   b) Double corridor
   c) Triple corridor

2) **a)** 2
   b) 10
   c) 6

3) a) Public Areas
   b) Clinical Areas
   c) Administrative Areas
   d) Circulation Areas

4) a) True
   b) False
   c) True
   d) False

Check Your. Progress 4

1) a) Individual Appointment

b) Block Appointment

2) a) Screening Clinics

b) Special Clinics

c) Increasing duration of OPD Services/Evening OPDs

Check Your Progress 5

a) True

b) False

c) True

d) False

1.10 FURTHER READINGS

Davies, R.L. and MaCaulay H.M.C. (1966) *Outpatient Services in Hospital Planning and Administration,* WHO, Geneva, pp. 105-11.

Grant, Colin. (1973) *Outpatient Services in Hospital Management,* Churchill Livingstone, Edinburgh, pp.103-12.

Kundcrs, G.D., Gopinath Sand Katakam A. (1999) *Outpatient Services in Hospitals – Planning, Design and Management, Tala* McGraw I-Iill Publishing Co.Ltd., New Delhi, pp.133-40.

World Health Organisation, (1957) "Role of Hospitals in Ambulatory Care and Domiciliary Medical Care", *WHO Technical Report Series 176,* Geneva, pp. 1-32.

UNIT 2 ACCIDENT AND EMERGENCY SERVICES

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- explain the role and importance of the Accident and Emergency services;
- describe the planning, staffing and functioning of Emergency services;
- enumerate the equipments required in this department; and
- identify appropriate measures for evaluating the services provided there.

2.1 INTRODUCTION

In the previous unit you have already learnt about Outpatients Services. In this unit you will learn about the salient features and functioning of the accident and emergency

services which constitute one of the most vital, important, and sensitive component of acute medical care services provided by the hospilal.

In many hospitals this department/unit is called "Casually" even though all over the world nomenclature has been changed. This service is usually provided non-stop round the clock, throughout the year, and it is an essential elcmcnt in contributing to the health of the community Smooth and streamlined functioning of the accident and emergency services goes a long way in projecting a good image of the hospital. So much so that these have in fact bccomc "miniature" hospitals within hospitals.

In this unit you will learn about the various administrative aspects of Accident and Emergency services (Casually Department) in hospitals. You will also learn about planning considerations, the equipment requirements, the staffing of the department; and policies and procedures governing this department.

2.2 ROLE AND FUNCTIONS

2.2.1 Definitions

"Medical Emergency" is defined as a situation when the patient requires urgent and high quality medical care lo prevent loss of life and limb and initiate action for the restoration of normal healthy life.

"Emergency" may also be defined as a condition determined clinically or considered (perceived) by the patient or his/her relatives (attendants) as requiring urgent medical services, failing which, it could result in loss of life or limb.

An "Accident" is defined as "an uncxpccted, unplanned occurence which may involve injury" or "an unpremeditated event resulting in recognisable damage".

2.2.2 Development and Scope

In the beginning of the twentieth century, every hospital had an "accident room" which was used for treatment of patients injured in accidents. By the 1960's, these rooms gradually evolved into "walk in" medical clinics, and even patients with medical problems started utilising them. In 1961, the Platt Committee (U.K.) recommended the name "Accident and Emergency Department" after which this discipline made rapid progress to gain status of a Lull fledged department in all developed countries.

In our country, the Central Council of Health in 1963 urged all state governments lo set up emergency medical services in all major cities and towns; which has subsequently been re-iterated by a number of committees till date. Howcvcr, despite some progress, this has not been given the necessary inputs lo develop it to the status of a department. The scope of accident and cmcrgcncy scrvices is gradually broadening and infact these are now becoming "mini hospitals" within hospitals.

2.2.3 Functions

As you have read earlier in this unit, you must be aware about the important functions of the accident and emergency services which are:

- to provide immediale and correct life saving medical care at all times and in all situations. Services should bc both effective and efficient as the patients are likely to deteriorate quickly.
- to be sensitive to the emotional needs of the patients and atlendants.
- to liaise with the courts and police in medico legal cases whenever requircd.

In addition some of the subsidiary functions arc:

- to provide ambulance scrvices for pre-hospital care and transportation of patients to and fro the hospital.
- to fulfil the role of information and communication centre, especially during disasters.
- education, training and research activities of medical staff.

However, you should understand that the accident and emergency services which can be provided by any hospital, depends upon the number of beds and the policy of the hospital.

In general, in our country, smaller hospitals run accident and emergency services (called as "Casualty") during non-outpatient deptt, hours, and share facilities with the OPD.

2.2.4 Type of Emergency Services

There are four types of emergency services:

i) Major Emergency Services

The depatment is provided with all its specialised facilities. Diagnostic and therepevetic coupled with speciality in different categories. Generally such services are provided in large, teaching and tertiary hospitals.

ii) Basic Emergency Services

This is available in hospital where all basic emergency facility available the centre is run by general duty medical officer round the clock. Specialists in respective field are available on call duty.

iii) Stand by Emergency Services

This type of emergency service is seen in PHC and Community Health Centre as first referral centre. These are run by trained nurses round the clock and Medical Officers are on call duty.

iv) Referral Emergency Services

In these centres only first aid is given and the patient then refer to the health centre/ hospital according to the severity and need of the case. This type of services are provided by AIIMS and other tertiary level hospitals.

2.2.5 Importance

The importance of this service lies in the fact, that out of all aspects of seeking health care, this is the most crucial and vital, as it is perceived by the patient and the attendants as an "emergency" which calls for urgent action. Therefore, not only is the patients life/limb at stake; but also the image and reputation of the hospital and the health care providers. From an administrative point of view, it is one of the most stressful and sensitive areas, which can trigger off serious chain reactions hampering the functioning of the hospital.

2.3 PLANNING CONSIDERATIONS

As with other areas of the hospital the basic principle of "Design follows Function" should be applied.

2.3.1 Location

The accident and emergency department should definitely be located on the ground floor, with direct access from the main road (near the hospital) with ample space for ambulance and parking. A covered porch with enough space for vehicles and the patients to alight at the entrance is also important. Proper sign posting should be there and it should be easily located.

Though it should be physically separate from other areas in the hospital; it should be readily accessible from wards, OT's, ICU's, Laboratories, Blood Bank, and mortuary.

2.3.2 Space Requirements and Patient Wards

The space required for the accident and emergency department depends upon:

- the number of patients attending in a day.
- the size and the type of hospital.
- the type of diagnostic and therapeutic facilities available.

Simply stated, a daily census of 100 patients in the accident and emergency services requires 1000 sq. metres area. To this another 50% i.e. 500 sq. metres should be added to prevent over crowding.

Patient loads generally show an upward trend in this department and are about 10-15% of total OPD patients. Hence, it is better to plan for over usage than under usage and be prepared for increased patient load.

2.3.3 Physical Facilities and Layout

In large hospitals, there is a need to have a separate independent department, because the dependent population is larger and concentrated, Space for future expansion must be

kept in mind while planning for accident and emergency services, rooms with good accessibility to palicnls and space for un-intcrruplcd patient flow should be of primary concern.

The entrance should be separate with enough space for movement of ambulances and other vehicles. Ramps lor wheelbound and steps wilh side rails for ambulant patients should be present along with a porch lo protect from natural elements. The door should be two-way swinging type for easy How of patients.

Inside the entrance a waiting hall/area should be provided with basic neccssitics (Telephone, Toilet, Drinking Waler elc.) for the attendants, which helps decongesting the main treatment area. MSW could also be located nearby the Emergency Department. It can also be used for "triage" purposes during disasters. The main lobby should also have facilities for reception and enquiry, and a trolley bay for trollies and wheel chairs.

The main acute treatment area should have the patient cubicles in full view of the nursing station; and should be partitioned from each other with curtains. This area includes the resuscitation cubicles, examination cubicles, paediatric cubicles with benches etc. There should also bc provision of revolving stools for ambulant patients. One room/ area should be separately earmarked lor observation patients who arc likely to remain in the hospital for few hours. Other rooms which are also essential stores, nurses/staff rest room, toilets and O.T. complex with recovery room, fracture treatment and plaster room, a room for infectious patients, Doctors and nurses duty room, staff room and clean and dirty utility room. Investigation facilities include radio diagnosis unit with dark room and a emergency laboratory. For medico legal cases a police room and a "brought in dead" room arc also required.

2.3.4 Architectural Design

It is important to remember the principle "design follows function" in planning of hospitals. The design should be such that there is minimum criss-crossing of patient traffic and privacy is maintained while treating. The room should be spacious, and the joining corridors at least 3 metres in width, Door ways should be so designed as to allow unhindered passage of trolleys. Floor should bc non-slippery and wall colours sliould be of light shades.

2.3.5 Communication

An effective communication system is a must in any accident and emergency department. Communication within the department and to other areas like ICU, support service areas, stores, blood bank, consultants arc essential for smooth functioning. Pagers should be provided to staff' on call for prompt response. Adequate number of telephones for the staff, telephone with only incoming calls and telephone for the patients/ relatives should bc provided in the department.

2.4 EQUIPMENT REQUIREMENTS

In the earlier section you learnt about the physical facilities which should be available in the Accident and Emergency Services. However, it is imperative that adequate number of properly working equipments must bc present thcrc, otherwise the doctors will not be able to render optimal care.

2.4.1 Essential Equipments

Broadly speaking the following essential equipments should be present in all patient care areas:

i) Centralised piped oxygen and suction supply.

ii) Airways, outlets and resuscitation bags.

iii) Wall mounted/portable manometer.

iv) Portable defibrillators and ECG.

v) Respiratory aids e.g. ambu bag, ventimask, nebuliser etc.

vi) Cardiac monitors and defibrillators.

vii) Special medications, intravenous equipments and fluids.

viii) Sufficient bandages, drugs and plasters.

ix) Utility table with emesis basin, kidney tray etc.

x) Slit lamp, loupe, ENT cxmination equipment.

xi) All equipments that will be required for O.T. and ICU.

xii) Adequate numbers of trollies and wheel chairs.

In addition to these equipments required for direct patient care, others like radiology equipments: x-ray machines, ultrasound machine, dark room, C.T. facility and investigation equipments in laboratory are also required.

2.4.2 *Equipment Maintenance* Issues

If wc consider the sensitiveness of the functioning of the Accident and Emergency Department; it will be obvious at once that proper maintenance of equipment in good working/order is a must, so as to avoid mishappenings. The main objectives of equipment maintenance are to:

- ensure reliability and readiness of equipment as far as possible;
- extend the useful life of equipment and decrease the down time; and
- ensure safety of operation and minimum wastage of resources.

All three levels of maintenance i.e. first level (day to day) by the operator; second level by in house staff; and third level by manufactures; bio-medical engineer or third party should be ensured. Preventive and breakdown maintenance must be done at regular intervals.

Check Your Progress 1

1) Enlist the functions of Accident and Emergency Department in a hospital

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2) What are the broad planning considerations while establishing an Accident and Emergency Department?

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3) Enumerate the essential equipments which should be present in such a department.

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4) Indicate "True" or "False":

a) Accident and Emergency Department is also known as "Casualty". (T/F)

b) It should be located either on the ground or first floor. (T/F)

c) The patient load in Accident and Emergency Department is approx. 25% of OPD Ward. (T/F)

d) Entrance of the hospital and emergency should be the same. (T/F)

e) First level of maintenance should be done by the operator. (T/F)

2.5 STAFFING CONSIDERATIONS

It is important that the staff members posled in the Accident and Emergency Department be highly skilled and competent. Besides they should also be of even temperament, calm and oricntcd Io the functioning of the department at the beginning of their posting. Staffing will depend upon the following factors:

- Size and nature of hospital (including category of hospital),
- Work load of the department,
- Resources available.

As' proper co-ordinalion and good team work is a pre-rcquisile, it is essential that similar staffing pattern is maintained throughout the day. Continous training should be provided so as lo keep them up Io date.

2.5.1 Categories

The following category of staff arc considered essential to maintain the accident and emergency department:

i) **Medical** : Physician, surgeon, paediatrician, orthopaedic surgeon and anaesthetist (in addition, house officers, interns, post-graduate students) should also be posted. These may bc available full lime on call. A lull time faculty incharge should by posted in the Accident and Emergency Services of a large hospilal.

ii) **Nursing** : The nursing staff should bc competent, intelligent, qualified and flexible, should he able to initiate life saving measures on their own.

iii) **Para medical** : ECG technicians, O.T. assistants, operalion room attendants, laboratory technicians, radiographers etc.

iv) **Group 'D'** : Orderlies, sweepers, drivers.

2.6 POLICY AND PROCEDURES

2.6.1 Ambulance Services

Generally, ambulance services arc considered lo bc a part and parcel of the Accident and Emcrgcncy Department. An ambulance is defined as "a vehicle for emergency care which carries equipment and supplies for optimal emergency care at the scene and during the period of transportation Io afford maximum safety and comfort and avoid aggravation of his condition. You will learn in more details about transporlation of patients in Unit 2 of Block 2, Course 5.

It has been established through several studies that the speed of transfer of a patient from the site of accident/emergency to the advanced treating centre is of utmost importance in saving life, and minimizing mortality and morbidity. The golden hour concepts, if a patient has besl chance of survival and minimum disability if brought to a centre will be an honour. It should also be understood that the basic minimum life saving/support equipments like oxygen cylinder, ambubag, endotracheal tube and airways, foot operated suction machine, portable ventilator, defibrillator with monitor, immobilising splints, PSAG/MAST and emergency drugs and fluids should be available in the ambulance. The ambulance should also be provided with two way communication system to facilitate its reaching at the sile will not delay and obtaining necessary guidence in rendering the pre hospital case lo the patienl if required.

Keeping in view the vastness and considerable geographical variation in the terrain, motorability of roads, lransportation facilities can be considered under the two broad categories of urban areas and rural areas. The essence of planning ambulance services should definitely take these factors into consideration.

2.6.2 Registration and Records

It is mandatory on the part of the hospital to develop and implement a simple and accurate system of registration of all patients who report to attend the accident and emergency department. If resources permit, in the present day scenario, computerised registration is the most effective and efficient way of alloting a serial registration number to all patients attending the department. In case resources do not permit, the manual system of registration can also suffice. However, one thing that needs to be emphasised is that the process of registration should not come in the way of starting the treatment. This becomes especially important in medico legal cases where, there is a ruling of the Hon'ble Supreme Court in this regard about which you will learn in greater detail in a subsequent section.

Proper and meticulous record keeping is absolutely essential, especially in the light of the Consumer Protection Act, which has been described in detail in one of the later units. The emergency department records should be simple, user friendly and should contain following:

- demographic parameters — name, age, sex, address. registration No.
- date and time of arrival of the paticnt
- the chief complaints — duration
- examination fin dings
- base line investigation and their values
- diagnosis and management
- whether admitted/discharged/referred

These should be retained for a period of at least two years. In medico legal cases, one copy of the emergency patient record should be retained by the hospital and the details of the findings should bc entered in a medico legal register, for safc custody. The investigation reports including radiological test reports should also be filed and kept in safe custody. Thcsc medico legal records should bc retained permanently; hence should be in a safc custody.

2.6.3 Investigations and Management

In tlic present scenario, by and large all patients attending the accident and emergency department require some or the other investigations before any treatment can be initiated. Hence, it is necessary to have an emergency laboratory and radiology unit within or near the department, so that these can be carried out urgently whenever required. Other basic investigations like ECG and arterial blood gas are also required on a number of occasions. For every patient, the investigation ordered and the results obtained should be mentioned in the emergency records and a copy of the same should be retained in safe custody for all medico legal cases.

2.6.4 Admissions and Referrals

Proper treatment should be initiated promptly on the arrival of the paticnt and accurate records of all ,fluids, drugs and medicines given should be maintained in the records and the treatment register (maintained by nursing staff), All the consultations carried out by different specialists in the department should be recorded chronologically and case management done accordingly. During the pcriod of observation the vital parameters should be recorded along with the time of recording. Whenever consultants/seniors are consulted their impressions should also be recorded. If it is required, the patient must be admitted in the hospital, and a new indoor patient registration number issued, along with the bed number, ward and the unit/ department under which the patient is being admitted. In case of admission, the emergency record is also sent along with the patient, and it becomes a part of the indoor patient case sheet, which is generally retained in the medical records department of the hospital.

However, if the patient has to be referred to another hospital with better facilities, it should be ensured that the patient has been stabilized, and vital parameters are okay, before the patient is referred. If possible, one doctor should be deputed to accompany the patient to the referred hospital.

2.6.5 Medico Legal Issues

In most of the accident and emergency departments in our country. a large majority of the patients who attend are medico legal in nature. A medico legal case is one, where tlie attending doctor, after taking the history of the patient, and performing clinical examination, thinks that some investigation by tlie law enforcing agencies are essential, so as to fix responsibility regarding the case in accordance with the law of the land. It is purely the responsibility of the Casualty Medical Officer to decide as to when to label a case as medico legal.

It is important to note that doctors posted in Accident and Emergency Department of a government hospital are duty bound to register, examine and treat all medico legal cascs coming to tlie department. The records should mention and categorise the case as medico legal case and injury report should be prepared and documented in the medico legal case register and intimation should be sent to police officials. Treatment of the patient, should in all cascs take precedence over medico legal formalities.

1.7 MONITORING AND EVALUATION

In tlie earlier section we have discussed about the operation and functioning of the accident and emergency department. It is clear that this department is one of the most important factors in giving a positive or negative image to the hospital. Hence the functioning must he subject to regular scrutiny, in order to ensure that the most efficient and effective services are available to the community. A study of the utilisation of these services should include data on tlie number of visits, tlie avcragc length of visits, the seasonal variation in patient load. the seasonal disease correlations, variations in "peak" and "slack!' hours and treatment categories. The last variable would help in determining how many cascs treated are actual emergencies.

The concept of 'medical audit' or 'peer review" must be initiated in the accident and emergency department. Broadly, it involves the review ofthc medical records of patients attending the casualty: and ascertains the Sollowing:

- the completeness, adequacy and accuracy of records,
- the correctness and substantiation of the final diagnosis,
- the errors in diagnosis and management of patients, and
- tlie causes of complications and death (if any).

2.7.1 Review (Audit) Committee

It is essential that a review or audit committee is constituted by the appropriate and competent authority to carry out this work, as it is of a highly sensitive nature. Senior Consultants belonging to broad disciplines of medicine, surgery, orthopaedics and paediatrics should be members of this committee, along with the administration and medical record officer. This committee should meet at regular intervals and take necessary corrective measures by training the staff in order to overcome the hurdles in future. The reports of tlie committee should be kept confidential.

2.7.2 Grievance Redrcssal Systems

A system must be implemented for the redressal of grievances by the patients/attendants who attend the accident and emergency department. This is more so, especially in the light of increasing number of cases against medical professionals/hospitals under tlie Consumer Protection Act. Complaint boxes should be strategically located and every valid complaint should be enquired into and necessary corrective action initiated. A senior consultant/faculty member should be made incharge of this forum; and it is also advisable to have prominent citizens from other fields as members.

Check Your Progress 2

1) List the various categories of staff and factors on which staffing of Accident and Emergency Deptt. depends ?

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2) What is the important information in emergency deptt. records ?

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3) Who should be the members of the review committee ?

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4) Indicate True or False:

a) Registration of medico legal case must be finished before starting treatment. (T/F)

b) A good ambulance service should have all essential life saving equipments. (T/F)

c) A judge should be the head of the grievance redressal committee. (T/F)

d) Medical audit refers to costing of the services in accident and emergency department. (T/F)

e) Patient should be stabilised before being referred to another hospital. (T/F)

2.8 LET US SUM UP

In this unit you have learnt about the changing role and importance of the Accident and Emergency Department in a hospital. Starting with the planning considerations for an Accident and Emergency Department, you have learnt that planning should be done for future patient loads. The emergency equipments have been explained along with the most vital maintenance issue which is imperative in this department. The various categories of staff and the factors affecting staff have been discussed.

Subsequently, you have learnt about the policies and procedures which have a direct bearing on the operational aspect of the department; followed by monitoring and evaluation of these services.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) The functions of Accident and Emergency Department are:

- to provide immediate and correct life saving medical care at all times and in all situations. Services should be both effective and efficienl as the patients are likely to deteriorate quickly.
- to be sensitive to the emotional needs of the patients and attendants.
- to liaise with the courts and police in medico legal cases whenever required.

2) The broad planning considerations are location, space requirement, patient loads, physical facilities and layout, architectural design and communication system.

3) The essential equipments which should be present are:

i) Centralised piped oxygen and suction supply.

ii) Airways, outlets and resuscitation bags.

iii) Wall mounted/portable manometer.

iv) Portable defibrillators and ECG.

v) Respiratory aids e.g. ambubag, ventimask, nebuliser etc.

vi) Cardiac monitors and defibrillators.

vii) Special medications, intravenous equipments and fluids.

viii) Sufficient bandages, drugs and plasters.

ix) Utility table with emesis basin, kidney tray etc.

x) Slit lamp, loupe, ENT examination equipment.

xi) All equipments that will be required for O.T. and ICU.

xii) Adequate numbers of trollies and wheel chairs.

4) a) True

b) False

c) False

d) False

e) True

Check Your Progress 2

1) The various categories of staff are medical, nursing, paramedical and group 'D'. The factors on which staffing depends are:

- Size and nature of hospital (including category of hospital),
- Wwk load of the department,
- Resources available.

2) The following information should be present in cmergcncy deptt. records:

- demographic parameters—name, age, sex, address, registration No.
- date and time of arrival of the patient
- the chief complaints — duration
- examination findings
- base line investigation and their values
- diagnosis and management
- whether admitted/discharged/referred to other hospital.

3) The members of the review committee should be senior consultants from the broad specialities of medicine, surgery, orthopaedics, paediatrics; the administrative and medical record officer.

4) a) False

b) True

c) False

d) False

e) True

2111 FURTHER READINGS

Rowland and Rowland, *Hospital Management—A Guide lo Departments.*

VHAI, A Practical Guide to Hospital Planning and Management.

Mc Gibony, *Principles of Hospital Administration.*

UNIT 3 OPERATION THEATRE

Structure

3.0 OBJECTIVES*

After going through this unit, you should bc able to:

- describe the objectives of planning of an Operating Department;
- describe the concept of zoning and list the advantages of zoning of the operating department;
- list out various facilities provided in different zones of the operation theatre department;
- describe various methods of calculating the number of operating suites required;
- discuss the various elements to be considered while designing an operation theatre; and
- describe the policies and procedures involved in an operation theatre dcparlment.

3.1 INTRODUCTION

During the course of your undergraduate studies, or while working in medical care facilities, you must have seen and heard about the functioning of operation theatre. In the previous unit you have already learnt about Accident and Emergency Services where Operating Department is one of the important components. The activities carried out in this department can make or mar the reputation of the hospital. It is therefore imperative that detailed planning should be done on scientific basis while evolving the operating department in order to ensure effective functioning of this department.

In this unit you will also learn about the essential policy and procedures which are required to be laid down for strict adherence by all concerned.

3.2 TYPES OF OPERATIONS

The significance of classifying operations as major and minor operalions has been seriously questioned. Statistics based on this classification may not produce meaningful data. Surgical operations may instead be broadly classified as emergency and elective operations.

Emergency Operation is that which must be carried out as soon as possible after the diagnosis has been madc and the patient prepared for the operation in a proper way. Emergencies from outside include patients who are admitted as urgent cases. In the case of in-patients emergencies, in a case like a wound dchisccncc or post-operative intestinal obstruction, the decision to operate is made by the surgeon-in-charge of the patient.

Elective Operations, which arc the majority, are carried out some time after the diagnosis has been madc and when they suit best for the patient and the hospital.

Currently there are at least fifteen surgical specialities or subspecialities which requires Operation Theatre to be equipped with spccialised euipment. Some of the advances that had taken place in recent years are:

Microsurgery: Microsurgery may be defined as surgcry performed under magnification; some people confine to surgcry using the operating microscope, while other includes loupes and other ocular aids.

Microsurgery has proved its usefulness in otorhinolaryngology, ophthalmology, neurosurgery, particularly peripheral nerve surgery, vascular, plastic and hand surgery.

Cryosurgery: Cryosurgery is that type o l surgery which is based on use of liquid nitrogen at a very low temperature. Nitrogen is brought into contact through prop with diseased tissue which dies and sloughs away. In this the local pain is absent.

Laproscopic Surgery: Major surgical interventions are done with the help of laproscope. Its use requires minimal incision post operative care and stay in the hospital.

Bio-medical Laser: Light amplification by simulated emission of radiation is one of the ways to make the conventional scalpel obsolete. In this procedure therc is absence of physical contact and the cutting is without mechanical pressure which makes the operation non-traumatic. The risk of infection is also less.

Check Your Progress 1

Fill in the blanks:

a) Elective operations are carried out .....
.....

h) Cryosurgery is based on .....

c) In biomedical laser procedure there is absence of ..... and the cutting is without .....

3.3 PLANNING

3.3.1 Aims of Planning

The aims of planning of an operating department arc to:

- promote a high slandard of asepsis.
- ensure maximum standard of safety lor patient and staff from environmental, anaesthetic, radiological and post-operative hazards.,

- ensure optimum utilization of operation theatre and staff time.
- ensure optimum conditions of work for the surgical team.
- ensure comfortable treatment of patients.

allow more flexibility by use of the individual operating rooms.

3.3.2 Planning Criteria

In order to achieve the above objectives, it is imperative that the operating department be so designed that they meet the functional, professional and technological requirements. The planning criteria so developed are:

a) Functional Criteria

The activities to be carried out in different functional areas of the operating department are to be critically studied and analysed. The design of the operating room must follow the functional requirement of the operating department.

b) **Economic** or **Work** Flow Criteria

The flow of patients, supplies and staff in an operating department is to be conceived and preplanned. This will ensure optimization of relationship between various functional areas of the operating departments.

c) **Environmental** Criteria

The environmental aspects should also be considered for the safety and comfort ot'the patient and staff, The complexities of the functional and workflow criteria will create numerous problems while designing an operating department and formulating its operational policies.

After a thorough study and analysis of the above criteria, the design considerations must be identified, which will decide the operating policies for the organisation and management of the department.

Check Your Progress 2

1) The aim of the planning of operation departments are:

a) To promote high standard of .....

b) To ensure .....of Operation Theatre and staff time.

2) Enlist three planning criteria:

a) .....

b) .....

c) .....

3.4 DESIGN CONSIDERATIONS

Before designing an operation theatre department should try to understand the various Activities Involved in operating a patient. There are number of activities which are involved with the basic procedures and other activities like supporting procedures and administrative activities. These are as under:

a) Basic Activities Involved in the Act of Surgery:

- Reception and identification of patient
- Pre-operating supervision of patient
- Depilation of patient
- Transfer of patient to operation table
- Administration of anaesthesia
- Intubation
- Positioning
- Preparation of the operative area and surrounding skin
- Draping of patient

- The act of surgery, OPERATION, which may involve blood transfusion, parenteral fluid administration and x-ray examination.
- Wound sewn up and dressed
- Drapes removed and bagged
- Extubation
- Transfer of patients from operation table to trolley or bed and to the post anaesthetic recovery area.
- Post operative supervision of patient.

b) Supporting Proccdurcs:

- Staff changing to opcration room garments and shoes
- Putting on cap
- Masking
- Aseptic washing of hands
- Gowning
- Putting on gloves
- Putting on apron
- Laying out, checking and re-checking the number of instruments and dressing to be uscd during the operation.

c) Administrative Procedures:

- Preparation of operation lists, duty schedules
- Requisition of patient
- Notification to wards of time for patient transport to and fro the surgical department
- Distribution of messages
- Requisition of records, equipment and material
- Contacts with other departments, laboratories, workshops and suppliers
- Ascertain availability of essential doctors and supporting staff for cmcrgcncy assistance

d) Clerical Proccdurcs

- Preparation of operation records
- Preparation of operation rooms records
- Filing
- Statistical interpretation of operation room records.'

c) Housekeeping Procedures:

- Collection of uscd instruments
- Collection of uscd materials and soiled surgical instruments, dressings and underlays
- Cleaning of operation rooms and other areas in the surgical department
- Disposal or incineration of refuse.

f) Storekeeping and Repairs

3.4.1 Location

The location of operating suites is dictated by the number of suites to be provided. The operation theatre complex can be conveniently located at the ground floor as siting an other floors adds to design and communication problems. However the OTs are usually located on higher floors in a multistorey building to minimise the general traffic and better maintenance of asepsis. The operating department should bc easily accessible Io the Central Sterile Supply Department (CSSD)/Theatre Sterile Supply Unit (TSSU),

Emergency Department, Surgical Wards. It should be independent of general traffic and should have maximum protection from sun, heat, noise, dust and wind.

The location of the department should be decided on the following factors:

a) Quiet environment

b) Noise, Dust, Wind, Heat and Direct Sun light Problem

c) Cross Infection Problem

d) Solar Radiation

e) Easy access to ICU, X-ray, Laboratory, Blood Bank, CSSD, Emergency Ward and Surgical Department.

The unit also needs constant specialised services such as piped suction and medical gases, electric supply, heating, air-conditioning, ventilation and efficient lift services (if theatres are located on the upper floor in the multistorey building).

If possible Operalion Theatres should be given its own wing, an independent low building. This will help in expansion of Operation Theatre complex without disturbance to other departmenls of the hospital.

Operation Theatres require more height (approx. 4.2 metres) bccausc of air-conditioning requirement of a modern OT. It is therefore felt if there is only one multistorey building of a hospital then OT should be located on the top floor of the building because of ease of providing more height. Dedicated (AHU) Air Handling Unit for 100% fresh air for each OT for blow through system could bc sited on the terrace of the multistorey building above the Operating Room.

3.4.2 Size of the Operating Room

Minimum clear area for a general operating room is 40 sq. metres. Cardio-vascular, Neuso-surgery, Orthopeadic and other spccialised procedures which require additional equipment needs minimum clear area of about 60 sq.metres. An additional adjoining room to the main OT may be needed for heart lung machines for cardio vascular OT and equipment storage for large equipment, in other specialiscd operating rooms. In Orthopeadic surgery, space may be needed for splint and traction equipmenl. Surgical cystoscopy and other endro-urological process room will require minimum clear area of 35 sq. metres.

Endoscopic Suite will require following rooms:

- Procedure Room(s)—minimum area 20 sq.metres
- Instrument processing room
- Processing room for cleaning and disinfection
- De-contamination room
- Patient holding/Preparation/Recovery Area

3.4.3 Number of Operating Rooms

Therefore, for calculating number of operating rooms approximately 80 minules including the hygienic intervals between operation is required as a average length of time per operation. The number of operation theatre rcquired for a particular hospital can be worked out by studying in greater detail the following factors which are more or less quantifiable:

- Number and type of Surgeons
- Type of hospital
- Hospital policy and procedures
- Hospital bed complement

  Number and'nature af elective and emergency surgery anticipated
- Number and type of surgical patients
- Number of operations per day
- Expected average length of slay of surgical patients

- Expected turn over interval in operation theatre
- Size of an average OT list
- Estimated time for cleaning between operations
- Time allowed for staff breaks
- Amount of time operating suites can be equipped and staffed
- Amount of time reserved for emergency use
- Allowance for septic patients

However, the number of operating suites can be conveniently worked out in the following way also:

i) **Number of Operating Suites and Number of Operations Per Day**

The number of operating suites can be found out from the predicted number of operations per day. Macaulay, in his book *Hospital Planning Administration* has stated that the number of operations can be calculated by dividing the number of surgical beds by the ALS (Average Length of Stay) of surgical patients.

Therefore,

$$\text{No, of Operations per day} = \frac{\text{No, of Surgical Beds} \times \%\text{ of BOR} \times 365}{\text{ALS} \times 100 \times \text{Number of working days in that hospital}}$$

Note: BOR - Bed Occupancy Rate

ALS - Average Length of Stay

The number of operations which can be performed in each operating suite can be determined by studying past trends and by conducting work studies or by making use of available standard norms. American authorities calculate one operating suite for two or three operations per day, while European authorities recommend that a minimum of six operations should be performed per day in one operating suite.

ii) **Number of Operating Suites and Hospital Beds**

According to American pattern, one operating suite is required for every 25 surgical beds while European authorities recommend one operating suite for every 50 surgical beds. Rao Committee (1968) which was appointed by the Govt. of India in connection with studying the facilities available in Delhi Hospitals has recommended one operation theatre for every 50 surgical beds.

However, the Committee on Planned Projects (COPP-1964) has given tlie following guidelines regarding number of operating suites in a hospital:

No. of Operating Suites Required

	Indoor		OPD Including Emergency	
No. of Hospital Beds	**Minor**	**Major**	**Mnjor**	**Minor**
300	2	3	x	1
500	2	5	1	1
750	2	8	1	1
1000	2	10	1	1

In addition to these, superspecialities like CTVS, Paediatric Surgery should have additional operation facilities.

3.4.4 Grouping of Operation Theatres

The centralization of major operation suites in one area has got definite advantage over individual operating theatre distributed close to the various surgical wards. These advantages are:

- Maximum flexibility in use
- Easy expansion at times of future demands
- Simplifies theatre staffing and better training, centralization and standardisation of procedures improving efficiency

- economics in common facilities such as men, material, machines and minutes
- Easy and economical maintenance
- Improved cleaning and better sterilization
- Flexibility in allocation of operating suites to various specialities
- Minimizes infection and cross-infection
- Improves utilisation of operating suites
- Improves efficiency to staff
- Minimizes cancellation of operating schedules

Therefore, grouping of operation theatres will ensure easy management and control.

Size of well administered OT unit varies in different countries:

Germany : 6-8 Operation rooms

Sweden : 8-10 Operation Rooms

Norway : Not more than 12 Operation Rooms

However, it can, therefore, be safely presumed that if there are more than 10 operation rooms two or more separate OT department may be provided.

3.4.5 Zoning

It is universally agreed that operation is to be performed under the most aseptic conditions. To ensure this aseptic condition the operating department is divided into four distinct Zones: Protective Zone, Clean Zone, Sterile Zone and Disposal Zone.

These Zones are bacteriological zones of varying degrees of cleanliness. The bacteriological count diminishes from the outer to the inner zones. 100% sterility must he ensured in the sterile zone. The zoning of the operating department has got the following advantages:

- Minimises risk of hospital infection
- Minimises unproductive movement of staff, supplies and patients
- Increases efficiency of staff working in the operation suites
- Ensures smooth work flow
- Reduces hazards in the operating suites

  Ensures proper positioning of the equipment
- Ensures optimum utilization of the operating suits

a) Protective Zone

It usually provides facilities like:

i) Reception

ii) Waiting Room for patients relatives

iii) Changing Room

iv) Pre-anaesthesia Room

v) Store Room

vi) Autoclave/TSSU

vii) Trolley Bay

viii) Control area of electricity.

b) Clean **Zone**

It provides facilities such as:

i) Pre-Operating Room

ii) Recovery Room

iii) Theatre Work Room

iv) Plaster Room

v) X-ray unit with dark room

vi) Sisters Work Room

vii) Staff Work Room

viii) Anaesthesia Store.

c) Sterile **Zone**

This zone has facilities.like:

i) Operating Room

ii) Scrub Room

iii) Anaesthesia Room

iv) Instant instrument sterilization

v) Instrument Trolley area.

d) **Disposal Zone**

This zone provides facilities like:

i) Dirty wash up room

ii) Disposal Corridor

iii) Janitor's Closet.

Check Your Progress 3

1) Enlist the area to which operating department should be easily accessible to:

i) .....

ii) .....

iii) .....

iv) .....

v) .....

vi) .....

vii) .....

2) Fill in the blanks:

a) Minimum clear area of general OT is .....

b) Minimum clear area of cardio-thoracic surgery OT is .....

3) Fill in the blanks:

Area of general OT is:

a) According to COPP 300 bedded hospital will require ..... major OT and ..... minor O1'.

b) Operation theatre department should not have more than ..... rooms.

3.4.6 Electrical

The administrators and the planner has to ensure the availability of electricity all the time in OT department. Any disruption of electricity is likely to bring lo a grinding hall and give a bad name lo the functioning of the department. It is therefore essential to provide fool proof system in the OT, so that stable electrical supply is available all the lime. Particularly when the surgical team is operating on a case or the patient is being resuscitated on ventilator or have been put on heart lung machine, power supply should never fail even for an instant.

Like human beings mechanical and electrical equipment can gel sick and may require repair and maintenance. However, patient sickness needing operation cannot wait for equipment lo be repaired. Therefore, planning has to be done in such a way that if one source gets disrupted then the electrical supply is available from the other sources.

While laying down the electrical cable and connecting it to distribution boards (DB) it should be ensured that OT electrical points are distributed between two or more DBs. This will ensure DBs repair and maintenance without effecting electric supply of the OT. DBs should be located in such a way that electrician can repair and maintain the same without getting into clean and sterile zone. Apart from the main electric supply OT is also connected with the stand-by generator and UPS which are discussed below.

Light

Light is the most important component of the Operation Theatre. It is with the help of light the surgeon is able to see the surface of the operation area and also the very depth of the wound where he performs procedures like culling and suturing.

The central field of operation luminance should be 2000-3000 candles per metres square. Wound surrounding area luminance ratio should be 2.5 : 1. The floor around surgical table should be 200-300 candles per metre square and walls 300-500 candle per metre square.

Reflectance (Glare): The instruments, clothes of operating room should be selected to avoid glare.

Colour Composition: These should be such so that anaesthetist will be able to see the colour changes of the patient skin. The operating light (special light/operation lamp) and the complimentary lighting, the colour scheme of the room and the textiles must be co-ordinated.

Operating Light: Before sclccting a operating light one should look into the following aspects. These arc as follows:

i) easy maintainability repair and maintenance

ii) intensity:

— 40000 lux at the place of incision.

— 80000 lux at the bottom of 13 cm deep and 5 cm wide incision (hut nowadays surgeon prefer intensity of 100000 lux)

iii) Fitting be directionally flexible

iv) Control accurate and quick

v) Once positioned it should be steady and should not move

vi) Shadowless

vii) Heat radiation small

viii) Maximum temperature of luminaries should be 58°C

ix) Mirror for Anaesthetist for seeing the surgical procedure be incorporated

x) Secondary or satellite light for some OT like cardio-thoracic surgery etc.

xi) OT lamp should not bc lower than 2 metre above the floor

xii) Camera for viewing the operation

xiii) Sterile handle for adjusting the lights etc.

xiv) Supply of accessories like bulbs Tor replacement.

Fiber **Optic** Operation Lamp

We have earlier mentioned about laproscopic surgery, in which fiber optic lamps are used. The light in a fiber optic operation lamp is transmitted through electrically powered flexible fibers. It is also called cold light because the tube docs not become hol. The optical fiber may be incorporated in instruments itself to bring the light to operating field,

General **Light:** General light luminance intcnsity may vary from 500 lux to 2000 lux. This will also depend upon the luminance intensity used lor the operating lamp/light.

Presently in the market different types of operating lights are available. Prismatic type of light is also available which does not give any shadow or obstructions to the site of operation. However, before going for this light one has to cater for extra blubs for emergency replacement as these lights have got one or more blubs. While installing this light one should also see the radius of its operation as the movement should preferably not interfere with other suspended eyuipments like pendant etc.

Power Outlet

Operation Theatres require electro-medical equipment for life support and for performing surgery. All these equipments are dependent on stable electricity. For using these. equipments power outlets at convenient location are needed. It is therefore essential that four power outlet (duplex type) is provided on every wall of the Operation Theatre. Near the Anaeslhetist location, six power outlets should be provided.

One of the outlet should be of heavy duly variety, so that equipment like X-ray, Laser, C-Arm could be plugged in. These outlet should be located at one metre above the floor level as the anaesthetic gases are heavy and settle near the floor. It is also advisable that all these outlet should he on UPS, so that at the time of emergencies any of the power outlet could be utiliscd. The outlet should bc flushed with the wall for easy maintainability. Power outlet should also be provided for the viewing box.

Stable Electrical Supply

Stable electrical supply is important for effective functioning of equipments. Voltage and frequency fluctuation is likcly to damage the electro medical equipment. Therefore, it is essential that stable voltage and frequency electrical current should be supplied in the OT. This could be achieved hy a UPS in the OT complex.

Standby Generator

Captive powcr is an important necessity for a hospital to meet the emergent situation of high dependency area like operation theatre and ICU of a hospital. One cannot takc a risk of carrying out an operation procedure in OT without power assurance. The captive power could bc provided by a standby generator which should be able to take the full load of operation theatre including its air-conditioning, The standby generator should be provided with Auto Main Failure Panel (AMFP), so that the generator comes up on load as soon as the main supply fails or get disrupted. The standby generator should be situated away from the OT complex to avoid noise and pollution.

Uninterrupted Power Supply (UPS)

Apart from provision stable electric supply, slandby generator, operation theatres rcquircs UPS. Nowadays many computcrised cquipmcnts are used in the OT where disruption of electricity is likely lo cause loss of data. It has also been observed that in best conditions standby generalor takes a few minutes before it gets activated and comes on load. Loss of vital timc is likcly to adversely effect the outcome of the operation. It is therefore essential that all plugs and lights in operalion room are put on the UPS.

The total load of the UPS apart from the light in operating room will depend upon the number of equipment present and used in that OT at the time of lights disruption. The electro-medical equipment load of an operating room is likely lo bc in the region of 6 KVA.

3.4.7 Airconditioning and Ventilation

To achieve the basic objective of promoting high standard of aspesis and proper environments of the OT departments high quality air-conditioning with proper ventilation system of positive pressure with different gradients is essential. With the passage of time OT air-conditioning has gone into major changes. Different types of operalions like Heart Transplant, Kidney Transplant, Operation on Central Nervous System lasting many hours requires environment where any type of infection occurring to operated patient has to be avoided at all costs. Tlicse surgeries require environment which is very conducive to patient staff and equipment apart from providing microbes free environrnenl. Environment required for different surgery differs. For example Paediatric surgeon may require more temperature as compare to other OT used for the adult patients. These can be achieved if the planner and air-conditioning consultants along with surgeons arc involved in advance.

Civil construction is the one which lasts over 50 years. Some of the hospitals at this time may not contemplate conducting major operation of a complicated nature, but after some time with improvement in technology and availability of trained staff they may like to perform these procedures. Such a situation may occur even in smaller hospitals or those in rural areas. Therefore, construction of OT should bc made in a way that it could be fitted with modern air-conditioning system at that time. Air' conditioning duct, laminar flow and high efficiency filter takes almost one metre space above the

false ceiling. It is therefore felt that clear height of 4.2 metres is needed in the OT. The location of the beam should be such as to permit provisioning of air-conditioning duct and also the return air-duct. Grill for return air-duct should be located 30 cm above the floor level.

The duct should not protrude in the operating room. Many types of air-flow are possible, but vertical laminar flow is preferred in OT as it provides maximum aseptic environment above the operation table because of its location.

Location of return air-duct is important. Number of return air-ducts will depend upon the total quantity of air which has to be exhausted. However, minimum of two return ducts should be provided in the OT located opposite to each other. Different types of positive pressure is used in the OT, operating room having the maximum so that air from outside does not enter and contaminate the operating room. It is therefore essential that, even when the OT is not in use also, positive pressure of the operating room is maintained. In the non-occupied mode, less air is kept in circulation to save energy and prolong life of the air filters.

It is recommended that air supply outlet be located on the ceiling with exhaust out-lets 30 cm above the floor. This provides a downward movement of clean air through the working zone to the contaminated floor area for exhaust.

Air-handling unit (AHU): Air handling unit is the place where the chilled water comes in contact with the air and cools it to the desired level. The treated air passes through different filters and than the clean air is discharged into the OT. In some OTs like Cardio-thoracic, Neuro Surgery, Kidney Transplant, Orthopaedic the surgeon prefers 100% fresh air of class 100 clean room application. In other OT, some re-circulated air is also accepted. *This* will *be an economical system.* While laying down the temperature and humidity of various operation theatres one has to consider the clinical requirement of the patients. In most instances a temprature of 22°C (± 2°C) and humidity levels of 55% (± 5°C) achieving the optimum environment.

3.4.8 Manifold Facilities

The following outlets for Oxygen, nitrous oxide, suction (vacuum) and medical air should be provided:

	Oxygen	Nitrous-oxide	Suction	Medical air
General Operating Room	2	2	4	2
Cystoscopy and Endoscopy Room	1	1	3	2
Anaesthesia Workstation	1	1		1
Post Operalive Room	1		1	1

3.4.9 Service Pendent

According to Oxford dictionary Pendent means "hanging". For ease of function and movement of surgeon team, it is felt that no wires should be lying on the floor around the operation table.. Therefore, certain hanging fixtures are added in the OT. These are called service pendents. Service pendents are ceiling mounted and provide manifold and electric outlet at convenient height for use. These can be made use of quickly by surgeon and anaesthetist. Three designs are available:

a) Fixed length service pendent

b) Telescopic service pendent are designed to give ideal working height in the downward position. When not in use, they can be raised above the ceiling.

c) Rotating type pendent can rotate in X-axis, but this is costly as compared to the ones mentioned above.

Oxygen, Nitrous-oxide, compressed air and vacuum outlet are provided in the pendent. Electrical sockets which are on UPS are also provided in the pendent. The pendent with manifold facilities is located near the anaesthetist end of the Operation Table.

In some operating rooms, two pendents are provided one at the head end of the table (having manifold and electrical outlets) and other at the foot end of the table. They are located diagonally opposite to each other. The pendent should be located 45 cm from end of the table and 45 cm away from the table. Pendent fitting should be 1.9 metres above the floor level.

3.4.10 Structured Cabling

Hospital nowadays requires reliable network for faster access to information. The first step towards the adaptability, flexibility and logitivity of network is important and this can be providcd by structured cabling.

Tele-medicine has become one of the most important aspects of medical management. It may happen that with the help of tele-medicine surgeons of tomorrow at some remote location may bc able to carry out complicated procedures in the Operation Theatre with live advice from the expert who is a long distance away from the patient. Computer voice, telephone, TV and Video is going to be an important feature of Operation Theatre.

Therefore structured cabling for present and future use has become a necessity and should be planned well in advance. In India various firms arc available in the market who lake up the task of planning, designing and executing a network by structured cable. One cable can carry out lhc functions like computer, telephone, music etc.

Camera: It is not necessary to provide a view gallery in the Operation Theatre and thereby lose a space. Nowadays camera is fitted on to the Operating Lamps itself and it transmits picture of the operation for live demonstration in conference room situated elsewhere.

Check Your Progress-4

Fill in the blanks:

a) Nowadays for operating light surgeon prefers intensity of .....

b) ..... duplex outlets are provided on every wall of the OT.

c) Grill for return air-duct should be located ..... above the ground floor level.

d) It is recommended that air supply outlet be located on the .....

e) The following outlet of suction ....., Oxygen....., Medical air ..... should be provided for general operating room.

f) Pendent fitting should be ..... above the floor.

g) Camera in OT is fitted in ....

3.4.11 Plumbing/Sanitary Installation

Plumbing and sanitary installation planning is an important aspect of OT design. It should be ensured that sewage shaft should not pass through the operating room. If it passes through any other area, there must he no opening provided. The entire shaft passing through this area must have impervious lining lo seal contamination. Plumbing fixtures and lines above the operating room should be avoided because of leakage and contaminations. In change room area of the department toilets are provided arid also the facility of shower.

These facilities should be of hospital standard. These are attached with the change room made for doctors, female staff and other staff. The height of the wash room and the sink should be 91.5 cm to 96.50 cm.

Scrub station: Scrub station is provided near the entry room of the OT. One scrub station per Operating Room should be providcd, The working height ol' scrub station is 96 cm with water source 10 cm higher. In scrub station if possible gowning area should also be provided. A scrub station and gowning area with three scrub-up places require about 11 sq. metre space. This is usually providcd for one operalion room. However, it can be shared by two operation rooms, if located adjacent to each other.

To prevent splashing between scrub-up wash basin, screen/wire glass/non-breakable glass may be provided. Elbow operated/foot operated handles are provided in the scrub station, so that the surgeon can keep his hands free and clean. Howevcr, it is better lo have photo electric cell operated wash basin, so that there is no body contact. This arrangement is most hygienic.

Nowadays ready to use scrub stations are available in the market lor installations. Washing of the OT may be carried out. Necessary provision should be made to drain the waler from OT department.

3.4.12 Fire Fighting

Fire detection system should be available in the operation theatre complex and it should be connected to central control room so as to give adequate warning. Fire fighting appliances and equipment should be suitably designed for different areas of the operation theatre and it should be properly maintained. Its locations and use must be known to the staff working in the operation theatre department.

3.4.13 Design and Finishes

Floors and Walls: Floor and walls should be hard, robust, impervious, jointless, non-absorbent, washable and de-contaminated. All corners and joint should be curved. Viewing cabinet switches, plugs, door and window frames is flush with the wall surface to make cleaning routine easier.

Although anaesthetic gases like ether are not being used but still it is preferred to have a conductive flooring in the operation theatre. Linoleum PVC conductive flooring is also available.

Ceiling: Ceiling should contain minimum number of fissures, open joints or crevices that minimize retention of dirt. Height of the ceiling should permit location of operating lights and pendant. Minimum height of 2.9 to 3.05 metres is needed for fixing operating light conveniently.

Clean Room: A clean room is a enclosed space implying environmental control over atmospheric contamination, temperature, humidity and pressure. The cleanliness of the space is controlled by laminar air-flow through high efficiency particulate air (HEPA) filters.

HEPA Filter is high efficiency filter used in clean room, they remove particles from the air. A particle is counted if *it* is larger than 0.5 microns. A micron as you know is one millionth of a metre which is one thousandth of a mm (001 mm). Clean rooms have different class. It could be class 10 room, Class-100 rooms etc. (A class 10 room will contain less than 10 particles per cubic foot.) In operation theatre class 100 clean room is acceptable. These rooms are provided with mylar fine guard ceiling with a vertical laminar flow and HEPA filter. This will be able to provide class 100 clean room

Doors: Main door to the operating room should be of 1.5 metre clear width with 2 leafs. Door should be protected up to the height of 1.25 inetre with Rubber, PVC or Stainless steel. Sound insulation of door should be perfect. Kick plate should be sound absorbent. Post operative room door should be minimum of 1.45 meter in width.

In the operation theatre a staff person dressed in sterilized garment needs a minimum door opening of 90 cm (door between scrub room/gowning area and operating room).

Height of the Door: The minimum clear height of door opening should not be less than 2.13 metres (7 feet).

3.4.14 Equipments

a) Operation Table: The main item of the operation room is the Operation Table. One table per operation room is needed. If mobile tables are used reserve table may be needed and this will depend on the frequency of operation. All operation tables should be provided with a convenient insertion of x-ray cassettes.

b) Microscope: For micro-surgery, a microscope with remote control is used. Nowadays stereo-scopic colour video microscope is being used. Equipment wherever. possible should be of wall hang type or could be even hung from the ceiling.

c) Mobile Equipment: Other mobile equipment used in OT are:

   i) Anaesthetic apparatus

   ii) Anaesthetic table

   iii) X-ray equipment

   iv) Diathermy equipment

   v) Electrical suction apparatus

   vi) Pulse monitor

vii) Ventilator

viii) Monitor-cum-defibrillator

ix) Heart lung machine

x) Other devices for physiological and isotope investigations.

All surfaces of castor wheels of equipment should be easily accessible for cleaning and decontamination. No piece of equipment which stand on floor should have a height exceeding 1.8. metres.

3.4.15 Staffing

For routine general surgery operative team size will vary between 4 and 7 persons. The operative team consists of:

i) Surgeon

ii) Anaesthetist

iii) Assistant to help the surgeon with ligatures, retractors

iv) Scrub nurse to pass instruments to the surgeon

v) Circulating nurse

vi) Anaesthetist nurse

There may be up to four assistants to help the operative team. These are:

i) Radiographer

ii) Technicians

iii) Sterilising staff

iv) Disposal staff

However, for Cardio-vascular surgery OT total of approximately 20 persons may be involved.

Check **Your Progress 5**

Fill in the blanks in the space provided:

a) Floor and wall of OT should be .....
.....

b) Conductive flooring should be provided in .....

c) Height of ceiling in OT should be .....

d) Main door of OT should bc ..... width

e) Operation table should have provision of inserting .....

f) Staffing in routine general surgery will vary between .....

3.5 POLICY AND PROCEDURES

3.5.1 Operating Schedule

The time lost between cases in a given operating theatre may amount to as much as 15-30 minutes depending upon the hospital, its personnel, the number of surgical instruments available and discipline and control prevailing in the theatre. It is important to ensure that there is no wastage of operating time of the surgical team nor there is any over-crowding of the operation list resulting in postponement of operations.

3.5.2 Administration of OT

Time saving technique depends considerably on operating room discipline. A well run OT requires an untiring and energetic theatre matron, a dedicated and disciplined Chief Surgeon, an anaesthetist who is keen on high standard of efficiency and a trained and well motivated para medical staff, If instruments are ready in advance of the appointed time, the assistants arc in the room, gowned and gloved and the anaesthetisl helps to coordinate the presurgical details before entry of the operating surgeon the duration of occupancy of that room by a particular patient will be decreased considerably.

3.5.3 Punctuality

Punctuality by cvcryhody concerned with thc operating schcdulc is important. The first case of the day should begin promptly when scheduled i.e. operation at 0800 hrs. should mean "knife" at that time instead of the patient being wheeled in. All delay should be investigated and discipline enforced with suitable penalties and motivation.

3.5.4 Theatre Staff

The chief surgeon should take personal interest in the training of theatre staff. Each member of the team including the junior-most ORA and the safai karamchari should be put through progressive training to bring them to a high pitch of efficiency so that they carry out their duties more or less by reflex action or "mechanically".

3.5.5 Operating List

The operation list should be made judiciously and time of operalion indicated against each. Efforts should be made to ensure that the cases are not postponed barring unforeseen and exceptional circumslances. Rigidity of "working hours" should not normally be allowed to come in the way of completing the list for the day. Other reasons for postponing operations such as non-availability of theatre linen. Lack of sufficient instruments and inadequate prcparalion of palients should be reduced to the minimum by suitable administrative measures.

3.5.6 Outpatient Cases

It is a common practice to see outpatients requiring minor surgical procedures such as special dressing, change of plaster, injection of piles, incision of a whitlow and so on, reporting to the OT early in the morning and being disposed off late in the afternoon at the end of day's operating schedule. This should be avoided at all cosls. Following approach is suggested:

a) Awareness on the part of all concerned that the above practice is highly demoralizing to the palients and all efforts should be made to plan and organise prompt attenlion for OPD cases.

b) Where there is one Surgeon in a hospital such cases should be dealt wilh either on OPD days in the afternoon or on the following day in the morning using the minor OT.

c) Where more than one surgeon/trainee in surgery are available the OPD surgery should be listed separately for the day and a surgeon detailed for the same. If necessary one of the medical officers can be trained to give routine anaesthesia1 carry out minor surgery.

d) Patients should bc called by appointment at the appropriate time when they are expected to be dealt wilh.

3.5.7 Transportation of Patients

Transportation of patients from and to the ward should be organised by the anaesthetist at a suitable time depending upon the time of operation. For this purpose adequate start should be made available permanently to the OT.

3.5.8 Maintenance of OT and Aseptic Standard

i) Time should be given for normal maintenance of OT. One day in a week should be earmarked for maintenance.

ii) Swabs should be taken from various area of the OT to check the growth of bacteria if any, particularly in the air-conditioning duct.

iii) Air-conditioning of OT should be checked thoroughly including effectiveness of its filters.

iv) Filter should be properly maintained and if it requires replacement, local agencies should be identified where filters like HEPA fillers are readily available.

v) In the OT gauges for checking, humidity and temperature should be available along with controls, so that operating staff can control the same from inside the OT.

vi) Operating lamp bulb is also likely to gel iused. Therefore some spare bulbs should be kept in stock in Operation Theatre department.

vii) Manifold facilities in the OT like Oxygen, suction, compressed air and nitrous oxide arc important. Adequate pressure should be maintained all the time. Therefore, location of manifold facilities plant room vis-a-vis location of operation room assumes significance.

viii) Operaling stall having infection should not bc permitted in the operating department.

ix) Disinfection/sterilisation of mobile equipment and operation table should bc ensured. Post operative infection rate, anaesthetic death rate should be documented and constantly rcvicwed.

x) Electro medical equipment/mechanical equipment, cvcn if we take all precautions, can fail and some time does not work, when it is most needed. It is therefore suggested that OT having only one life saving equipment should know the location of the same type of equipment in other OT which can be utilised at the time of need.

Check Your Progress 4

1) Describe in brief the concept of operating list.

.....

.....

.....

.....

.....

.....

2) Describe in brief the procedure for outpatient cases reporting to OT.

.....

.....

.....

.....

3.6 LET US SUM UP

In this unit you have learnt that the eminence of a hospital is determined by the performance of the OT complex. This is where the real action lies. It is here a clean aseptic environment is provided where a surgeon performs operative procedures wilh the objective of curing the illness of patients.

You have also learnt about the necessity of proper planning of the operation theatre department and elements of planning. It is, therefore, essential that the operation theatre department is planned properly. Location, grouping, size are important elements. Aseptic environment can bc cnsurcd if proper zoning is carried out and the best possible air-condilioning facilities with good control on ventilation system, temperature and humidity as per particular OT requirement and air pressure are provided. Asepsis standards ol' the OT shoulti be thoroughly checked by carrying out swab tests and bacteriological examination to check its sterility.

Further you have lcarnt that stable electricity is an imporlant element. While operating a case, the surgeon has to look at the site of incision and also look into the depth of the wound to operate there on. For this purpose operating lights have to be selected carefully to fulfil all the criteria.

Towards the end you have learnt about various policy and procedures, issues/ consideration.

You learnt that planning and creation of facilities is important, but it is necessary that it is staffed, equipped and organised properly. The policy and procedures should be laid down and adhered to. Any lapses in this is likely to adversely effect its functioning and spoil the image of the hospital,

3.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) after the diagnosis is made and at time suitable for both doctors and patients.

b) Neuro surgeon and Vascular surgeon.

c) physical contact, mechanical pressure.

Check Your progress 2

1) **a)** asepsis

b) optimum utilisation

2) a) Functional Criteria

b) Workflow Criteria

c) Environmenlal Criteria

Check Your Progress 3

1) i) ICU

ii) X-ray

iii) Laboratory

iv) Blood bank

v) CSSD

vi) Emergency ward

vii) Surgical department

2) a) 40 sq. metre.

b) 60 sq. metre.

3) a) 3, 3

b) 10

Check Your Progress 4

a) 100000 lux

b) Four

c) 30 cm

d) ceiling

e) 4, 2, 2

f) 1.9 metre

g) operating light.

Check Your Progress 5

a) Hard, Robust, impervious, jointless, non-absorbent, Washable and decontaminated.

b) operating room floor.

c) 2.9 to 3.05 metres.

d) 1.5 metres width with 2 leafs

e) X-ray cassettes.

f) between 4 and 7 persons.

Check Your Progress 6

1) Operating list is made for each operating room/surgical team. This should he made properly and time noted against each case and it should be seen that patient in the list should be operated upon even when surgical team has to work for extra time. All administrative measures should be taken so that essential instruments, linen and staff are available for carrying out the operalion listed in the operating list.

2) These cases should be called by appointment. If there is only one surgeon, OPD cases should be operated on the OPD days itself. If there are number of surgeons then one surgeon should be earmarked to attend these cases. Outpatient cases should not bc made to wait from morning to evening. This has a demoralising effect on patient and their relatives.

3.8 FURTHER READINGS

Background study material, PG Diploma in Hospital and Health Management, Paper-11, Academy of Hospital Administration.

Golman, J.W. (1969) "How to Determine Optimum Number of Operation Theatres", *"Modern Hospital"*, Vol. III, No. **3.**

Guidelines for Construction and Equipment of Hospital and Medical Facilities, 1992-93.

Kheczkowski, M.B. and R. Piboulcau (1983) *Approaches to Planning and Design of Health Care Facilities in Developing Areas,* Vol. *4,* WHO.

Macaulay, H.M.C. and Davies, R.L. (1996) *Hospital Planning and Administration,* WHO, Geneva.

Mc-Gibony,.J.R. (1969) *Principles of Hospital Administration,* Chicago.

Putsep Erwin: *Modern Hospital Internation Planning Practices,* Lloyd-Lukeltd 49, Newman street, London.

UNIT 4 INTENSIVE CARE UNIT

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- define Intensive Care Unit area;
  select appropriate patients for ICU;
- describe the types of Intensive Care Units;
- assess the requirement of staff and equipment for Intensive Care Units;
- help lay down admission and discharge procedures; and
- help measure the quality of care and take steps for improvement.

4.1 INTRODUCTION

You have already learnt about three of the important Clinical Services in a Hospital. In this unit beginning from the definition and Development of Intensive Care Unit you will

learn about classification of patients for the purposes of intensive care unit. You will also learn about different types and the requirement of the staff and equipment for the Intensive Care Unit. In addition to learning about the admission and discharge procedures you will also learn about the assessment of quality of care and the steps necessary for improving the same. In the end you will learn briefly about the concept of cost effectiveness in Intensive Care Services.

4.2 DEFINITION

An Intensive Care Unit (ICU) is a specific area of the hospital where sophisticated monitoring, titrated life support, specific therapy and specialized nursing, can best provided for potentially salvageable, critically ill patients with life threatening illness or injury. IT IS A PLACE AND NOT A FORM OF TREATMENT

The ICU's were developed to concentrate three critical components—theseriously sick patients, highly skilled staff with the knowledge and experience to treat the patients and use equipments for better results at reduced costs.

4.2.1 Selection of Appropriate Patient

One of the objective of ICU is to decide which type of patient should be treated.

The selection of patient appropriate for Intensive Care not only depends upon medical and organisational factors but also on financial, legal, ethical, moral and societal values. Life would have been much simpler if we believed that we could characterize patients as too well, too sick and just right for intensive care.

In this connection following simple classification can be used a) Patients expected to survive; b) patients potentially recoverable (a good chance of recovery); c) patients having uncertain prognosis; d) not likely to survive whatever is done; and e) patients in which death is apparently imminent. In view of public expectations of what medicine can achieve, intensive care should be provided for the first two of these categories. However the classification system fails to recognize that these distinctions are not always possible and not necessarily desirable.

la fact to choose appropriate patient one must broaden the admission guidelines and include not only the Loo siclc patients but also those who may be too well for intensive care requiring only monitoring to prevent occurrence of serious complications.

4.2.2 Generic Goals

A qualitative basis for categorizing patients is required depending on generic goals of intensive care. The categories, which generally apply to all speciality ICU patients besides distinguishing surgical ICU patients from routine post-operative surgical patients have been identified. The three categories are:

a) monitoring/observation;

b) extensive nursing requirements; and

c) constant patient care.

Patients are considered appropriate candidates for ICU admission for just monitoring and observation even if they are physiologically stable. This is for early detection and rapid response to serious complications.

4.2.3 Distributive Justice

Intensive Care Units encompass the total number of patients who could be considered eligible for care, given the number of available beds. ICU beds are expensive and any hospital cannot afford to maintain excess of beds with available staffing to accommodate emergency admissions. Emergency admissions are predictable although not the timing. If all the existing care has been allocated, some decision will have to be made to distribute resources so that no patient is deprived of necessary care, In terms of ethical principle of distributive justice the principle usually followed is first come, first served in which the care is apportioned to appropriate candidate seeking admission; and these continue to receive care until there outcome is detennined. I-Iowever, it is inappropriate to devote limited ICU resources to a patient whose prognosis has resolved to one of vegetative state In routine wards intensive monitoring and observation was never easy or effective as the nurse patient ratio is usually 12 : 1 or 18 : 1 in night shift in regular wards in our hospitals. This means that a nurse has less than 30 minutes/shift available for individual

patients after excluding time for their administrative functions. This is so bccausc patient needing intensive monitoring and observation are looked after in ICU. However special areas intermediate care areas arc developed.

The third category of patients requiring constant physical care are physiologically unstable and require constant reaction to changes and implementing validating and redefining therapy. These patients conform to image of ICU because clcmcnts of high technology, rapid and efficient activity, crisis exists with dramatic success. There is no problem for selection of these patients for admission to ICU.

4.2.4 Immediate Objectives: Societal Patient Values

The immediate objectives for our patient's, society and ourselves are preservation of life and alleviation of sufferings which are derived from the sanctity and quality of life. ICU epitomises challenges of high tech medicine. The crisis in ICU care is mainly bccause of societal values that every problem has a solution, often technical one, and the expectations are to do everything possible, which ultimately raises the cost of ICU carc.

The objectives of improved utilization of ICU resources and better locus for care of dying patients are attainable today. Therefore diminishing unnecessary activity will decrease complications and have salutary effects. If we have more time for thinking, assessing and decision making and to be with patients and families rather than frantically ordering, reacting and intervening we will decrease our sense of failure and fulfil important goal of caring.

Check Your Progress 1

1) Why ICU's were developed'!

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2) In view of public expectations Intensive care should be provided to which patients?

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3) What are the three categories of patients requiring intcnsivc care depending on the generic goals of intensive care'?

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4) What is ethical practice of distributive justice?

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5) What types of patients conform lo the image of ICU?

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4.3 TYPES OF INTENSIVE CARE UNIT AND STAFFING PATTERN

Intensive care as you know is a method of organising medicine and nursing so that expertise and sophisticated equipments are concentrated whcrc they are most needed and efficiently utilized. However, the dcvclopmcnt of ICU's has suffered from overemphasis on gadgets and spatial designs and under emphasis on personnel.

4.3.1 Classification on Type of Patient Admitted

Intensive care units can be classified into following depending on type of patients admitted:

1) ICTU : Intensive Care and Therapy Unit
2) CICU : Coronary Intensive Care Unit
3) PICU : Pulmonary Intensive Care Unit
4) BICU : Burns Intensive Care Unit
5) OICU : Obstetric Intensive Care Unit
6) NICU : Neonatal Intensive Care Unit
7) ANCU : Acute Nursing Care Unit
8) MSICU : Medical and Surgical Intensive Care Unit

4.3.2 Classification on Organisational Structure

All the above Intensive Care Units can be of three types:

a) **Open** Unit: All attending physicians may admit and care for patients. However, Triage decision falls on director of ICU when there is bed or staff shortage.

h) **Semi Closed** Unit: The Directors ol' ICU and/or associates must review and approve all admissions. However they should take into care the approprialeness of care and staffing level. All final decisions are of administrators.

c) Closed Unit: The Directors and/or associates are responsible for all admissions and discharges. Once the patient is admitted, the unit team looks after in collaboration with admitting team for efficient patient care.

4.3.3 Staff Requirements

a) Medical Staff

ICU must have a Director/Incharge of ICU in the best interest of palienls. The referring unit consullant or surgeon cannot be constantly available and neither he nor his staff is l'ully experienced with specific problems of ICU patients, which are quite different from those in general wards. In UK and USA most ICU's are in administrative charge of one or more consullant anaesthcsiologists with variable amount of clinical autonomy. Besides his clinical duties, the incharge of ICU has other responsibilities viz.

i) is spokesman for unit in administrative matlers
ii) provides continuity of clinical care
iii) .organises leaching and supervision of junior staff who require detailed instructions, not only regarding palient care but also for use of unfamiliar equipment.
iv) is responsible for purchasing and servicing of ICU, cquipments.
v) should initiate research and be recognized as an authority.
vi) should review all treatment regimen with staff.

It is esscnlial that Director of ICU should be rcspccted by colleagues not only for his clinical and administrative abilities, but also for his tact. The sharing of responsibilities especially for care of patients always creates problems with disastrous results. It is therefore mandatory to define the terms of reference. In particular he/she must never appear to steal either his colleague's professional status or the palients.

In any case the outline of patients treatment is agreed in consultalion with parent unit. However staff of unit should have right to initiate carry out other treatments which may be necessary when emergency arises.

b) **Senior Registrar in ICU**

One senior resident (Post MD) will always be on duly. The shift duties of senior and junior staff is 12 hourly. The scnior resident has the right to initiate and carry out emergency treatment which may be necessary without permission. Nowcvcr later consultant must be informed.

c) **Junior Resident in ICU**

One doctor in training (during post graduation) will bc on duly in unit day and night. The duty roster will overlap so as to allow for proper handing over of responsibility. The duty would include keeping patients records while in ICU and preparing case summaries which will accompany the patients to his parent ward.

d) **Nursing Staff**

Continuous skilled medical and nursing carc is essential. It can be provided only on the basis of one nurse per patient at all times together with incharge nurscs. For a general ICU with a mean 75% bed occupancy, it can be achieved by five trained nurscs per bed together with appropriate number of sister or charge nurses for day and night duties. The nurse: patient ratio, which is acceptable on ICU is as follows:

Nurse : Patient Rutio:

1:1/1:2 during day time

1:2/1:3 during night

2-2.5 stall : 1 in a 6-8 beded ICU

1-1.5: in a 12 beded ICU

4 : 2 nurse/Bed including allowances for holidays and occasional absence arc required for constant patient care.

However for paediatric ICU it should not be less than 1:2 every time.

There should be inscrvice basic training programme in ICU for nurscs, and it takes about 2 months for a qualified nurse to become confident and compliant. As many student nurses as possible should spend fixed period (3 weeks) in unit to gain experience as it is from these sources nurses can be recruited at times of need. ICU nurscs are vulnerable to emotional and physical strain and therefore their postings should not be for more than one year. However, where the establishment is adequate and the nursing staff arc selected properly, trained and supported, this is not the case.

e) **Other Staffing Requirement**

In addition to nursing and medical staff requirement every ICU requires professional and non-professional assistance. The physiotherapists (including both physical therapist and respiration therapist) is an integral part of staffing of ICU. **A** Radiographer and Instrument technician is required. In USA the responsibility for establishing, maintaining and monitoring controlled ventilation is taken over by respiratory therapists. They arc also responsible for blood gas analysis. The amount of paper work done should bc reduced to minimum by clerical and secretarial assistant. It is difficult to overestimate need to maintain high standard of cleanliness.

f) **Intensive Care Unit Staff Requirements (8 Beds)**

Direct Requirements for Provision of Constant Medical Care

4	Sisters/charge Nurses
32	Trained Nurses
6	Nurses in Training
4	SHO/Registrar (on rotation)
1	Consultant
4	Domestic staff
2	Ward Administrator
1	Secretary
1	Peon
1	Director of ICU

2 Physiotherapist

3 Radiographers

1 Biochemistry Technician

1 Blood Bank Technician

1 Bacteriological Technician

Engineers, plumbers be together with optimum medical and surgical specialists (Expertise) are required.

These are ideal requirements and many departments may have to be satisfied with a less comprehensive standard.

Check Your Progress 2

1) Enlist different types of ICU's.

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2) What should be nurse patient ratio in ICU?

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3) What arc the direct requirement of staff for 8 bedded ICU?

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4) Enumerate the roles of the Director of ICU.

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4.4 PHYSICAL FACILITIES, PLANNING AND DESIGNING

The ICU requires special space and equipmenl considerations for effective staff function. Not every hospital can provide all types of critical care. It is a service faculty for its own hospital and its clientele, size and design is dictated by needs. Some hospital may have small combined unit, other may have separate, sophisticated units for highly specialized treatment. The following standards are for the more common types of critical care services which shall be appropriate to needs defined in functional programme for efficient, safe and effective patient care. The important problem of ICU is unpredictability of demand and occupancy. Underuse can never be avoided entirely in a service departmenl, but it can be minimized by careful planning.

4.4.1 Location

The ICU should be located close lo operation theaters and recovery rooms. Il should offer convenient access from emergency respiratory therapy, surgery and other essential departments. It shall be arranged to eliminale the need for through traffic. The movement areas should he large and freely accessible and corridor should be more than

2.5 metre wide. If elevator transport is used for transporting critical patients the size of cab, mechanism and controls should be carefully planned.

4.4.2 Levels of Provision

In the UK one ICU bed for every 100 acute beds in hospital is recommended. In USA and other countries up to four times this proportion may be provided. In UK units of 4-8 beds arc rule. In Germany 5% of total number of beds are for ICU. ICU of less than 4 beds and less than 200 cases annually with average occupancy of less than 75% is uneconomical. It implies that on 8 bedded ICU should admit about 500 cases per year with similar proportion in other sized units.

2% of the total hospital beds in ICU will generally meet the requirement.

However for Paediatrics ICU 6%of all beds or 8% of average hospital pacdiatric census.

4.4.3 Spatial Requirements

There is an average overall spatial need of 50 metre square per bed. The entrance should bc like an anteroom with a place for gowning and a separate emergency entrance for patients.

a) Patient's Space

If it is a new construction each patient's spacc (whether separate rooms, cubicles or multiple bed spacc) should have a minimum 15 sq. feet of clear floor area and minimum headwall width of 1.2 feet per bed exclusive of anteroom, vestibule toilet room, lockers and/or alcoves. A staff assistance system should he provided on most accessible side of bed which must annunciate at nurse station with back up from another staffed area from where assistance can be called. If private rooms or cubicles arc provided view panel to corridor are required and should have drapes or curtains which may be closed. Each patient bed area spacc should have space at each bcdsidc lor visitors, and provision for visual privacy. There must be a minimum 8 feet between beds for both paediatric and adults units. Patients bed should have visual access other than skylights, to outside environment. Therefore there should be at least one outside window in each patients bed area. The distance from patient bed to outside window should not exceed 50 feet.

Nursing Calling *System:* There should be two way voice communication provided which must include provisions for an emergency code resuscitation alarm to summon assistance from outside ICU.

Hand Washing Fixtures: These must be located convenient to nursing station and patient bed areas. It is recommended that there should be at least one hand washing fixture lor every three beds and should be located near entrance to patient room. Moreover these should be sized to minimize splashing water on to floor.

b) **Patient's Services**

The following are essential:

Pipeline oxygen and suction outlets.

Medical quality compressed air and Entonox.

- 12 electrical sockets.
- Outlets for transmission of biological data to central nursing station.

Medical gases and suction devices.

- Mobile partitions/Bed divider system.

c) **Nursing Station**

This area must have space for counters, storage and may include centers Sor receplion and communication, The patients in ICU needs to be visually observed at all times. The central station should geographically be so located that:

it allows for complete visual control of all patient bed

it is designed to maximize efficiency in traffic pattern

- the patients should be so oriented so that they can see nurse but cannot see othe patients.

Lighting: The ICU should be well illuminated with non-reflecting paint works and other surfaces.

d) **Medication and Nourishing Areas**

In ICU provision should be thcrc for 24 hours slorage and distribution of routine drugs and emergency medication. The area should contain a work counter, cabinets (for storage of supplies) sink with hot and cold water supply, refrigerator for Pharmaceuticals and should have a minimum 50 sq. feet area.

e) **Isolation Rooms**

Thesc must have minimum 14 sq. meter area plus space for Ante room, minimum 20 sq. feet Io accommodate washing, gowning and storage. The electrical, medical gas, heating and air conditioning shall support need for patient and ICU team member. The following additional service space should also be available within ICU and may be shared by more than one ICU, provided direct access is available.

a) Securable cabinet compartment for personal effects of personnel in ICU.

b) Clean supply room: IT it is used for preparing patient care ilems it must have work counter hand washing fixture and storagc facility for clean sterile supply material.

c) Clean lines storage.

d) Soiled work room/holding room: These must be separate from clean work room and should have separate access door, clinical sink, lavatory (or hand washing fixture) for both cold and hot mixing formulas.

e) Nourishment station: It should have sink, work counter, refrigerator, storage cabinets and equipment for hot and cold nourishment between scheduled meals.

f) An X-ray viewing facility

g) Equipment slorage room appropriate room shall be provided for storage of large items of equipment necessary for patients.

h) 24 hours laboratory, radiology and pharmacy services should be available.

The following should be provided and may be located outside ICU if convenienlly accessible:

- Visitors wailing room wilh convenient access lo telephones and toilets. One wailing room may serve several critical care units.

  Adequate office space adjacent to ICU for medical personnel which should bc large enough to permit consulting with mcmbcrs of ICU team and visitors.

- Staff lounges and toilets with telephones, intercom and emergency code alarm connection wilh provision person for storage of coats. It should have space for comfortable seating and preparation and consumption of snacks and hcveragcs.

- A special procedure room if required by functional programme.

- Sleeping and personal care accommodations for staff on 24 hr. on call work schedule.

- Multipurpose rooms for staff, patient and patient families for conferences, reports , education training session elc.

  A house keeping room containing service sink for floor receptor and provisions for slorage of supplies and house keeping equipment.

  Storage space for stretchers and wheel chairs in a strategies location without restricting normal traffic.

4.4.4 Intensive Coronary Care Unit

The coronary patients have special needs. They are fully aware of their surroundings but still requires immediate and intensive care. In addition to above requirements, the following standards apply to all. Each patient must have separate room for acoustic and visual privacy. Each patient must have access to a toilet in room. Portable comrnodcs if used the provision must he made for theirs storage, servicing, and odour control, Each unit must have equipment for continuous monitoring with visual display at paiients bedside and at nurse station. Monitors should be located for permitting easy viewing.

4.4.5 Combined Medical and Surgical Intensive Care

It medical surgical and cardiac intensive care services are combined in one intensive care then at least 50% of beds must be located in private roomed cubicles.

4.4.6 Paediatric Intensive Care Unit

The children have unique physical and psychological needs. Every hospital cannot have a separate paediatric ICU's and therefore a sale transport system is required to safely transfer these patients to appropriate hospitals. However, the paediatric ICU may be an open ward plan and one isolation room for every 6 ward beds is essential. In addition to general standards mentioned the paediatric ICU must include:

- Space at each bed side and separate space for visiting parents.
- Provision for formula preparation.
- Separate cabinets for toys and games for use by patients.
- Space allowance for paediatric beds and cribs equal to those of adults.
- Examination and treatment room, which should have minimum 120 square feet floor area and must have a hand washing fixture, storage facility and a desk, counter or shell space for writing.

Check Your Progress 3

1) Where should ICU be located?

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2) What are the considerations if elevator transport is used?

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3) What are levels of provisions in:

a) USA

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b) UK

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c) Germany

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4) Which ICU is economical?

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5) How much patient's space is recommended ?

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6) How and where the Nursing station be located ?

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7) Enumerate the Patient's services in the ICU.

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8) Enlist the additional requirements of Paediatric ICU.

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4.5 EQUIPMENT REQUIREMENT

Intcnsivc Care Unit is a centre for physiological measurements, nursing procedures and therapeutic maneuvers including temporary replacement of functions of one or more organs. Therefore, there is heavy demand in terms of equipments. The type of equipment required are:

4.5.1 Monitoring Equipment

It is essential to have equipment for continuous monitoring of heart rate, e.g., blood pressures, temperature etc. with visual display for each palient at bed side and at nursing station. Non-invasive system should always be used if data provided are reliable. It is essential Io measure blood gases frequently and acute and it is essential to monitor oxygen saturation continuously by pulse oximetry. It is now possible to measure cardiac output non-invasivcly but the cost of such investigations including radionuclide imaging of heart limits their use in any but the most specialized units.

4.5.2 Therapeutic Equipment

Majority of patients in ICU receive artificial ventilation necessitating use of ventilation. The choice of ventilator depends upon the illness the patient may be suffering from in addition Io their age and size and financial resources available.

For diagnostic and therapeutic purpose a fiberoptic bronchoscope is required. The need for other therapeutic devices is dictated by functional programme of ICU's, haemodialysis, haemofitralion, plasmaphaeresis and haemoperfusion which is used in ICU require skilled staff and support service for safe application.

Check Your Progress 4

1) Enlist the important considerations to be kept in mind for purchase of ICU equipments.

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2) What are the different equipments required in ICU?

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4.6 POLICY AND PROCEDURES

ICU is place with high tension environment due to random appearance of catastrophic events or unpredictable clinical crises. Crises commonly reflect acute cardio-respiratory and oxygen transport problems. It is also apparent that initial success may not be sustained and death may occur in ICU or even after discharge. Therefore, standard policy and procedures to be followed based on evaluation of long term outcome, and they must form a part of process of starting therapy even in cases characterized as crises. The protocol should be unambiguous for smooth running of ICU's.

4.6.1 Admission Procedure

The type of patients suitable for admission to ICU's are:

- Patients with multiple injuries'or after major operations who require continuous observation, monitoring or support of vital functions.
- Patients requiring support of airway and/or artificial ventilation of lung.
- Patient requiring support to maintain cardiovascular integrity including those in haenzorrhagic shock.

  Patients requiring control of toxemia of metabolic or infective origin (including pneumonia).
- Patients who are donor or recipient of transplant.

Once the patients are admitted to the ICU the following policy is recommended:

a) Patients admitted to ICU will remain the clinical responsibility of consultant/unit under whom they are admitted.

b) A bed is kept in appropriate ward to await their return.

c) No patients are directly admitted to ICU. However, patients coming directly from casualty/transfer from other hospitals are first shown admitted under a special unit in ward and then shifted to ICU.

d) Admission to ICU shall normally be by recomn~endationof ICU consultant.

e) Admission will be made to ICU only if bed is available or alternative arrangement for speciatised care in intermediate care area will be done.

f) The consultant incharage of ICU will be responsible for maintaining continuity of care and for initiating treatment decided upon at morning rounds after consulting with physician under whom patient is admitted.

g) The senior resident may initiate such treatment as indicated in emergency by alteration in patients condition. However, consultant must be informed about it.

4.6.2 Day to Day Care and Discharge Procedures

- Liaision with the parent unit is essential for proper treatment of patients in ICU.

- Daily ICU rounds shall be held in morning at 9-11 AM along with doctors of parenl unit undcr whom patient is admitted. The main decision regarding treatment are taken in these rounds.
- The treatment instituted to palients is written by the senior resident posted in ICU.
- The decision of discharge of patients is taken in consultation with the consultant of the parent unil under whom the patient was admilted. A simple criteria can he followed:

  a) Patients who have recovered and are stable can be discharged.

  b) Patients in whom immediate threat is alleviated but requires close observation can either be discharged lo wards or in intermediate carc areas, depending on need for ICU bed.

  c) Patients in whom immediate threat is alleviated but expected to die shortly, are observed in ICU depending on bed required for other patients with rccoverablc illness.

  d) Patients in whom death is agreed to be imminent even if intensive care is continued again kept in ICU depending on availability of resources.

1.6.3 Quality Assessment and Improvement in ICU

The importance of quality assessment and its effects on bedside practice in intensive care unit is not always obvious. Every unit must develop plan for monitoring and evaluation, quality of carc, by whatever definition.

The physicians view of quality of trauma cases is in terms of readiness of OT, availability of ICU intensive care nurse and team protocol followed towards successful outcome. The patient's perception of quality is in terms of convenience, a caring staff, availability of services without undue wait and how he reels at the end of it.

The Administrators may consider cost and length of patients slay as primary factors in assessing the procedures quality.

The **Regulator/Controller** may look at all **of** above.

The ten steps plan for monitoring and evaluation is as follows:

- Assign responsibility

  Who is responsible-physician, incharge ICU/staff ?
- Delineate scope of key function

  What do one looks at?
- Identify important aspects of care

  What activities have highest priority'?
- How to know what you are doing is right

  Set indicalors
- When one knows that there is need for improvement

  Get triggers for evaluation.
- What actually needs improvement

  Probably methodology (data collection and aggregation).
- Do not know why it needs improvement

  Process of evaluation.
- Know why

  Then action after evaluation and feed back.
- How much successful

  Improvement is measured.
- Then what

  Lastly documentation and communication.

4.6.4 Aspects of Care

The monitoring and evaluation depends on aspects of care being provided in the ICU and the indicators and triggers to evaluate each procedure is developed. The different aspects of care provided in ICU include:

- Mortality
- Morbidity
- Appropriateness of admission
- Medication errors
- Timelines of discharge
- Assessment of physician response time
- Performance of tracheostomy care
- Management of ventilator support patients
- Performance of hazardous procedures (Arterial Blood gases sampling)
- Monitoring effects of medication ordered and administered
- Assessment of standard orders compared with actual practice
- Evaluation of patients satisfaction
- Evaluation of staff complaints and satisfaction
- Evaluation of nutritional needs
- Evaluation of patient care incidents
- Assessment of appropriate use of intravenous lines
- Assessment of equipment failure
- Development of CPR protocol

Check Your Progress 5

1) Enumerate the aspects of care in ICU.

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2) Enlist the ten steps of monitoring and evaluation.

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4.7 COST EFFECTIVENESS

On the other hand it is furthermore difficult to assess benefits. The important question is "Is society getting improved quality for our increasing expenditure in terms of number of lives saved, longevity and quality of life?" There are better places to invest the resources. The most popular representation of this trade off is the equation.

More money spent on prenatal care results in less money spent on neonatal ICU care.

There is often a disagreement about what constitutes benefit. It is only occasionally that it can be said with certainty that it this patient was not admitted to ICU he would have died. The benefit of survival depends on longevity and quality of life. Several attempts have been made to categorise the severity of illness, quantify treatment and predict outcome. The best known are:

- Injury severity score

  APACHE system (Acute Physiology and Chronic Health Evaluation)

- Engehardt and Ries ICU Entitlement index

The doctors are asked to be guardians of society's resources and gatekeepers of technology. Wc are implored to be efficient in our use of resources. Costs which are esclating at a rate that exceeds the growth of the economy are the driving force for cost containment. The benefit of intensive care is usually expressed as cost related to predicted remaining life span for the survivor.

Check Your Progress A

1) What is the total cost of the ICU?

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2) What is the concept of benefit in the ICU?

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3) How is benefit of ICU expressed ?

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4.8 COORDINATION AND CONTROL

The ICU senior residents should bc considered as central figure, with whom mosl other team members comes into contacl for patient information. He carries the responsibility of communicating patients status to others. Although the consultants on both the surgical and ICU team have ultimate legal responsibility for patients, the interaction between the ICU senior residents and senior residents of surgical team is the level on which many decisions reflecting changes in management occurs. They are also responsible for recognising which decision needs confirmation by their respective consultants and then to give feedback in those instance.

The consulting services are just consultants but they may be brought into patients management at the request of either the ICU or surgical team. Moreover they should also dictate the day to-day management of patient including admission and discharge.

The nurses in ICU are vital not only for nursing care of patients but also for keeping ICU consultants. Senior residents abreast of patients condition. The same holds true for the respiratory therapists and senior residents in terms of goals for respiratory management.

The junior members (residents) of both surgical and ICU team are important even though they are given least responsibility as far as patient management decisions is concerned. They are in the early stages of their careers and training and it is often their frequent innocent questioning which many times leads the senior to change perspective on patient care.

Check Your Progress 7

1) Who is legally responsible for patients in the ICU?

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2) Who should order Day to Day management in ICU?

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4.9 LET US SUM UP

In this unit you have learnt that though ICU is an expensive and polentially disruptive development in modern medical care, it can also be a valuable facilities with high tech. medicine supporting aspirations of patients, society and specialists. You have also learnt that it provides a safe, atraumatic and humane environment for those critically ill patient!, who need this-service in the hospital. It is also an area which provides invaluable teaching experience for all grades of nursing, medical and paramedical personnel. If used effectively and efficiently it may elucidate obscure problems endangering lives of sick patients. In addition you have also learnt about physical facilities, staffing pattern and coordination and control besides method of quality assessment and appropriateness of care. The relationships among cost, quality and liability are assessed and a favourable balance of improvement achieved.

4.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) The ICU's were developed to concentrate three critical components—the sickest patients, the highly skilled staff with the knowledge and experience to treat the patients, and use equipments for better results at reduced costs.

2) In view of public expectations of what medicine can achieve, Intensive care should be provided for patients a) expected to survive, b) potentially recoverable (good chance).

3) The three categories of patients who require Intensive Care are those requiring a) monitoring/observation, b) extensive nursing requirements, and c) constant patient care.

4) In terms of ethical principle of distributive justice the principle usually followed is 'First come, First served in which the care is apportioned to appropriate candidate seeking admission; and these continue to receive care until there outcome is determined.

5) The third category of patients as per disributive justice requiring constant physical care are physiologically unstable and rcquirc constant reaction to changes and implementing validating and redefining therapy. These patients conform to image of ICU because elements of high technology, rapid and efficient activity, crisis exists with dramatic success.

Check Your Progress 2

1) Intensive care units can be classified into following types depending on type of patients admilted:

a) ICTU : Intensive Care and Therapy Unit
b) CICU : Coronary Intensive Care Unit
c) PCCU : Pulmonary Inlensivc Care Unit
d) BICU : Burn Intensive Care Unit
e) OICU : Obstetric Intensive Care Unit
f) NICU : Neonatal Intensive Care Unit
g) ANCU : Acute Nursing Care Unit
h) MSICU : Medical and Surgical Intensive Care Unit

Intensive care units organisationally are of three types:

a) Open unit
b) Semiclosed unit
c) Closed unit

2) The nurse : patient ratio, which is acceptable on ICU is as follows:

Nurse : Patient ratio

1:1/1:2 during day time

1:2/1:3 during night

2-2.5 staff : 1 in 6-8 bedded ICU

1-1.5 staff : in 12 bedded ICU

4:2 Nurse/Bed including allowances for holidays and occasional absence are required for constant patient care.

3) Direct requirements of staff for provision of constant medical care:

4 Sisters/charge Nurses
32 Trained Nurse
6 Nurse in Training
4 SHO/Registrar (on rotation)
1 Consultant
4 Domestic Staff
2 Ward Administrator
1 Sccrclary
1 Peon
1 Director of ICU

4) Besides his clinical duties, the incharge of ICU has other responsibilities viz.

a) is spokesman for unit in administrative matters.
b) provides continuity of clinical care.
c) Organises tcuching and supervision of junior staff who require detailed instructions, not only regarding patient care but also for use of unfamiliar equipment.
d) is responsible for purchasing & servicing of ICU equipments.
e) should initiate research and should be recognized as an authority.
f) should review all treatment regimen with staff.

Check Your **Progress 3**

1) The ICU should be located close to operation theaters and recovery rooms. It should offer convenient access from emergency respiratory therapy, surgery and other essential departments.

2) If elevator transport is used for transporting critical patients the size of cab, mechanism and controls should be carefully planned.

3) a) 4/100 acute beds.

b) 1/100 acute beds.

c) 5% of total acute beds.

4) ICU of less than 4 beds and less than 200 cases annually with average occupancy of less than 75% is uneconomical.

5) If it is a new construction each patients space (whether separate rooms. cubicles or multiple bed space) should have a minimum 150 sq. feet of clear floor area and minimum headwall width of 12 feet per bed exclusive of anteroom, vestibule toilet room, lockers and/or alcoves. A staff assistance system should be provided on most accessible side of bed which must annunciate at nurse station with back up from another staffed area from whcrc assistance can he called. If private rooms or cubicles are provided view panel to corridor arc required and should have drapes or curtains which may be closed. Each patient bed area space should have space at each bedside for visitors, and provision foi visual privacy. There must be a minimum 8 feet between beds for both paediatric and adults units. Patients bed should have visual access other than skylights, to outside environment. Therefore, thére should bc at least one outside window in each patients bed area. The distance from patient bed to outside window should not in exceed 50 feet.

6) The Nursing station should geographically be so located that:

- it allows for complete visual control of all patient bed
- it is designed to maximize efficiency in traffic pattern.
- the patients should be so oriented that they can see nurse but cannot see other patients.

7) The following patient's scrviccs are essential:

- Pipeline oxygen and suction outlets.
- Medical quality compressed air and Entonox.
- 12 electrical sockets.
- Outlets for transmission of biological data to central nursing station.
- Medical gases and suction devices.
- Mobile partitions/Bed divider system.

8) In addition lo general standards the pacdiatric ICU must include:

- Space at each bed side and separate space for visiting parents.
- Provision Tor formula preparation.
- Separate cabinets for toys and games for use by patients.
- Space allowance for pacdiatric beds and cribs equal lo those of adults.

Examination and treatment room, which should have minimum 120 square feet floor area and must have a hand washing fixture, storage facility and a desk, counter or shelf space for writing.

Check Your Progress 4

1) The three most important considerations which must be considered before purchasing or assessing the equipments are simplicity, reliablility and standardization. In addition mechanical and electrical safety must also be construed lo prevent potential hazards.

2) There is heavy demand in terms of equipments. With the high technology medicine practiced in ICU, there is no apparent limit to ingenuity of modern scientific equipments, bolh for monitoring and therapeutic purpose.

Check Your Progress 5

1) The different aspects of care provided in ICU include:

- Mortality
- Morbidity
- Appropriateness of admission
- Medication errors
- Timeliness of discharge
- Assessment of physician response time
- Performance of tracheostomy care
- Management of ventilator support patients
- Performance of hazardous procedures (Arterial Blood gases sampling)
- Monitoring effects of medication ordered and administered
- Assessment of standard orders compared with actual practice
- Evaluation of patients satisfaction
- Evaluation of staff complaints and satisfaction
- Evaluation of nutritional needs
- Evaluation of patient care incidents
- Assessment of appropriate use of intravenous lines
- Assessment of equipment failure
- Development of CPR protocol

2) The ten steps for monitoring and evaluation are:

- Assign responsibility

Who is responsible physician, incharage ICU, staff?

- Delineate scope of key function

What do one looks at?

- Identify important aspects of care

What activities have highest priority?

- How to know what you are doing is right

Set indicators

- When one knows that there is need for improvement

Get trigger.; for evaluation

- What actually needs improvement

Probably methodology (data collection and aggregation)

- Do nut know why it needs improvement

Process of evaluation

- Know why

Then action after evaluation and feed back

- How much successful

Improvement is measured

- Then what

Lastly documentation and communication

Check Your Progress 6

1) The immediate cost of intensive care unit is considerable, but it is very difficult to quantitate. It is around 15-20% of total hospital budget. The basic ICU cost must include cost of building services, staff salaries, initial and replacement costs of capital equipments, drugs, disposable items and therapeutic materials along with the costs of investigative services. If the amount is divided by number of patient days in unit it appears that one ICU day costs at least three times that of an acute bed in general ward. It is said that **Total costs = Volume of services x Unit costs.**

2) The important question is 'Is society getting improved quality for our increasing expenditure in terms of number of lives saved, longevity and quality of life?' There is often a disagreement about what constitutes benefit. It is only occasionally that it can be said with certainty that it this patient was not admitted to ICU he would have died. The benefit of survival depends on longevity and quality of life.

3) The benefit of intensive care is usually expressed as cost related to predicted remaining life span for the survivor.

Check Your Progress 7

1) The consultants on both the surgical/medical and ICU team have ultimate legal responsibility for patients.

2) The consultants of ICU team after discussing with the consultant of parent team under whom the patient is admitted should dictate the day-to-day management of patient including admission and discharge.

UNIT 1 INPATIENT SERVICES

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- enumerate the roles and functions of inpatient services;
- describe the various types of wards;
- discuss the various steps in planning inpatient services;
- describe the various equipment and staffing requirements in inpatient services; and
- discuss the various methods of monitoring and evaluation of inpatient services.

1.1 INTRODUCTION

You will appreciate that non-critical patients who require investigations, diagnosis and treatment are also admitted in the hospital. Therefore, it becomes imperative to plan and organise inpatient services on a scientific basis, In this unit, you will learn about these aspects. To begin with, the roles and functions of inpatient services have been described. Thereafter, you will learn about various planning considerations including physical layout and staffing of inpatient services. Subsequently, you will learn about the various managerial issues including policies and procedures. Towards the end, you will learn about the methods to monitor and evaluate the inpatient services.

1.2 FUNCTIONS

In hospital based health care delivery system, inpatient services or ward area is the mosl important and largest single component of the hospital, forming approximately 35-50% of whole hospital complex.

The prime objective of inpatient areas is to provide accoinmodation for patients at the point in an illness when dependence on others is at its highest. Because of this, they are, with the emergency department the only areas in continuous day and night operation for patient related activities. The inpatient care area, ward or nursing unit would thus include a nursing station, the beds it serves and the necessary ancillary and auxiliary accommodation needed for patients care.

Inpatient services are under constant pressure of increasing demand and its capital and operational cost is also very high, which effects directly on the hospital and national budget. It is, therefore, essential for all hospital administrators to be fully aware of cost intensive nature and assert on effective planning and efficient utilisation of inpatient services.

Every inpatient nursing unit should be designed in such a way that it can be built and operated at the lowest possible cost and at the same lime, it can achicvc the functional goals of the unit which are as follows:

1) To provide the highest possible quality of medical and nursing carc for the patients.
2) To provide necessary equipment, essential drugs and all other stores required for patient carc in an organised rnanner in the ward.
3) To furnish most desirable environment substituting as temporary home for the patients designed to accommodate all their basic needs (eating, sleeping, toilet activities, diversional matters).
4) To provide facilities to meet the needs of the visitors and attendants.
5) To provide highest degree of job satisfaction for the nursing and medical staff and to render opportunity for training and research.

Check Your Progress 1

Fill in the blanks:

1) Prime objective of inpatient areas is to provide.....for patients.
2) Inpatient services are under constant pressure of.....demand and its capital and operational cost is also very.....
3) Functional goal of inpatient care is to providc the highest possible .... of medical and nursing care for the patient.
4) Functional goal of inpatient services is also to provide highest degree of .... for the nursing and medical staff.

1.3 PLANNING AND ORGANISING INPATIENT UNIT

The planning and designing of an inpatient care unit is a very vital step in hospital planning. Following factors should be considered broadly when planning is being done:

a) Policy of the hospital
b) Physical facilities: Location and area, Size, Shape/Design, Ancillary accommodation, Water, Electricity supplies and air-conditioning, Auxiliary accommodation
c) Staffing

1.3.1 Policy of the Hospital

The policy of hospital is very important for, designing inpatient carc area, it should bc considered whether the hospital will be a general with all facilities grouped into or it be

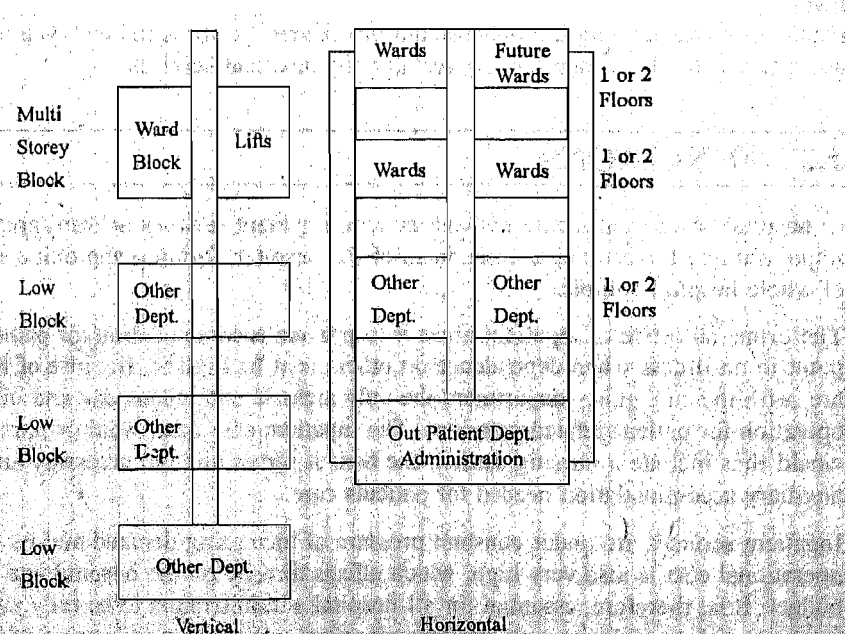

Fig. 1.1: Arrangement of Wards for Vertical and Horizontal Circulation

a super speciality or specific hospital, e.g., Neuro-Sciences Centre, Maternity & Child Centre, Psychiatric Hospital, elc. Bed strength of hospital influences on planning and designing of hospital structure. A hospital with less than 200 beds is generally planned as horizontal where it saves lot of time in internal movement than in vertical (multistorey complex). The upper limit for horizontal planning (maximum ground plus one floor) is considered up to 300 bedded hospital. However, all hospitals planning of 300 and more beds require the inpatient care area planning on vertical expansion which is cost effective and convenient for patient movement.

1.3.2 Physical Facilities

Location and Area

The inpatient area should be located away from main roads and from OPD area, to avoid disturbance and potential source of cross infection. Howcvcr, the inpatient area should be approachable from supportive services (Imaging, Laboratory, Blood Bank, CSSD, etc.) and a good intramural transportation should be planned for effective and efficient movement of patient and staff within the hospital.

Inpatient area covers approximately 35-50% of total hospital area. The arca per bed within the ward is 70-90 sq. It (about 7 sq. m.) but in acute obstetrics ward and orthopaedics wards it is 100-120 sq. It whereas ICU the area requirement is 120-150 sq. ft. per bed. Single bed rooms should have a minimum size of 125 sq. ft. Space left between two rows of beds is 5 It. Dislance between 2 beds is 3½ to 4 ft. Clearance between bed head and wall should be 1 ft and between side of the bed and wall about 2 ft. Standard dimension of hospital bed is 6'6"× 3'×3" and so the minimum width of 20 for dormitory type ward is optimum.

Size

The size of ward or nursing unit varies in different hospitals. Units of 20-90 beds are known to have been made. The nursing unit should not bc very small nor very large. There are various factors which have a bearing on the optimum size of a unit:

1) Type of Patients: In the wards where critical types of patient are kept, the intensity of work is high like rccovcry room, ICU, CCU, acute ward, burns wards, these should be of a smaller size. A chronic disease ward can have even more than 50 beds like tuberculosis ward, psychiatric ward.

2) Requirement of Staff: It has been observed that in the ward, maximum activities take place between 8 A.M. to 12.00 noon, fewer during the rest of the day and least at night. In a very small unit, the requirement of staff in the night shift will be the same as in average size unit, so the night nurse will not be gainfully employed unless the unit is of 30 to 50 beds.

3) Position of the Heud Nurse and the Ward Clerk: The head nurse and the ward clerk carry a lot of administrative responsibilities and clerical workload on their shoulders leaving the staff nurses to devote their mosl of the time to bed side nursing. The abscncc of a proper hcnd nurse leads to lack of leadership and guidance. The presence of an administrative nurse in the unit helps in improving patient care, inter departmental relationships and materials management in the ward. However, if the unit is very small, appointment of a properly trained head nurse and a clerical assistant is not justified. So the modern trend is in favour of a unit of 30-35 beds.

Shape/Design

The primary objective of a ward design is to facilitate the nurse to hear and see everything that happens in the ward and to react accordingly with maximum efficiency and minimum physical and emotional strcsa Many changes in designing a ward have been made and accepted during last 3-4 decades.

1) Open Ward: The rectangular pavilion type of ward was first constructed in 1770 by a Frenchmen. About 80 years later Florence Nightingale adopted this design and it is still known after her name. This ward consisted of patients beds in two rows at right angles to the longitudinal walls with bath rooms and WC facilities at one end and nursing station, doctors room and other facilities at the other end. It was usual to house 30-35 patients in such wards and the length of the ward was not less than 96 feet. This type of ward continued till 1925. Subsequently nurses

table was shifted to centre as the nurse had to walk long distance to attend to the patients. The bath rooms and WC facilities were also shifted in the centre in the form of an annexe. Still later this nurses table was replaced by a proper nursing station consisting a few cubicles to house the various service facilities. A treatment room and an isolation room were also added, In tropical countries wide verandahs are placed on either side of the ward to protect it from direct sun light.

Advantages of an open ward are:

- Nurses have ample visibility and direct observation of patients at all times
- Cross ventilation is maintained
- Natural light is available
- It is economical to construct and maintain

Disadvantages of an open ward are:

- Noise and lack of privacy
- Danger of cross infections
- Constant glare to the patients
- A critical ill patient if placed closer to the nurses desk as it requires maximum attention would thus lie in the centre of greatcsl traffic density

2) **Rig's** Ward: The first major development over above-mentioned defects appeared in Rigs hospital, Denmark and thus came the name Rig's ward. In this design the ward unit is divided into small compartments or cubicles separated for each other by low partitions, each cubicle having 1, 2, 4 or 6 beds arranged parallel to the longitudinal walls. Although the Rig's pattern does not suffer for disadvantages of open wards, it has its own problems, some of these are:

- Cominunication between the nurse and the patient becomes more difficult.
- The patients are deprived of direct observation by the nurse.
- Wards become longer, consequently the nurse has to walk more.
- More number of nurses are required.
- Costly to build and maintain.

In our country however it may not be practicable to have the entire ward on the Rig's pattern with single or double'bed rooms due to shortage of finances and nursing personnel. In a report on General Hospitals the Committee on Plan Projects (Buildings Projects Team) of the Planning Commission (COPP) have recoinmended that in our conditions maxiinurn of two single bed ,rooms in every Ward of 20-30 beds should be provided to accommodate such patients whose condition require special nursing and treatment. Two more single rooms may however be added as "Paying Ward" wherever required. The rest of the ward may be divided into compartments of 4-6 beds.

First two can be overcome by artificial devices like call bells, signal lights, two way speakers and close circuit television. In order to remedy next two, several modifications in different shapes have been adopted like T, Y, X, circular or semicircular shape and single or double corridor type.

Anciliary Accommodation

1) **Nursing Station:** This is the nerve centre of the ward unit and should be so located that the nurses can keep watch over as many patients as possible and the distance to the farthest patient should not be too much. In the Rig's pattern the acute patients are housed on either side of the nursing station with provision of large glass windows for direct observation. The nursing station should be 20'×20' and have the following essential components:

   a) Sister's room with attached bath and WC. This room should have cupboard for medicines and dangerous drugs.

   b) A large work table or counter in the open space outside the sister's room with stools here the staff nurse can carry out their work.

   c) A built-in drug cupboard to hold daily use medicines, stationary forms etc.

2) **Treatment Room:** A treatment room is required for each nursing unit for physical examination, dressing and certain procedures which cannot be carried out conveniently at the bed side of the patient. The room should be equipped with an

examination table, spot light, cabinets and a dressing trolley. Hand washing facilities should be provided inside the treatment room.

3) Clean Utility Room: This room 100-200 sq. ft is used for clean storage, e.g., intravenous sets and solutions, CSSD articles, packing dressing drugs and clean work like setting up a trolley or a trealment tray for minor procedure and so on. This is sometimes combined with treatment room.

4) Ward Kitchen/Pantry: The major function of the ward kitchen is temporary storage and distribution of meals and the preparalion of beverages. The kitchen should be equipped with facilities for hot water, refrigerator, hot case and facilities for storage of crockery and cutlery. This room should have a large sink with a drain board for washing various articles.

5) Day Room: Patients these days are encouraged to move about at the earliest. A place congenial for sitting and relaxing is provided in the ward unit with comfortable chairs and reading malerial. This place can also be used as dining place and for meeling visitors. A common day room can bc provided for two adjacent wards.

6) Stores: A small store room for keeping linen and bulk supply of cleaning material is also provided. Attached lo the slores, a space may be provided for patients lockers where they can keep their personal articles.

7) Dirty Utility Room: A dirty utility or sluice room is provided in each ward for cleaning bed pans, urinals, sputum, mugs and for slorage of slool and urine specimens. It should be fitted with bed pans washer and sink. Large stainless board is provided for slorage of specimens.

8) Bath and Toilets: Bath rooms and toilets are to be provided in adequate proporlion as per scales given below:

a)	Urinal	—	One for 16 beds
b)	WC	—	One for 8 beds
c)	Bath	—	One for 12 beds
d)	Wash hand Basin	—	One for 10 beds

The above scales are exclusive of WC, bath and wash hand basins provided for single and double bedded rooms and staff toilets provided on floor basis.

9) Janitor's Room: A janitor's room is provided in each ward for keeping mops, brooms, cleaning material and buckels. It should have a large sink for cleaning buckels and other equipment and adequate supply of hot and cold water.

Water and Electricity Supplies

Adequate round the clock water supply should be available for ward areas, approximately 300 litre of water is required per bed.

Light points for ward and anciliary accommodation should be carefully designed, There should not be any glare from the lights, alternative source of sunlight should be planned. There should be one industry switch for portable X-ray and one each of 15 amp, and 5 amp. in each cubicle (1, 2, 4, 6) for any contingency.

Auxiliary Accommodation

1) Duty Room for Doctors: There should be arrangements for doctors duty room where doctors can work during the day and rest during the night duty period. It should be equipped with a bed, chair and a table and attached toilet.

2) Seminar Room: One seminar room for each floor or block for teaching purposes should be provided if the hospital can afford. All the clinical teaching can be conducted in this room without disturbing rest of the patients,

3) Attendant Room: A small area on each floor for 2 or 3 nursing units is needed as a retiring room for the visitors and attendants of the patients, Lockers should be provided, so that personal articles of the attendants can be kept safe.

4) Side Room Laboratory: A ward laboratory where routine types of tests can be done is optional for each floor or block which can serve two, three or four nursing units on a hospital Boor.

5) **Locker Room for Staff:** A room with lockers should be provided for the staff who do not reside in the hospital campus for their changing and keeping their belongings safe.

6) **Wheel Chair/Trolley Bay:** A suitable area is needed for parking wheel chairs and trollies in the nursing unit.

Check Your Progress 2

State True or False:

1) The upper limit for horizontal planning is considered up to 500 bedded hospital. (T/F)

2) The inpatient area should be located near main roads and **OPD** area. (T/F)

3) The inpatient area covers approximately 35-50% of the total hospital area. (T/F)

4) Single bed rooms should have a minimum size of 125 sq. feet. (T/F)

5) One bath room is required for every 12 beds. (T/F)

1.3.3 Staffing

An appropriate planning of staffing for hospital inpatient care area should be done well in time, so that user staff is recruited and trained before the ward unit is completed. The general staffing norms for ward are suggested in Table 1.1,

Table 1.1: Staffing Norms for Medical Personnel for General Hospital

Sl. No.	Speciality	Bed Strength					Suggested Norms
		30-50	100	200	300	500	
1)	General Medicine	1	1	2	2	3	One physician up to 100 beds thereafter 1 for 50 additional beds
2)	General Surgery	1	1	2	2	3	One surgeon up to 100 beds and thereafter 1 for 50 additional beds
3)	Gynae. & Obst.	1	1	2	2	3	One Gynae. & Obst. up to 100 beds and thereafter 1 for 40 additional beds
4)	Paediatrics	1	1	2	2	3	One up to 100 beds and thereafter 1 additional for each 150 beds
5)	Anaesthesia	1	2	3	4	5	
6)	Dentistry	1	1	2	2	3	
7)	Radio-diagnosis	–	1	1	2	3	One up to 200 beds and one additional for each 150 beds
8)	Pathology	–	1	2	2	3	
9)	Orthopaedics	–	1	1	2	3	
10)	Opthalmology	–	1	1	2	3	
11)	E.N.T.	–	–	1	2	3	
12)	Skin & S.T.D.	–	–	1	1	2	
13)	Psychiatry	–	–	1	1	1	One per hospital above 200 beds
14)	Chest Diseases & Tuberculosis	–	–	1	1	2	One per hospital above 200 beds and thereafter one addl. for each 200 beds
15)	Biochemistry	–	–	–	1	1	One per hospital above 200 beds
16)	Microbiology	–	–	–	1	1	One per hospital above 200 beds
17)	Forensic Medicine	–	–	–	–	1	One per hospital of 500 beds
18)	General Duty Medical Officer	4	8	12	20	32	One GDMO for 12-15 beds

The norms for nursing personnel should be studied in Unit 3 of this block.

Table 1.2: Norms for Class 'D' Employees

Sl. No.	No. of beds in the Hospital	No. of Class 'D' employees suggested	Suggested Norms
1.	30-50	15-25	1 class 'D' per two beds;
2.	100	50	- do -
3.	200	100	- do -
4.	300	150	- do -
5.	500 and above	250	- do -

1.4 POLICY AND PROCEDURES

Policy: Every hospital has a definite hospital policy, though the basic policy of the hospital is to provide adequalc patient care, with available resources. However, certain policies differ from hospital to hospital. Various policies govern the functioning of the hospilal. Various committees or sub-committees are fonncd to form tlie policies and check the implementation of these policies. Various policies are drug policy, antibiotic policy, condemnation policy, procurement policy and other policies concerning the welfare of the patients.

Procedures: Knowing the policies of the hospital, various procedures are followed in providing inpatient care, Whcrcver the patient requires admission, it is given through out-patient department or casualty/emergency services. Once the patient is admitted, he has to make an Admission Card at the Central Registration Counter on admission. His/ her admission is recorded by a nurse. All tlie records of inpatient are written day to day. All the drugs given to tlie patient are entered and investigations performed are recorded, If any operative procedure is performed than an operation note is kept in the records along with anaesthesia record.

At the time of discharge, a discharge card is writtcn and given to the patient. The case paper along with all the records is kept in the Medical Records Department. In the event of death of the patient, a deatli summary is written and kept for tlie records, while a death report is given to the patient's relatives.

1.5 MANAGERIAL ISSUES

Day to day management of inpatient services is normally at two levels. At the medical level, implementation of the liospital policies is usually the responsibility of either the Doctors in-charge of the unit or tlie Medical Superintendent, But the specialists in-charge may leave much of the minutial of management to the sister-in-charge. It may also fall to her during the hours wlien the medical staff are not present. In such situations tlie principle of unity of command seems to have disappeared and there may well be a possibility of conflict arising with the sister-in-charge and from the Chief Nursing Officer. Clearly such problems can be anticipated and mutually satisfactory procedures and policies established to obviate them.

Another important issue in management of inpatient care services is the relationship with other departments. Because of the specialised and distinctive nature of the departments in the inpatient services, and the close contact with the medical staff, the senior nursing staff may come to regard themselves as being somewhat apart from the rest of the Department of Nursing, Valuable as espirit de corps is, the administrator may view this type of development with well foundcd suspicion.

Apart from the relationships with normal service departments of the hospital situations of conflict can arise. For example, in the obstetric ward, in the teaching of dietary information to expectant mothers for their pregnancy and for the care of their infants, confusion may arise as to the respective roles of the medical, nursing and dietary staff. By defining function and roles, the administrator can shape the management structure to avoid problems. The department of social work may also be involved with the work of the obstetric unit, dealing with some of the social problems of single mothers, adoptions and work related to problem families.

Management of inpatient services is defined as the optimum utilisation of the ward resources to produce maximum out put, namely, care and comfort of the patient. It is a specialised function performed by a group of doctors, nurses and other para-medical staff.

Ward Management

The objectives of inpatient services can be classified by the time spent and the tangibility of the objective. Patient care, treatment and early discharge will be short temi tangible objectives, while speciality treatment, personnel training and advancement will be long term objectives.

In case of intangible, short term will be patient comfort and rehabilitation, while long term will be image of efficient and effective speciality treatment centre. This should be in good co-ordination as the ward uses other resources from the hospital in addition to ward resources. Success of the ward depends on a number of intangible resources in addition to the ward infrastructure.

Main role in ward management is performed by the nursing unit. This nursing unit that forms the system in the ward ensures their proper implementation and performs its evaluation towards the care and comforts of the patients with full supervision. A nursing unit should be so designed that it can operate at minimum cost and can at the same time also achieve the functional goals of the ward. The person in-charge of a nursing care in the ward is called ward-sister or sister-in-charge.

The functions of ward-sister are:

- Good nursing care of the patient
- Carrying out instruction given by the doctor about medical care
- Supervise, guide and control the staff under her
- Proper orientation of the ward staff
- Evaluation of ward staff on a regular basis through systematic methods
- Proper management of ward with house keeping

Strategic Munagcmcnt

Wards need a strategic management. Nursing unit of the ward is responsible for giving strategic direction to a ward. Person in-charge of the ward should have over all perspective of the resources, constraints, objectives and plans of the hospital. There should be a definite image of the ward and the speciality treatment aimed for. The capacity, requirement of the personnel, medical and para-medical equipment should be determined. The standards of quality care of the patients must be set. There should be proper training of the ward personnel and should establish an evaluation system by patients to draw management's attention in areas where required.

Operational Management

Strategic management gives an anchor and direction, while operational management works towards this strategy. The objectives should be to provide comforts and good care to the patients, as a short term, while long term objective should be improvement and establishment of a system in the functioning of the ward.

1.6 MONITORING AND EVALUATION

Monitoring

Ward management is monitored by various methods. Nursing is a dynamic, therapeutic and educative process in meeting the health needs.

Various activities undertaken by the nurses are:

i) **Patient care:** providing adequate care to the patient.

ii) **Administration:** related to the direct process through which the unit functions.

iii) **Education:** it forms a part of the education programme for nursing students and other class of workers.

iv) **House keeping:** involves in maintenance of clean, safe and comfortable environment.

v) **Clerical:** involving maintenance of records and reports and giving routine information.

vi) **Maintenance of supplies and equipment:** involves replacement of equipment used and maintenance of supplies for carrying out unit activities.

vii) **Off-station: the** activities which take nurses away from the unit but have definite relationship to the patient or the unit.

Patient care is one of the important productive activities, which includes comfort, nutrition, needs, special care of the patient. It also includes preparing patient for procedures and follow up there after, carrying technical procedures, assisting technical procedures, health teaching, supporlive care, recording and collection, examination of specimens. By the effective control, nursing unit should be able to maintain discipline in the ward.

Ward-laboratory and Ward-pharmacy are attached to a ward. The management of this two important components increases the work. Investigations of the ward are done in the ward laboratory, while drugs distribution is done in the ward pharmacy.

House keeping gives first good impression about environment lo the patient. The person responsible for the function, should have knowledge of the activities concerned.

Efficient and effective monitoring of all the above activities will result in the better patient care in a hospital.

Evaluation

By quality of the inpatient care is meant by the degree of excellence of medical attention offered to the patients by a hospital. This quality will depend upon the efficiency of the hospital which in turn is influenced by many factors. In order to measure the quality standards should be available against which one product can be compared with another. The practice of medicine today has become very complex and multi-dimensional. It is provided by numerous categories of health personnel utilising a variety of equipment and is spread over a large physical area of activity, The administrator is responsible for monitoring this whole organisation of a wide spectrum of men and material into a functional effective machine. The product of this machine is the "service" or "medical care" provided by a hospital.

This product being tangible and depends on so many individually and collectively, does not lend itself to easily definable standards or to simple units of measurement. No rough and ready standards are available, which can be universally applied to directly measure the quality of hospital care. The evaluation of such care is, therefore, done indirectly by first examining the quality and adequacy of the factors and factors which contribute towards better patient care and secondly by analysing the medical care process of individual patients from the medical records maintained by the hospital, The latter method of judging the quality of medical care from medical records is called Medical Audit.

Factors Influencing Inpatient Care

i) **General:** There are a number of factors which contribute or influence the quality of hospital care. The presence or absence of these factors'or the extent to which a particular hospital tries to achieve better standards with regards to these factors will indirectly reflect the quality of hospital care.

ii) **Hospital staff:** Hospital care is provided by hospital staff. Their efficiency and proficiency will effect the patient care.

iii) **Education and training:** Continued education and in-service training of entire hospital staff will contribute to a large extent to better patient care.

iv) **Physical facilities and equipment:** Adequate space, good design and layout, clean and pleasant environment and availability of adequate equipment contributes greatly towards effective discharge of hospital functions, there by better hospital care.

v) **Clinical and service facilitics:** Availability of adequate and appropriate clinical facilities to take care of all type of clinical problems will improve the quality of medical care.

vi) **Effective** use **of beds:** Effective use of beds is a factor as well as a measure of the quality of care.

vii) **Quantum of work:** Load of work on a particular hospital affects the quality of carc and serves as an index for arrangement of rcsourccs.

viii) **Administration:** Proper administration and management of a hospital by trained and experienced administrators can contribute a lot towards improvement of quality of hospital carc.

Medical Audit

Medical audit is defined as the evaluation of medical care in retrospective through analysing of clinical rccords. The object of medical audit is to ultimately improve patient carc.

The evaluation of patient in-service or ward management is based on the performance, evaluation of the ward pcrsonncl. The Medical Supcrintcndent should provide with a detail mechanism of performance evaluation for efficiently achieving the ward objectives. Such evaluation procedures should bc performed with discharged patients. This will help in finding the deficiency and lack of services by the personnel and to improve in the near future.

Besides evaluation by the patient is very important. The assessment to be given by the patient should **be** based on nursing care, medical and investigative care of the patient, doctor-patient relationship, house keeping and any suggestion to improve the facilities and care with the rcsourccs.

Check Your Progress 3

Fill in the blanks:

1) Stalling Norms for General Hospital for Doctors:

	Speciality	Bed Strength	
		100	500
i)	General Medicine		
ii)	General Surgery		
iii)	Gynae & Obst.		
iv)	Paediatrics		
v)	Anaesthesia		

2) Tangible objective of inpatient services are patient care,..... and early discharge as also..... treatment, personnel..... and advancement.

3) Intangible objective of inpatient services are patient..... and rehabilitation as also image of .....and ..... speciality treatment centre.

4) Medical audit is analysing the medical care..... of individual patients from the..... maintained by the hospital.

1.7 LET US SUM UP

In this unit you have studied organisation, planning and management of inpatient services in a hospital. You have studied the functions of inpatient services. You have also learnt how physical facilities like location, size, shape and design, ancillary and auxiliary accommodation, and water supply could be organised in the inpatient services. You have also studied how medical and para-medical staff requirements could be planned for various sizes and levels of hospitals. You have also been able to know how the inpatient services should be managed in addition to policy and procedures involved in management. You have also studied the methods to monitor and evaluate the process of inpatient services.

1.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) accommodalion
2) increasing, high.
3) quality
4) job satisfaction

Check Your Progress 2

1) False 2) False 3) True 4) True 5) True

Check Your Progress 3

1) i) 1, 3
   ii) 1, 3
   iii) 1, 3
   iv) 1, 3
   v) 2, 5
2) treatment. speciality, training
3) comfort, efficient, effective
3) process, medical records

UNIT 2 NURSING SERVICES ORGANISATION AND ADMINISTRATION

Structure

2.0 OBJECTIVES

After studying this unit, you will be able to:

- define the role of Nursing in the health care delivery system;
- identify the need for organisation, the staffing pattern and the duties connected with each appointment;
- identify the components of Administration i.e. Planning, Organising, Implementing and Evaluation, applicable to the nursing services; and
- effectively utilise the resources, facilities and services.

2.1 INTRODUCTION

In this unit you will learn about the brief history of nursing services, its role and functions, and the attrributes of a nurse, staffing and the duties involved.

A WHO Expert Committee on Nursing defines the Nursing Service as that part of the total health organisation which aims to satisfy the nursing needs of the community. The major objectives of the nursing services is to provide:

- the nursing care required for the prevention of disease and the promotion of health;
- the nursing care required in the interest of his mental and physical comfort, by reason of the disease from which he is suffering.

You are aware that nursing is only one part of the total care of the patient, and nursing activities must be co-ordinated with those carried out by other personnels, such as, doctor, social workers, technicians etc.

In this unit you will learn the role of nursing services, the skills and attributes of a nurse required for nursing care services and nursing activities. You will also learn the

importance and the place of nursing service in a health care organisation. For your guidance the job description of various appointments have been incorporated in this unit.

2.2 DEVELOPMENT OF NURSING AS A PROFESSION

The traditions in nursing stem from several sources. The earliest historical references to organised nursing services are based upon the work of the religious orders—heroic bands of sisters who dedicated their lives to personal and devoted service. Another source of nursing tradition has been the military influence.

Tribute must be paid to Florence Nightingale, pioneer in modem nursing and modern hospital administration. Some of her works, such as Notes on Nursing written in 1859, are as pertinent till day as at the time they were written. She was responsible for laying down the standards and started a school of nursing in 1860 in London. The advent of two world wars gave impetus to training of more nurses, and various schools were opened in all parts of the world. Indian history has many references to nursing. Lord Buddha in 500 B.C. created monasteries and hospitals and with that he established an order of nuns presumably for nursing in the hospitals. During the period 600 B.C. to 200 A.D., nursing had an important part in treatment of the sick, although the references are to males as nurses. A number of ancient Hindu medical treatises contain account of hospitals and of "attendants" (nurses). They give details of attributes of a good nurse. Notable among these are Charaka Samhita, Ashtanga Hridaya and the writing of Sushrata. Emperor Asoka built many hospitals and employed nurses. As per their writings, the nurses of those days should be proficient in cooking, in caring for bed patients and in other nursing procedures. Perhaps nursing schools existed even in those days.

Organised training for nurses in India can be said to have started in 1854 with the opening of a school for midwives at Madras. Soon schools for nurses training were opened in Calcutta (1859) and in Madras (1871). To cater for the demands of the Army during World War, Lady Reading Health School was opened in Delhi in 1918 to train nurses. Training of male nurses was also started during the early period of this century. In succeeding years, nursing schools were opened all over the country in collaboration with government and private hospitals. These schools generally followed the system which was in use in western countries at that time.

The next logical step in the development of nursing was the formation of trained Nurses Association in 1908 and passing of Nurses Registration Act in Madras in 1926. Soon various provinces except Assam formed Provincial Nursing Councils by 1939. Following Bhore Committee's recommendations in 1946, the Indian Nursing Council was formed in 1949 with the object of standardizing the training of nurses in India, and co-ordinating the efforts of various state councils so that there is an uniform policy for the whole country.

The need for a post basic training to improve the standards of nursing and also to prepare nurses for higher responsibilities requiring administrative skill was felt and a school was opened for that purpose in Delhi in 1943. This was later upgraded to a college. Similar colleges were opened in Madras and Vellore. In these institutions nurses are trained as tutors and as administrators. At present there are many colleges giving post basic training

2.3 ROLE OF NURSING SERVICE

One of the classic definitions of nursing, as formulated by Virginia Henderson (1966) delineates the unique function of the nurse as follows:

To assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge. And to do this in such a way as to help him gain independence as rapidly as possible.

Professional nursing is changing and adapting to meet changing health needs and expectations. One such adaptation can be noted in the expanded role of the nurse. The nurse who functions in an expanded role provides direct care to patients through either

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Professional nursing is changing and adapting to meet changing health needs and expectations. One such adaptation can be noted in the expanded role of the nurse. The nurse who functions in an expanded role provides direct care to patients through either

independent practice, team or interdependent practice, or practice within a health care agency or with a physician. Specialisation had evolved within the expanded roles of nursing. Fundamental areas of functioning include practice, teaching, leadership and research.

However although each role carries specific responsibilities various aspects of each role interrelate with one another and are found in all nursing positions. Accomplishment of each of these roles is designed to meet the immediate and future health care and nursing needs of the patients who are the recipients of nursing care.

For your better comprehension the roles are briefly enumerated below:

2.3.1 General Role

- Round the clock nursing services
- Monitoring and coordinating nursing care
- Assisting other professionals in implementing their plans of care.

2.3.2 Specific Role

- Assess the patient care needs
- Plan and provide nursing care interventions
- Prevent complications and promote improvement in the patients comfort and well being
- Alert other care professionals to the patients condition
- Documentation.

2.3.3 Bole of Nurse Executive

- Participating with the organisation leaders in designing and providing patient care and services by allocating sufficient number of qualified nursing staff to care for the patients
- Ensuring continuous and tiinely availability of nursing services to patients
- Developing, presenting and managing the nursing services portion of budget
- Implementing the findings of current research into policies and procedures governing the provision of nursing care
- Measuring, assessing, and improving patient outcomes achieved through developing and implementing nursing standards of patient care and nursing standards of practice
- Organise continuing education programmes
- Assigning responsibility to individual or groups of nursing staff to take action to improve the nursing services performance.

The nurse executive has the authority and responsibility for establishing standards of nursing practice, and nursing policies and procedures and to coordinate and control the nursing service/care activities, through continuing education programmes and research.

Check Your Progress 1

1) Fill in the blanks:

   a) First school of nursing was started by .....in .... in.....

   b) The Indian Nursing Council was formed in ..... .

   c) Trained Nursing Association was formed in ..... .

2) Enumerate five important roles of nurse executive.

   .....

   .....

   .....

   .....

   .....

2.4 FUNCTIONS, TASKS AND ACTIVITIES

Functions here broadly imply planning, leadership, co-ordination and control over all responsibilities as regards the provision of nursing care, in terms of quality, quantity, efficiency and effectiveness. The nursing care service functions are being described below.

2.4.1 Functions of Nursing Care Services

The functions involved in nursing care services include:

- The actual provision of nursing care services (all aspects) and treatment.
- The organisation and administration of nursing services.
- Education and practice.
- Quality control.
- Supervision.
- Provision for financial resources, and procuring materials and supplies, and for maintenance.
- The establishment of a communication system for nursing personnel, other health workers, patients, health authorities, government authorities and the public.
- Instruction in nursing and related subjects for students in formal programmes of education for the health services.
- Counselling for health personnel, patients and the public.
- The establishment of a system for the collection of essential information, research and studies concerning all aspects of nursing.
- The formulation of policies, standards and goals for nursing service, education and practice.

Operation of Nursing Care Services

In preparing for operation of the above functions for nursing care services, function must be clearly defined in terms of administrative process involved in the performance. For example in order to perform the function of quality control by means of supervision of nurses, you will need to define the objective of such supervision and to indicate the course of action to be taken (i.e. by whom, when, where and how the activities and tasks are to be carried out), the manner in which each action may be coordinated with other functions including those of other departments, and the manner in which supervision may be evaluated.

2.4.2 Nursing Activities

You must be remembering that functions are a group of activities with a common purpose. In operationalisation of the identified functions, therefore, you as administrator must define the activities involved in the performance of various functions for which nursing is responsible, in collaboration with planners of other components of health services.

It is particularly important for nurses to take initiative in this. If quality control by means of supervision is once again used as an example of a function the activities that will be involved include:

- The planning and coordination of programme of supervision and consultation to meet staff needs.
- The planning of education and training programmes including in-service training.
- The professional supervision of nursing personnel individually or in groups.
- Counselling in the field of professional development and the development of suitable areas for clinical practice and community health experience.

Following are other examples of activities involved in nursing care functions:

- Family health counselling and teaching.
- Assistance with medical treatment or physical examination on patients.

- Referral of individuals and families to the source of care.
- Follow up nursing care.
- Specialised nursing care.
- Rehabilitation and preparation of data relating to nursing needs and resources.

Because of the total health care concept and a multi disciplinary approach to the care of individuals, families and communities, it is difficult to define the scope of activities of each profession represented in the health team.

In some situations the activities of doctors and nurses and social workers will overlap. For example taking history of a patient may be performed by doctors, nurses and social workers etc.

2.4.3 Nursing Tasks

Any activity can be divided into units of work or tasks that can be further subdivided into a series of small steps — the kinds of skills involved in each task by defining the steps to be taken, the equipment to be used and the environment in which the task will be performed, and other relevant information being taken into account.

— In this way tasks can be classified in an order ranging from the simplest to the most complex.

This classification will help nurses to determine the category and grade of nursing personnel required for each task. Decisions in this respect will again depend on the availability, cost and effectiveness of each category of nursing personnel under consideration.

Nursing tasks include:

a) Those performed on the patient e.g. taking blood pressure, temperature and pulse.

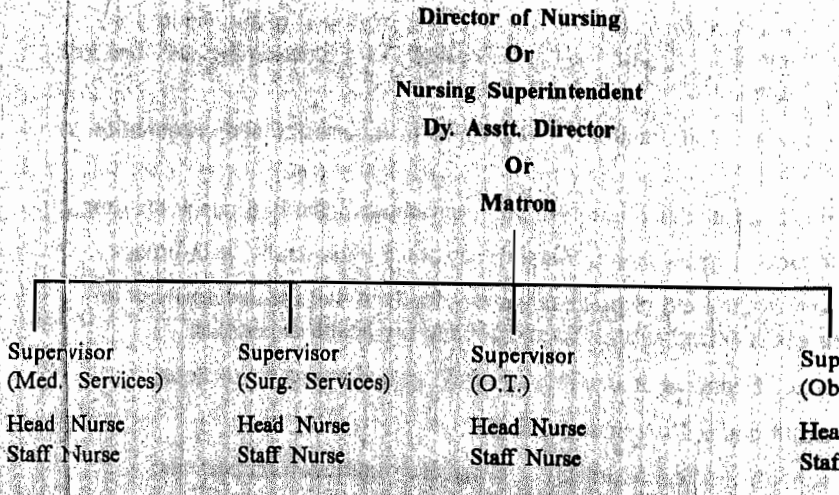
b) Those performed in the presence of the patient, e.g., observing his physical condition and behaviour, listening and talking to him and determining his needs.

c) All other tasks having a bearing on the care and welfare of patient, but not performed in his presence, e.g., preparing his medication, carrying out tests and establishing a plan of care.

2.5 ORGANISATION

You have already learnt that administration makes its greatest contribution in second managerial function i.e. organising. Planning paves the way for organising so that staff can accomplish the plans with efficiency and effectiveness. You also know that organising involves establishing a formal structure that provides the grouping and coordination of resources to accomplish objectives, establish policies and procedures, and determine position, qualifications and descriptions. Organising involves developing an intentional structure of roles for effective performance. Organising requires a network of decision and communication system for coordinating efforts towards a common goal.

The organisation of the nursing services of a general hospital may be drawn as under:



It will be seen from above that the work of the various nursing units in a service is coordinated by a supervisor and the general coordination is effected by the nursing superintendent through her deputy. In case of a teaching hospital, there may be a chief instructor who may be functioning under the Nursing Superintendent or independently with same status, depending on the size of the school.

The appointment of one person as supervisor of a service is followed mostly in advanced countries, with a view to relieving the nursing staff from a lot of administrative duties. In USA the trend is to appoint unit managers for each nursing unit, so that the sister-in-charge of the unit is free to concentrate on purely nursing duties. These unit managers look after the administration of the units and their work in turn is coordinated by service supervisors.

The idea of appointing supervisor for each service has not taken root in our country, possibly due to paucity of funds and shortage of nurses. In some of the Delhi Hospitals, there is a system of appointing supervisors in the rank of Assistant Matrons. The question of appointing floor supervisors is receiving consideration.

Check Your Progress 2

1) What are the managerial functions involved in nursing service?

.....

.....

.....

2) Enumerate any five functions of nursing care services.

.....

.....

.....

.....

.....

3) What are the advantages of appointment of floor supervisors?

.....

.....

.....

.....

2.6 JOB DESCRIPTION OF NURSING SUPERINTENDENT AND DEPUTY NURSING SUPERINTENDENT

2.6.1 Nursing Superintendents

Qualifications

Master in Nursing (with any speciality) with 6 years experience of which 3 years in administration.

or

Post Basic B.Sc. Nursing with 3 years experience in any position.

or

Basic B.Sc. Nursing with 10 years total professional experience.

or

R.N., R.M. with Diploma in Hospital Administration preferable with 10 years experience in administration.

Line of Authority

The Nursing Superintendent is responsible to the Medical Superintendent. The Deputy Nursing Superintendent (in hospitals with less than 150 beds) is responsible to the Medical Superintendent. In hospitals where the post of Nursing Superintendent exists, the Deputy Nursing Superintendent will be responsible to the Nursing Superintendent.

Duties and Responsibilities

In hospital where posts of Nursing Superintendent and Deputy Nursing Superintendent both are available the two share the following duties and responsibilities. Where no post of Nursing Superintendent is in existence, the Deputy Nursing Superintendent shall carry out the duties and responsibilities along with the Asst. Nursing Superintendent.

The main thrust of the duty of the Nursing Superintendent and Deputy Nursing Superintendent is the smooth management of the Nursing Services in the hospital at all times and every time.

She/he shall be responsible for:

1) Planning and Organising Services in Hospital:
   - a) Preparing a philosophy and objectives for the nursing department in accordance with those of the hospital.
   - b) To see that all service areas are managed as per their needs.
   - c) Utilising specially trained nurses in that particular area only, i.e., psychiatry, paediatrics.
   - d) Planning and putting up of proposals to the authorities for increase of staff in different categories so as to fulfil the INC recommendations.
   - e) Co-operating with the authorities during emergencies in setting up special nursing squads, wards or any other machinery as required.
   - f) Preparing an organisational chart showing channels of communications.
2) General Administration:
   - a) Framing Personnel policies, keeping within the framework of government rules and regulations.
   - b) Interpreting and implementing policies of the Governing Body, the hospital and the Indian Nursing Council.
   - c) Carrying out correspondence with the hospital with nurses and others.
   - d) Attending to the correspondence from outside agencies and individuals.
   - e) Submitting proposals for special equipment required for Nursing Services giving specification.
   - f) Conducting rounds of Ward and Departments.
   - g) Preparing job descriptions where none are available and seeing that each staff member gets one.
   - h) Investigating complaints, preparing reports and taking disciplinary action or recommending the same.
   - i) Preparing annual statistics, and projecting manpower needs.
   - j) Handling grievances and solving problems frequently.
   - k) Holding Departmental meetings allowing free exchange of ideas and reviewing Ward staffing.
   - l) Guiding subordinates and delegating powers depending upon the person's ability to carry the responsibilities along with commensurate authority.
   - m) To see that ward procedure manual (Nursing Procedure) is maintained in all wards.

n) Sanctioning or recommending leave to Nursing personnel.

o) Maintaining individual and cumulative leave records of all Nursing staff.

p) Writing reports — confidential reports of Nursing staff, annual report of the Nursing department, depicting achievements, future plans of expansion — incidented report whenever required — any other report that may be required to be submitted.

q) Reading and analysing daily reports on hospital situation e.g. admission, discharges etc. in order to re-plan posting or submit reports to higher authority.

r) Making of a routine to have 6 monthly or yearly health checkup for all nurses and 6 weekly for those working in Tuberculosis department, to enable adjustment in duty schedule, if found necessary.

s) Taking an active interest in staff development through:

   i) Orientation programme for new staff.

   ii) In service education programme.

   iii) Encouraging and recommending interested nurses to get further training and higher education.

   iv) Performance: evaluation and guidance to those needing it.

   v) Experimenting with newer duty and staffing patterns.

3) Miscellaneous:

   a) Giving leadership to the Nursing department.

   b) Encouraging Nursing personnel to become members of the professional Association.

   c) Participating in meeting, workshop, seminars of local, State or National level and representing the profession.

   d) Providing counselling services to Nursing personnel.

   e) Carrying research or co-operating with others who may be doing it.

   f) Any other activity concerned with the profession.

2.6.2 Assistant Nursing Superintendents

Qualification

R.N.R.M./B.Sc. Nursing with 5 years experience as Ward Incharge

Line of Authority

The Assistant Nursing Superintendent is directly responsible to the Deputy Nursing Superintendent and the Nursing Superintendent. In hospitals where the Asstt. Nursing Superintendent is the only post, she/he becomes directly responsible to the Medical Superintendent.

Duties and Responsibilities

The main objective of the duties is to provide for good Nursing care to patients through proper Nursing services management.

a) In hospitals where she/he is working under the Deputy Nursing Superintendent and the Nursing Superintendent her/his work will be mainly to supervise wards and departments.

b) To help the ward incharge with solving problems.

c) To see that enough Nursing staff is available in all wards throughout the day.

d) To help newly appointed/promoted ward incharge to arrange duties, get indents and establish good inter personal relations with other Nursin staff, laboratory workers, physio-therapist, X-ray technicians, Doctors, linen keeper etc.

e) Arrange duty relation for Nursing personnel in consultation with the Deputy Nursing Superintendent.

f) Help Nursing Superintendent and Tutors with in-service education programmes.

g) Take rounds of the wards and departments and report anything requiring attention.

h) See that registers are maintained in each ward as required.

i) Check to see that treatment is carried out as prescribed.

j) Check day, evening and night report books.

k) Maintain the whole hospital statistics and submit the authorities whenever required.

l) Check duty assignment books in each ward as required.

m) Check drug cabinets and medicine cupboards occasionally.

n) Act as liaison between the hospital and public.

o) Perform any other duty assigned by the Nursing Superintendent.

In the hospital where there is only the Assistant Nursing Superintendent (Asstt. Matron) post, she shall carry the job description as listed under the title Nursing Superintendent.

2.6.3 Job Description of Ward-incharge (Sister)

Qualification

a) Registered Nurse, Registered Midwife, with 7 years experience as a staff Nurse.

or

b) Registered Nurse, Registered Midwife with Diploma in Ward Administration and 6 years experience as a staff Nurse.

c) B.Sc. Nursing (Basic or post Basic) with 5 years experience as a staff Nurse.

d) She/he must be registered with the State Nursing Council.

Ratio

- sister for every 25 beds for Medical-Surgical-Paediatric wards
- for each shift in ICU, CCU, Labour Room and Operation Theatre
- overall for OPD
- for Gynae. OPD

Casualty and Emergency	1 for each shift
Leave reserve	30%

Line of Authority

The ward incharge is directly responsible to:

a) The Departmental Supervisor or Floor Supervisor where such a post exists.

b) The Nursing Superintendent (Matron) where the above post do not exist.

Duties and Responsibilities

1) ***Administrative and Supervisory***

The ward incharge is responsible for the smooth running of the ward. This she can attain by:

a) Distributing ward duties to staff nurses, students and servants.

b) Making plans for recognization of ward and maintaining discipline.

c) Maintaining supplies.

d) Giving and receiving nursing reports of day and night duty nurses.

e) Writing report and orders.

f) Keeping custody of dangerous drugs and records of its administration.

g) Writing confidential report of Staff Nurses.

h) Reporting to the immediate authority any incident of importance relating to ward staff.

i) Maintaining good relations with all categories of hospital personnel.

j) Writing out the weekly duty schedule.

k) Reporting to the concerned authorities emergencies, accidents or deaths.

l) Maintaining a clear record of admissions and discharges of patients.

m) Supervising the general cleanliness of the ward and sanitory annexe.

n) Delegating to the other ward staff such work that she/he can do.

o) Supervising the laundry work.

p) Holding meetings with ward staff to work out difficulties.

2) *Nursing Care*

As the person incharge of the ward she/he is responsible for carrying out patient care with such devotion to help the hospital achieve its goal.

a) Total care of patient: she/he must know the patient's physical condition and any special nursing problems.

b) Seeing that the doctors orders are carried out.

c) She/he must not allow any nursing personnel to give I/V fluids, blood transfusion or take blood sample for investigation.

d) Seeing that the patients get good nursing care, and that the necessary observation and recording is done in each case.

e) Seeing that medications, dressings, nursing procedure, investigations and other treatment are carried out.

f) She/he must observe and report patients condition to doctors when they come on rounds.

g) She/he must prepare for ward rounds and accompany the head of the unit on rounds and bring to the doctor's attention any point of importance.

h) Seeing that the preparations for transportation of patients to Operation Theatre and other departments are done properly.

i) Varifying the patients coming from OPD of other departments for admission to that particular department only and that the papers of the patient are in order without which the patient should not be admitted.

j) She/he acts liaison between the hospital and the community.

3) **Teaching**

The ward incharge is also responsible for the eduational aspects — both for the Nursing students and ward staff.

He/she is responsible to see that:

a) The nursing students are helped in understanding the patients illness and type of care that is to be given. This can be done by having bed-side clinic, ward clinics or conferences.

b) The nursing students are taught the procedure they are required to perform. In case the student does not know the procedure the sister can herself teach or give the work to the senior students or the staff nurse. A student who does not know a procedure should not be left on her own. If something goes wrong the ward incharge will be responsible.

c) The procedure of patient care is carried out properly and all required articles, material are provided. It would help to have a procedure manual in each ward.

d) She co-operates with the tutors in teaching by assigning work to students according to their educational level (PTS, 1st year, 2nd year, 3rd year) by arranging clinical teaching, informing the nursing tutors about any patients admitted with special type of disease.

e) Practical work is supervised. Health talks are given as per schedules.

f) Students are taught how to handle sputum mugs, kidney trays, urinals, bed pans and soiled linen and dressings, they are also taught lifting and moving patients.

g) Plans and implements orientation programme for new staff.

h) He/she participates in in-service education programmes and encourage other nursing staff to do likewise.

i) She encourages staff nurses to take up higher studies.

j) Participates in research studies and cooperates with those nurses who may like to carry out research studies.

2.6.4 Job Description of Staff Nurse

Qualification

General Nursing and Midwifery (alternative courses for Male students) or the new general programme or Basic B.Sc. Nursing from a recognised university.

Ratio—Staff Nurses and Nursing Sister

	Department	Nursing Sister	Staff Nurse
1.	General Medical and Surgical Ward	1 for 25 beds	1 for 3 beds
2.	ICU, ICCU and other Special Wards	1 for each shift	1 for each bed per shift
3.	Labour Room	1 for each shift	4 for each shift
4.	O.T.	1 for each shift	3 per table per shift
5.	Obs. & Gynae	1 overall 1 for Gynae OPD	1 for each room of department
6.	Out-patient Department	1 for the OPD	Actual needs
7.	Paediatrics	1 each shift	1 for two beds
8.	Casualty and Emergency	1 for each shift	2-3 per shift depending on No./No. of Admissions
9.	Leave Reserve	30% in all categories Note: Norms vary from time to time	

Job Specification

The staff nurse is the second in nursing hierarchy in the ward, who works under the instructions of the ward-in-chief.

Her duties and responsibilities can be divided as under:

Administrative

a) Help the Ward Incharge to carry out her work.

b) Work in place of the Ward Incharge in his/her absence.

c) Maintain general cleanliness of the ward and the sanitary annexe.

d) Write the diet register and supervise distribution of diet. See that special diets are served and eaten by the patient.

e) Maintain poison/(scheduled) drugs registers.

f) Supervise medicine given by students or do it herself in case there are no students.

g) Supervise nursing care being given by nursing student.

h) Maintain emergency trays and other duty room trays, sterilizer, instruments in working conduction by getting indents from sister or getting repairs done in case of a break down.

i) Maintain good inter-personal relations with all other staff.

j) Maintain all procedure trays in readiness.

Nursing Care

a) Take over from previous duty nurse all new and serious patients, instruments, supplies, drugs, etc.

b) Make beds of serious patients and help students make beds, supplying necessary linen.

c) Administer injections/tablets or liquid medicines requiring care in giving e.g. oily medications.

d) Prepare patients for operations and see that he/she is sent to operation theatre with all necessary papers and medications.

e) Get patients clothes and bed linen changed as and when necessary.

f) Take rounds with doctors when called to list new orders and see they are carried out.

g) See that all investigation specimens are sent to the proper laboratory with forms.

h) Insist that the unit doctors prepare and sign the forms. Filling up the forms is not the duty of the staff nurse.

i) Keep I/V or Blood transfusion tray ready and help the doctor with the procedure.

A Staff Nurse is not allowed to give I/V infusions or Blood Transfusion.

j) Observe all patients conditions and report changes to ward incharge and/or the doctor.

k) Carry out nursing procedure for all serious patients. Help newly posted students, PTS students to carry out their nursing procedures.

l) Check on every new admission. Before admitting the patients all his papers must be in order. This is specially when a patient is transferred to your ward from another department.

m) Read case papers properly and carry out orders and see that they are carried out.

n) Give expert bed-side nursing care to serious patients.

o) Maintain case papers, investigation reports, etc. in the proper file or board. See that all reports get attached to the correct case paper, temperature charts and in take output charts or any special chart are maintained. Case papers should not be allowed to be handled by anyone except the doctor in-charge of the patient. This is specially for medico legal cases.

p) Write day and night orders and maintain ward statistics.

q) Talk to pre operative patients to reduce their tension and give them confidence.

r) Listen to patients problems and help to solve them through various means.

s) See that a discharged patient goes home with proper understanding of the follow up procedure and details of the diet and medication exercises etc.

t) Inform doctor in case of a patient dying during your duty time. All concerned records, reports must be completed and handed over to the next shift staff nurse.

u) In special areas carry out duties which required expert handling e.g.:

i) Labour Room	Difficult and abnormal deliveries. Premature baby care.
ii) Operation Theatre	Care of instruments and gloves. See to sterilization Trays and Trolleys.
iii) Mental Hospital	Prepare patient for ECT and assisting doctor with it. Care of mentally retarded (where such a Unit exists)
iv) ICCU	Total patients care, helping with ECG or any other investigative procedure.

Teaching

a) Instruct students in their work, and orient newly posted students.

b) Carry out health teaching for individual or group of patients.

c) Instruct students specially the newly appointed ones in the correct ways of handling bed pans, urinals, sputum cups, kidney trays, soiled dressings, bandages, binders, linen.

d) Provide for and demonstrate methods of dis-infection and cleaning.

2.7 STAFFING PATTERN

Staffing is the third managerial function. Having planned and organised, the manager must now staff to accomplish the goals of the organisation. Staffing involves the

selection of personnel and assignment systems and the determination of staffing schedules. There are many variables to be considered when planning for staffing. The more accurate the assessment, the higher the probability of containing costs while providing high quality care.

The nursing care of patients in hospital depends on the numbers and quality of nursing personnel on duty at all times of the day and night. The number of nurses required to man the nursing services in a hospital, depends on many factors, some of them are:

a) Number of beds in a hospital.

b) The type of hospital and the prevailing medical practice, including kinds of treatment and medications given, and tests and services required for the patients.

c) The design and layout of the hospital compact or spread out, and the type of physical facilities provided (single layout beds or multiple bed).

d) Pattern of assignment of nurses — based on functional method, case method or team method.

e) The type and the number of emergency cases coming into the hospital.

f) Available labour saving devices; automation, mechanization — centralization.

The staffing depends on the time spent by nurse on the patient. The work load to be undertaken in caring for patients may be considered from three points of view:

The quality of nursing, the characteristics of the patients and the schedule of nursing care.

Extensive research has been done to ascertain the average number of hours a patient needs nursing care in a hospital. It has been worked out that average number of bedside nursing hours required per patient in 24 hours is as under:

			Hours of Care
a)	Medical/Surgical and Mixed Ward	—	3.2
b)	Maternity Ward	—	2.3
c)	Neonatal Ward	—	5.5
d)	Children's Ward	—	4.3
e)	Communicable Diseases Ward	—	4.7
f)	Private Patients: i) Mixed	—	5.4
	ii) Maternity	—	6.5

Every hospital has to work out its own need based on the above factors. According to the recommendations of the Nursing Committee set up by Ministry of Health, Government of India (Shetty Committee), the ratio of nurses to patients in a hospital should be 1:3 in hospitals where nursing training is imparted. Other hospitals should have a rate of 1:5. These figures do not include teaching and administrative staff and staff for special departments which are to be provided in addition.

The Master Staffing Pattern

Making the Staffing Pattern for the nursing service of the whole hospital is relatively a simple task once the staffing patterns for each ward have been provided. The selection of categories and the number of personnel needed for each category are decisions made by the Director of nursing service, with the help of her assistants, Supervisors and head nurses.

The development of Master Staffing Pattern based upon a study of the needs of patients and availability of personnel should result in a sound, realistic, reasonable and understandable plan. Studies in some general hospital, however, indicate that the effective ratio for their particular need is one professional nurse to two auxiliary nurses.

Shortage and Turnover

Shortage of nurse is an old problem existing the world over. This is partly due to the rapid expansion of medical care programmes and the general lack of understanding on the part of the public about the duties and responsibilities of the nurses.

Connected with shortage is the problem of turnover of nurses. By turnover is meant the replacement of trained nurse due to her resigning or getting out of service. In a survey

conducted in Chaster Hospital (USA) over a period of 4 years it was found that 55.8% of resignations were due to personal reasons like change of town, domestic reasons and so on; and 44.2% due to factors related to the job. It is here in the later group that the hospital can reduce the turn over by using better man management techniques. Some of the major reasons related to job are given below:

a) Lack of Job Satisfaction

b) Inadequate Supervision

c) Maladjustment with Fellow Employees

d) Poor Personnel Policies

e) Other Job Opportunities, Incentives, Promotion etc.

Check Your Progress 3

1) What is the 'line of authority' of Nursing Superintendent/Depury Nursing Superintendents?

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2) What is the estimated requirement of ward in-charge (sister) in a hospital?

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3) Enumerate the factors for estimation of the number of nurses required in a hospital.

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4) What are the factors responsible for turnover of nurses?

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2.8 LET US SUM UP

In this unit you have learnt that the nursing services play a very crucial role in the health care delivery system. The role of nursing service towards patients and the community has similar responsibilities as the medical service, and the need for close co-ordination between the doctor and the nurse and the other health workers is essential to maintain quality of care and patient satisfaction.

You have also learnt about the duties and responsibilities attached to the nursing staff and their vital role in the organisation to achieve the objective of patient care. Shortage of Nursing is an old problem existing world over. Nevertheless, there is a need to reduce the turn over by appropriate use of management techniques and improvement in the working environment.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) Florence Nightingale, 1860, London
   b) 1949
   c) 1908

2) a) Designing and providing patient care and services
   b) Ensuring continuous and timely availability of nursing service to patients
   c) Quality control of nursing care
   d) Research in nursing care
   e) Training of staff

Check Your Progress 2

1) Planning, organising, leadership, co-ordination and control.

2) a) Provision of nursing care services and treatment
   b) Organisation and administration of Nursing Services
   c) Co-ordination and supervision
   d) Training
   e) Research

3) a) Relieving ward nursing staff from administrative duties
   b) Coordination of work of various nursing units
   c) Communication with public, counselling, investigation of complaints etc.

Check Your Progress 3

1) a) Nursing Superintendent to Medical Superintendent
   b) Dy. Nursing Superintendent (DNS) to Medical Superintendent in hospitals less than 150 beds. DNS to Nursing Superintendent where the later post exists.

2) a) 1:25 beds for general wards
   b) 1 for each shift for ICU, CCU, Labour Room, OT, Casualty & Emergency
   c) 1 overall for OPD; 1 for Gynae. OPD
   d) 30% leave reserve

3) a) Number of beds, type and clinical services available
   b) Design and layout of hospital
   c) Pattern of assignment of nurses
   d) Patient load-type and number of emergency cases
   e) Labour saving devices available.

4) a) Personal reasons — change of place, domestic
   b) Job related — such as:
   Lack of job satisfaction
   Lack of supervision
   Maladjustment with staff, work culture
   Poor personnel policies
   Lack of incentives, opportunities, promotions.

UNIT 3 WARD MANAGEMENT AND NURSING CARE

Structure

3.0 OBJECTIVES

After studying this unit, you will be able to:

- explain the concept of Ward Management and Nursing Care;
- define the nursing needs of patients;
- enumerate the nursing service of department and organisation of units;
- list the nursing care methods;
- describe the management of ward personnel, patient and attendant; and
- describe nursing records and nursing audit.

3.1 INTRODUCTION

In the preceding unit, you have learnt nursing services and organisation. In this unit you will learn about ward management and nursing care. You shall learn the concept of ward management. You shall also learn the nursing needs of patients, how wards/units are organised and managed. You shall also learn various nursing care methods. It shall also be possible to learn how to manage patients and attendants, how to perform functions of coordination and counselling. You shall also study nursing records and nursing audit.

3.2 CONCEPT OF WARD MANAGEMENT AND NURSING CARE

The nursing care was considered as an art and vocation. Now ward management and nursing care is considered a scientific profession which is an important part of total hospital management and it is very much demanded for the care providing at the level of high technological areas of the health care organisation such as Operation Theatre and ICU. The nursing care required for the prevention of disease and promotion of health, it also required a) In the interest of the physical and mental comfort of the patient b) By reason of the disease from which the person is suffering. As nursing is only one part of the total health care of the patient, the nursing activities must be

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coordinated with those carried on by workers such as doctor, social worker and others. A distinction is sometimes made between the terms nursing care and nursing services. Nursing care refers to the care of patient with specific regard to nursing, while the term nursing service/ward management refers to the coordinating responsibility of the nurse who in addition to giving nursing care also works with the members of allied disciplines. In recent years, increased emphasis has been given lo the administration/ ward management in nursing services as a result of increased scope of activities related to hospital services other than the true nursing, e.g., supervision of food, care and distribution of linen and compilation of reports and maintenance of patient records. With the ever increasing dimension of medical sciences quantitatively and qualitatively, nursing care is becoming more and more complex with its management services and the services provided for the patient care scienlifically based on needs of the patients/ community,

Florence Nightingale, the pioneer in modern nursing and modern hospital administration is the first nurse executive to start the concept of modern nursing care/ intensive nursing care (ICU care). She also recognized medical administration a tool for improving medical care in civilian hospitals. She was responsible for laying down nursing standards and started a school of nursing in 1860 for providing the training to the nurses. The Indian history has also had many advents. Lord Buddha in 500 B.C. created monasteries and hospitals where running by deploying the monks for nursing the sick patients. Emperor Ashoka built many hospitals and employed nurses for the care of the sick. During this time there were no special training for the nurses but they were selected on the basis of the fact that they should be good in cooking and taking care of the patients and experts in various nursing procedures.

Definition of Nursing Cnre

WHO expert committee on define the nursing as "the conscious practice of human relationships. It is clear that nurses must keep alert to observe the needs of their patients as individual human beings."

Nursing as per the WHO definition is the part of total health organisation which lo satisfy the nursing needs of the community, organisation of nursing service is a complex process which helps the institution to stand on its own.

Nursing care is defined as the care of the patient with the specific regard to nursing.

3.3 NURSING NEEDS OF PATIENT

The plan for the care of a patient in the hospital begins with the plan made by the physician for medical care. The plan for nursing care begins when the patient is admitted to the ward. An analysis of the nursing needs of the patient necessarily includes consideration of the plan for medical care, and the facilities for patient care provided by the hospital.

The patient being the central figure, his needs are paramount:

a) First need is an accurate assessment of his illness in as short a time as possible with least disturbance to him.

b) The second need is the appropriate and effective action in accordance with the assessment of his condition.

c) The third need is to provide him the maximum degree of comfort and happiness by way of pleasant surrounding and service by people attending on him.

d) The fourth need is to prepare him for return to the society completely cured or with such supportive therapy as needed.

3.4 NURSING SERVICE DEPARTMENT/UNIT

The nursing services must be under the direction of competent leader i.e., Chief Nursing Officer/Director of Nursing Service/Nursing Superintendent who is responsible to the hospital administration for the programme and activities of the nursing care of the patient. The Chief Nursing Officer/Nursing Director/Nursing Superintendent has dual role of responsibility. In addition to nursing administrative responsibility to the hospital

administration she has the role of coordinating professional activities of nursing staff with those of medical staff. She has also the responsibility of entire nursing service as well as the patient care services. In the ward/unit the ward incharge/Sr. incharge ANS is the key person.

In the hospitals, nursing care is broadly classified into general wards, speciality wards and intensive care units, casually or emergency unit, ambulatory care unit and operation theatres unit. In general wards one can ensure sufficient nursing care by segregating patients according to the categories (according lo the sickness of the patients).

Check Your Progress 1

I) Enumerate the nursing needs of patients.

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2) What is Florence Nightingale's contribution towards nursing?

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3) Define nursing care.

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4) Fill in the blanks:

a) ..... is the pioneer of the modern nursing, modern hospital and nursing.

b) In Indian history monastries and hospitals were run by .....in 500 B.C.

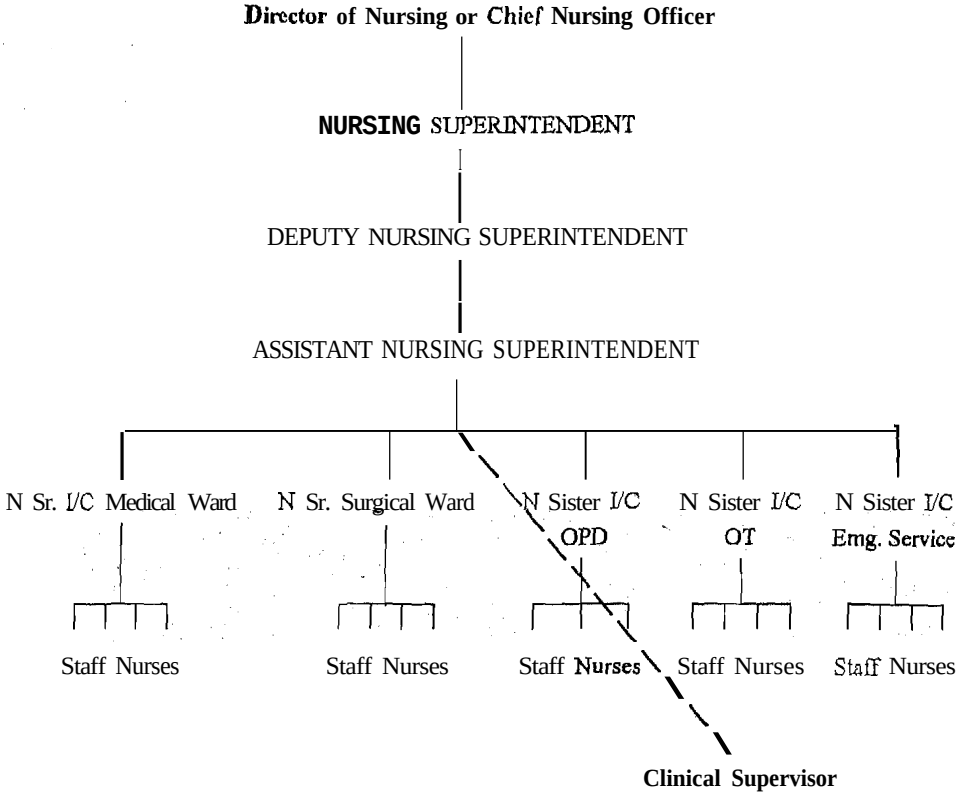
c) Emperor ..... built many hospitals and employed nurses for the care of sick.

3.5 ORGANISATION AND MANAGEMENT OF UNITS

There are two accepted types of organisation in the nursing services, which run parallel to each other. They are the Line and Functional Organisation about which you have learnt in the earlier unit.

You will recall that in the Line organisation the Director of Nursing or Chief Nursing Officer or the Nursing Superintendent is responsible for the selection/recruitment, appointment, training and deployment of nurses in various areas. The post of Chief Nursing Officer (CNO) was created in 1992 and filled by all central govenunent hospitals as well as undertaking e.g. All India Institute of Medical Sciences, New Delhi. There are other nursing administrators like Nursing Superintendent, Deputy Nursing Superintendent and Assistant Nursing Superintendent who have direct control over the nurses activities. In the functional organisations the nurse takes the instructions from the physicians so far as the medical care of the patient is concerned. The physician, however is not authorized to act or take the action against the nursing personnel for the nursing activities. If a nurse does not perform her duties, she should refer the matter to the nursing in-charge whose responsibility is to deal with such' matters. The physician, however is not authorized to act in the line organizational manner. Effective coordination and cooperation is ensured for the proper functioning of dual activities. Normally there is no conflict but controversy exists whether the nurse should be counted

as an assistant to the physician or from her background knowledge and training she should plan nursing care independently within the framework of the physicians policy. More and more emphasis is laid on the coordinating member of the team, coordinating the orders of the physician and the work of the other services to achieve efficient patient care based on the above lines, the organisation of the nursing service of a general hospital may be drawn as under: (In this Diagram both the Line and Functional/Staff authority has been showned.



It could be seen that the work of the various nursing units/wards in a service is coordinated by a supervisor (Ward Sister, Assistant Nursing Superintendent, Deputy Nursing Superintendent) and the general coordination is affected by the Nursing Superintendent/Chief Nursing Officer through her deputy. In case of a teaching hospital there may be an inservice education coordinator or instructor who may be functioning. under the Nursing Superintendent/Chief Nursing Officer or independently with same status depending on the policy of the hospital and the size of the school/nursing college. The appointment of one person as supervisor of a service is followed mostly in advanced countries, with a view to relieving the nursing staff from a lot of administrative duties. In USA the trend is to appoint unit managers for each nursing unit, in England the trend is to appoint a clinical manager for each unit, in India in All India Institute of Medical Sciences there is an Assistant Nursing Superintendent posted in each ward, so that the sister in-charge of the unit is free to concentrate on purely nursing duties. These unit managers look after the administration of the units and their work in turn is coordinated by service supervisors.

The idea of appointing supervisor for each service has not taken root in our country except in AIIMS, New Delhi, possibly due to paucity of funds and shortage of nursing personnel. In some of the Delhi hospitals there is a system of appointing floor supervisors in the rank of Assistant Nursing Superintendent (assistant matron). In Safdurjung Hospital and Ram Manohar Lohiya Hospital, New Delhi the question of appointing floor supervisors is receiving consideration.

Objective of Nursing in the Ward/Unit

While providing nursing care in the ward/unit a nurse must always be able to:

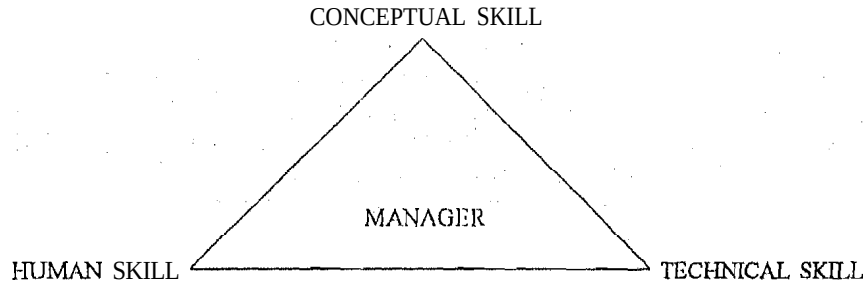
1) Maximum comfort and happiness to the patient by way of pleasant surroundings.
2) Qualitative/Comprehensive care to the patient.
3) Care based on the patients need.

4) Accurate assessment of illness.
5) Adequate material resources at all the times.
6) Health cducntion to the patient and attendants.
7) Managerial skills as and when required,
8) Privacy at all levels.

Management in the Ward

Management defined in a simple language is to get the work done in a systematic way for accomplishment of defined objectives based on management of Man, Money and Materials. Management gives us the clue to how Io get best possible services and how to make the ward administration successful and fruitful. It is also said that management is a process by which a cooperative group directs action towards common goals.

Ward management is facilitated by the development of systematic procedures for dealing with the details of ward administration by adoption of a system of day-to-day tasks. While managing a ward/unit the manager has lo apply various managerial skills which differ as per the level of the management. These can be shown diagrammatically as under.



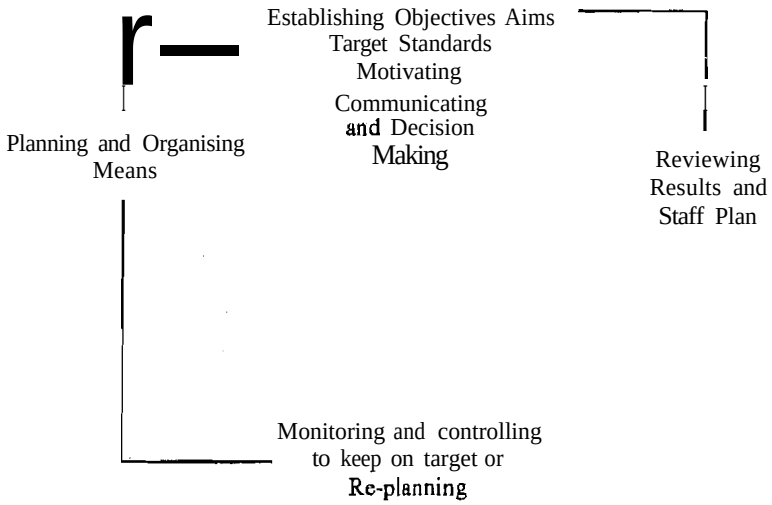
A diagram of the application of managerial process has been drawn in the next page to its application as per the level of nurse managers.

For an effective management, a Nurse Manager must apply the managerial skills.

Though the above mentioned skills are needed in all levels of nursing management, to provide the effective nursing care to the patient by a nurse manager in the ward/unit, but the use of them vary as per the level of the managerial role of the nursing personnel, according to their category.

At the top level, the nurse manager, the Chief Nursing Officer/Nursing Superintendent has to apply the conceptual skill for planning the nursing service, nursing man power, and to make the decisions of various aspects of nursing. It is the top level of nursing where the Nurse manager has lo play the role in planning, policy making, liasoning, co-ordinating, and controlling for these the conceptual skill is needed. In the middle level the nurse manager, the Deputy Nursing Superintendent/Assistant Nursing Superintendent has to apply the human skill as well as the conceptual skill to manage his/her unit effectively. As she/he has to keep coordination with various departments for the day-to-day management of the unit and has to plan the nursing care as well as to take some decisions to solve various problems at her own level. Being a middle level manager the nurse manager has to ploy a crucial role in the midline supervision by liasoning, and co-ordinating with the various departments for smoothening of work and strive professional growth. For this she/he needs to apply the human skill as well as the conceptual skill. Besides this the middle level nurse manager has lo apply the technical skill also.

At the base level of the management the ward sisters and the staff nurses are responsible to provide the total/comprehensive care to the patients of their respective unit. For this they have to apply the technical skills mainly though they have also to apply the human skill to manage the patient care services effectively. The base level/core level nurse manager is responsible for direct and total patient care.



The nurse manager has to apply the whole management process while managing the ward/unit and to follow these main four steps mentioned above for an effective management of her/his ward. These steps are to be followed in a cycling way as they are related to each other. In every step the monitoring, controlling, and the reviewing must be done to get an effective result and to avoid/minimise the errors which may be cost effective as well as time effective also. Special care should be taken in the step of planning which is a crucial and most important step of whole management process.

Check Your Progress 2

1) What are the types of organisations?

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2) Sketch/draw the organisation set up of nursing service in any one of a general hospital.

3) List three objectives of nursing in the ward.

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4) What are the skills that a manager should apply while managing the ward/unit?

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Management of Nursing Personnel

The nursing care of patient in hospital fully depends upon the number and the quality of nursing personnel on duty at all times of the day and night.

The following factors should be considered before planning the nursing manpower.

1) Number of beds in a hospital.
2) The type of hospital and the available services.
3) The design and the lay-out of the hospital.
4) Available/pattern of arrangement of nurses.
5) The type and number of emergency cases coming to the hospital per day.

Staffing Norms

For planning of nursing manpower wc have to follow some norms.

The nursing norms are recommended by various committees, such as; the Nursing Man Power Committee, the High-power Committee, Dr. Bajaj Committee, and the Staff Inspection Committee, Trained Nurses Association of India, and Indian Nursing Council (1985). (For details See Unit 2 of this Block.)

All the above committees and the staff inspection unit recommended the norms for optimum nurse-patient ratio. Such as 1:3 for Non Teaching Hospital and 1:5 for the Teaching Hospital. The Staff Inspection Unit (S.I.U.) is the Unit which has recommended the nursing norms in the year 1991-92. As per this S.I.U. norms the present nurse-patient ratio is based and practiced in all central government hospitals.

Most of the hospital today is following the S.I.U. norms. In this the post of the Nursing Sisters and the Staff Nurses have been clubbed together and the work of the ward sister is remained same as staff nurse even after promotion. The Assistant Nursing Superintendent and the Deputy Nursing Superintendent have to do the duty of one category below of their rank. There will be:

- One nursing sister for 3.6 staff nurses (30% nursing sister) has been fixed by the Government in settlement with the Delhi Nurses Union (DNU) in 1990.
- One ANS (Assistant Nursing Superintendent) for every 4.5 Nursing Sisters.
- The ANS will perform duty in shift as done by the present Nursing sisters.
- One DNS for 7.5 ANS.
- The DNS will perform the duty of the Assistant Nursing Superintendent.
- One Nursing Superintendent for 200 beds in the Hospital.
- One Chief Nursing Officer for 50Q to 750 beds.

There should be 45% posts added for the area of 365 days working including 10% leave reserve (maternity leave, earned leave, and days off as nurses are entitled for 8 days off per month and 3 National Holidays per year when doing 3 shift duties).

The Nurse-patient Ratio as per the S.I.U. Norms

General Ward	—	1:6
Special Ward	—	1:4
Nursery		1:2
Labour Room	—	1:1 per table
I.C.U.	—	1:1 (Nothing mentioned about the shifts)
O.T. Major	—	1:2 per table
O.T. Minor	—	1:1 per table
Casualty		1:35
Burn	—	1:2
O.P.D.	—	1:40

The Nurse-patient Ratio as per the norms of *TNAI* (Trained Nurses Association of India) and INC (The Indian Nursing Council, 1985)

The norms are based on Hospital Beds.

1)	Chief Nursing Officer	1 per 500 beds
2)	Nursing Superintendent	1 per 400 beds or above
3)	D.N.S.	1 per 300 beds and 1 additional for every 200 beds
4)	A.N.S.	1 for 100-150 beds or 3-4 wards
5)	Ward Sister	1 for 25-30 beds or one ward. 30% leave reserve
6)	Staff Nurse	1 for 3 beds in Teaching Hospital in general wards and 1 for 5 beds in Non-teaching Hospital +30% Leave reserve

7) Extra Nursing Staff to be provided for departmental research function.

8) For OPD and Emergency 1 staff nurse for 100 patients (1:100) + 30% leave reserve

9) For Intensive Care Unit (I.C.U.) 1:1 or (1:3 for each shift) +30% leave reserve.

10) It is suggested that for 250 beded hospital there should be One Infection Control Nurse (ICN).

For specialised departments, such as Operation Theatre, Labour Room, etc. 1:25 +30% leave reserve.

Norms are not based on Nursing Hours or Patient's Needs here.

Following is another set of norms in practice based on the nature of illness of patients. These norms will be helpful to you in implementing progressive patients care concept in your hospital.

Nursing Hours Required

Nature of Illness	Direct Nursing Hours Required	Nurse-Patient Ratio	Remarks
Critically ill patient needing intensive care	8-10 hours	1:1	
Moderately ill patients needing intermediate care	3-5 hours	1:3 1:5	(Teaching hours) (Non-teaching hours)
Mildly ill patients needing self care (Ambulatory)	1-2 hours	1:6 1:10	(Teaching hours) (Non-teaching hours)
Chronically ill patients requiring skilled prolonged medical and nursing care	30 minutes to 1 hour	1:12 1:18	(Teaching hours) (Non-teaching hours)

Source: Academy of Hospital Administration, *Diploma in Hospital and Health Management Course Paper II*, 11th edition, 2000.

Check Your Progress 3

1) List four factors that affect the planning of manpower.

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2) Match the following:

S.I.U. recommendation of Nurse-patient ratio is:

	A	B
i)	I.C.U.	a) 1:1
ii)	General Ward	b) 1:4
iii)	Special Ward	c) 1:6
iv)	O.T. major	d) 1:2
v)	Casually	c) 1:1
vi)	O.T. Minor	1) 1:35

3) Indicate True and False:

a) For ICU Nurse-patic111ratio is 1:1 recommended by S.I.U. (T/F)

b) The S.I.U. Norms were recommended in the year 1991-92. (T/F)

c) The INC recommended Nurse-patient ratio in 1985. (T/F)

d) The norms of the staff nurses should be 1:5 in teaching hospitals. (T/F)

e) For every 200 beds one additional DNS to be posted as per TNAI and INC norms. (T/F)

3.6 NURSING CARE METHODS

There are many incthods that may be applied for providing the care to the patient in the ward, but mainly three methods which should be practiced for an effective ward management. There are three Nursing Care methods used for the assignment of nursing work.

The tasks of the ward are carried out mainly by these three accepted patterns of Assignments/methods which depend on the training, experiences and the rules of a particular hospital/institution.

1) Functional Method
2) Case Method
3) Team Method

Organisation of ward work and assignment of staff need careful.consideration.

I) Functional Method

In this method the tasks are divided among the staff e.g. in a ward one sister (nurse) is made responsible for giving injections, another sister takes care of oral medications and the third sister does all the other works for the patients. In this a nurse is assigned to specific function in the ward as mentioned above, giving injection, oral medicines, taking vital signs of the patients, doing any other work of the patient etc. This method is also called efficiency method.

Following are the advantages of this method:

a) It helps to improve the efficiency of care provider (Nurse).

b) More work can be accomplished in a given period of time, so it is very useful method during evening and night shifts.

c) Less interruption and less confusion is there.

d) It helps in developing the skill when the activity is repeated often.

Following are the disadvantages of this method:

a) There is no satisfaction to the nurses.

b) Nursing activity becomes monotonous when the same activity is repeated again and again leading to less interest in the activity,

c) No individualized nursing care is possible, so patients also do not get satisfied and they do not know whom to approach in case of any problem far clarification.

d) More confusion is there in the patient to attend many people (nurses) in a day.

e) Less accountability of the work by the staff can lead conflict with the supervisor.

2) Patient/Case Method

In this assignment a nurse is expected to give complete nursing care to one patient. Each nurse is assigned to one or two cases and she is fully responsible for total care of those patients. A nurse is providing general nursing measures, treatment and medications, taking temperature, pulse, respiration, serving nourishment to lier patients also giving health education. If she goes off for lunch that time she has to hand-over the patient to another nurse for the time being. She is responsible to giving complete hand-over to her next shift partner about her patients before going off from duty.

The advantages of this method are:

a) More individualized care is possible.

b) Opportunity of nursing education is superior.

c) Satisfactions to the nurse are getting increased.

d) Satisfaction of the patient is also of a higher grade and there is less confusion.

Disadvarilages of this method are:

a) More workers (Nurscs) are required for the patient care.

b) Less work is done in a given period of time,

c) This method does not improve the efficiency of the workers (Nurses).

d) The method is not good for developing the nursing skills,

3) The Team Method

It is a new method of assignment/patient care. In this method the nursing staffs are divided into Teams, each of which is led by an experienced Nurse. There is one experienced professional nurse, who is being designated as a team leader. This leader assigns duties to other nursing staff members of her team for giving care to a group of patients. The work is done under the direct supervision and guidance of the leader. The team leader is fully responsible to the ward sister/ward in-charge (A.N.S.).

The advantages of this method are:

a) Better patient care is provided to the patients assigned to the team.

b) It helps the leader to assume the responsibility and to organise the work efficiently and independently.

c) There is better ward management and better planning of patient care.

d) Job satisfaction is there among the nursing personnel.

e) All the members learn to work in a team spirit.

Disadvantages of this method are:

a) More nurses are required than the functional method.

b) The team cannot function unless there is a stable team leader,

c) It can be successful only if everyone concerned is interested and determined to make it work efficiently,

Check Your Progress 4

1) List the methods of nursing care.

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2) Give brief account of each method.

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3) Name the method which needs less staff (Nurses).

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4) Briefly enlist two advantages and two disadvantages of Patient/Case Method.

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3.7 MANAGEMENT OF PATIENT AND ATTENDANTS

It is the legal responsibility of the nursing administrator/ward incharge to provide and ensure quality care to the patients. The administrator/ward incharge should instruct his/her employees to be very cordial and sympathetic with the patients and their attendants besides providing the quality care to the patient, he or she is also responsible for the welfare of the patients as well as the attendants. It is to be ensured that nothing is provided or done which is harmful for the patient and attendants, as any casual remark by the employee can hurt the patient and attendants and may lead to conflict.

Management of Personnel

Management of personnel is not an easy job. The nursing administrator/ward incharge has to create a working environment providing facilities and services within the reach of all categories of staff. He/she has to motivate the subordinates to achieve the organisation goals. Other duties of the nursing administrator are conflict resolution, maintenance of industrial harmony and well-coordinated activities, staff counselling etc.

3.7.1 Coordinating

Coordinating is the integrating process in an orderly pattern of group efforts in any enterprises towards the accomplishment of a common objective, To ensure the harmonious and smooth working of an organisation with a number of its divisions, departments or units, the activities in all areas are required to be pulled together, unified and blended so as to give them a common purpose. Coordination must have time, quantity, and direction dimensions. It is a mutually arranged effort of the requisite quality and quantity, arranged at the proper time through deliberate executive action. Coordination should not be confused with cooperation. Coordination is one of the most important managerial function. The ward incharge/nurse administrator has to coordinate or work with his/her subordinates to achieve a common goal. The Chief of the nursing services has to coordinate with the chiefs of the other departments to ensure the smooth functioning of the hospital. Good coordination among the different departments help in achieving the organisational goal i.e. good patient care.

3.7.2 Counselling

Counselling in general is defined as advising and guiding. It is the process of helping a person to solve his problem by himself. Counselling is also defined as a conversation between two people for the purpose of solving the problem or as an interview conducted for the same purpose. Counselling is the heart of guidance. It is the main element in guidance, regardless of the field of nursing service or others. Guidance is impossible without it. The main purpose of counselling is to develop self-reliance of the counsellor, chief of the nursing services and its staff members at the supervisory level should learn the art of counselling. The counselling skills are acquired by practice and experience. The term counselling is used in three senses:

a) **To describe a helping relationship**

This refers to the core qualities of the counsellor and includes empathetic understanding, respect for the client and genuineness.

b) **As a set of activities and methods**

These activities and methods include empathetic relationship with clients and theoretical approaches such as psycho-analytical, behavioural and rational-emotive.

c) **As a special area for providing services**

The differences between psychological therapies and counselling lies in the type of clients. In counselling the focus is on the clients in non-medical settings who are less disturbed than those who are receiving psychological therapy in the hospital.

Factors Necessary for a Counselling Programme

1) Gathering the data about the counsellee.
2) Conferring with others concerning the counsellee.
3) Assessing the employees potentialities, attitude, stamina, etc. for a given position.
4) Building an index to helpful information.
5) Consulting sources of information, gathering facts and determining the type of counselling required or best suited.
6) Follow-up and evaluation of results.
7) Organisation of cumulative records to determine not only immediate but also the long term progress of the counsellee.
8) Writing up case records of counselling in regard to certain problems to serve as guide in similar issues. Records can be used for research purpose also.

Types of Counselling

Counselling may assume one of the several forms:

1) **Directive counselling:** In this type of counselling, counsellor collects the information about the aptitude, interest, motives and other characteristics that facilitate or inhibit adjustment. It is mainly diagnostic or conventional counselling. The counsellor establishes rapport with his/her client, investigates his/her problems and help the client to solve these problems.

2) **Non-directive counselling:** It is client oriented. In this the counsellor talks less but listens more. The counsellor is not interested in historical background of the counselling. The counsellor assumes the passive role. He/she maintains an attitude of interest and avoids expression of shock, discomfort etc. that may cause psychological blocking in the counsellee.

3) **Electic counselling:** It is the combination of directive counselling and non-directive counselling. The following steps are taken in this as under:

   a) Put counsellee at ease.
   b) Cultivate self-understanding.
   c) Demonstrate interest and listen sympathetically.
   d) Be personal in manner but impersonal in interest of workers etc.

   There are occassions when counselling needs to be forceful, when the counsellor needs to make decisions and when the insight and acceptance of counsellee is minimal. For example in emergency situation when the client possessed of very rigid mind set.

4) **Group counselling:** In this the counsellor is counselling a group of counsellees at a given time. All the process of counselling is also being done with the group and the same decision by the counsellor is being taken for the group.

Role and Function of the Counsellor has been termed as the three C's:

1) Counselling 2) Consulting 3) Co-ordinating

Generic Role of Counsellor

1) Counsellor as a Counsellor
2) Counsellor as a Consultant
3) Counsellor as a Manager
4) Primary Prevention Agent

There are some basic counselling skills like attending, observing, active-listening, summarising, reflecting, questioning, silence, independence, and concreting etc.

While using above-mentioned counselling skills, Nursing administrator/Manager can get source of the administrative problems solved. Good counselling helps the counsellee to develop the insight, also helps in establishing new goals. There is a growth of confidence and ability to take the decision, once the client develops ability to take self decision, no more help by the counsellor is given. The relationship betwen the counsellor and counsellee should break gradually. Too early breaking will give more emotional trauma to the counsellee.

Check Your Progress 5

1) What is counselling?

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2) List the types of counselling.

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3) List four factors necessary for counselling.

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4) Write short note on electic counselling.

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3.7.3 Nursing Records

Nursing record is defined as the record of events pertaining to patients, maintained by a nursing personnel, it is the responsibility of the ward sister to maintain the records correctly. They should be complete in all aspects. The records have got a medico-legal value, they should be preserved carefully, the nursing personnel do keep non-medical records like stocks ledgers, breakage book, drug ledger, ward maintenance register etc. It is the ward sister's duty to ensure that the records are accurate and uptodate. The ward incharge should help the staff in maintaining adequate and useful records. Routine record review may be done by the ward incharge periodically or when common errors are committed by the staff repeatedly. The records may be scanned in a given order first the admission and discharge records of the patients, then the records of the treatment rendered to the patients, and the procedures done in details. The staff may be encouraged to check their own records to improve their accuracy and the completeness.

A routine may be established for the scanning of each new record. The records may be scanned again at the time of closing or before final filing.

Purpose of Records

- Provide data for programme planning and evaluation;
- Tools of communication between the health workers, the family and other development of personnel;
- Record indicates plan for the future.

It provides baseline data to estimate the long term changes related to the services. It provides an opportunity for evaluating the services. It helps in the research for improvement in the ward management and nursing care.

Types of Records:

1) **Cumulative Records:** This is the record which is bound to be time saving. It is also helpful to review the total history of an individual (patient) to evaluate the progress.

2) **Family Records:** All records which relate to the members of the family should be placed in a single folder. This gives the picture of the total situation, and helps to give effective economic services to the family, as a whole.

Filing of Records

Records could be arranged alphabetically, numerically, geographically, and with index cards in a systematic way. It is important at all levels.

Characteristics of the Good Records

The records should be complete and accurate, it should also be legible. There should be mentioned the type of services rendered to the patients in details and written clearly.

Advantages of Keeping the Records

Records are the properties of the hospital and the patients. The advantages of keeping the records are:

1) The records speak on the behalf of the personnel in his/her absence.
2) It protects the hospital employees from baseless allegations.
3) It helps to keep the hospital staff away from the Consumer Protection Act (C.P.A.).
4) It is beneficial for the staff as well as the patients for future reference.
5) It helps in research to the medical and the nursing students.

3.7.4 Nursing Audit

Nursing audit is a new adventure in the nursing services which plays a crucial role in this modern nursing era. It may be a good start of improvement of nursing services by implementing nursing audit in India, though it has already been started in Western countries and found very useful.

Nursing audit is defined as periodic evaluation of nursing service. Some of the indices to base on the evaluation are the qualification and the practical skills of the nursing personnel, turnover of the patients and their satisfaction. Correctness and the promptness of the execution of doctors, dietician, pharmacy, sanitation and the cleanliness of the ward. The nursing audit was first time discussed by the R.N. Peterfisher, in 1953, at an Institute for nursing service administration in New Orbans. Seven years later, Sister Helen Louise Deeken published a guide for nursing service audit. A periodical review of the nursing care by nursing professional is now become an actuality. Monthly meetings are held to audit a random selection of charts on patients discharged during the preceding month. Now it is a felt need of every hospital administrator to implement the nursing audit as well as the medical audit for obtaining the best result of the services provided to the patients by the hospital.

There can be mainly two types of nursing audit — Retrospective and Introspective. The audit can be done during the patient's stay in the hospital or after the discharge from the hospital, depending upon the policy of the Institution. Nursing Audit helps in evaluation of nursing service. A periodical evaluation is necessary.

Check Your Progress 6

1) Explain the purpose of keeping records.

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2) List four advantages of records.

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3) How the final filing of records should be done?

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4) Why nursing audit is important?

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3.8 LET US SUM UP

Ward Management and Nursing Care as well as the Nursing Service is the part of total health organisation that helps the institution to stand on its own. The nurse works with the members of allied disciplines in supplying a comprehensive programme of health care. Nursing services developed to a profession with the work of Florence Nightingale. She let down the nursing standards and started a school of nursing in 1960. Nursing services are always to be under the direction of a competent leader, i.e., Chief Nursing Officer who is responsible for the entire nursing services. Nursing service is broadly classified into general ward nursing, speciality ward nursing, intensive care unit, casualty, O.T., and ambulatory care unit nursing. There are two types of organisations in nursing service i.e., line and functional. In the nursing service various norms and methods are practiced. Every method has its own merits and demerits. The important aspects of ward management are Management of Patient and Attendants, Coordinating, Counselling, Keeping of Nursing Records and Nursing Audit. So, good quality patient care is only possible in the hospital through good ward management and good nursing administration.

3.9 KEY WORDS

Felt Need : This is a need experienced by individuals, which they are prepared to acknowledge, and for which they may be able to demand services.

Florence Nightingale : The Lady With the Lamp; the Founder of Modern Nursing.

High Power Committee	:	Committee constituted with nursing and other experts which submitted report on various nursing aspects in 1989.
I.N.C.	:	Indian Nursing Council. A professional Body for Nurses.
Management	:	Function of an enterprise which concerns itself with the direction and control of the various activities to attain the organisational objectives.
T.N.A.I.	:	Trained Nurses Association of India, Founded in 1908. The National body of nursing practitioners at various levels.

3.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1)
- Accurate assessment of illness of patient
- Appropriate and effective action
- Provision of maximum degree of comfort and happiness
- Preparation for return to society

2) She was the first nurse executive to start the concept of modern nursing care/ intensive nursing care. She also laid down the nursing standards and started a nursing school in 1860.

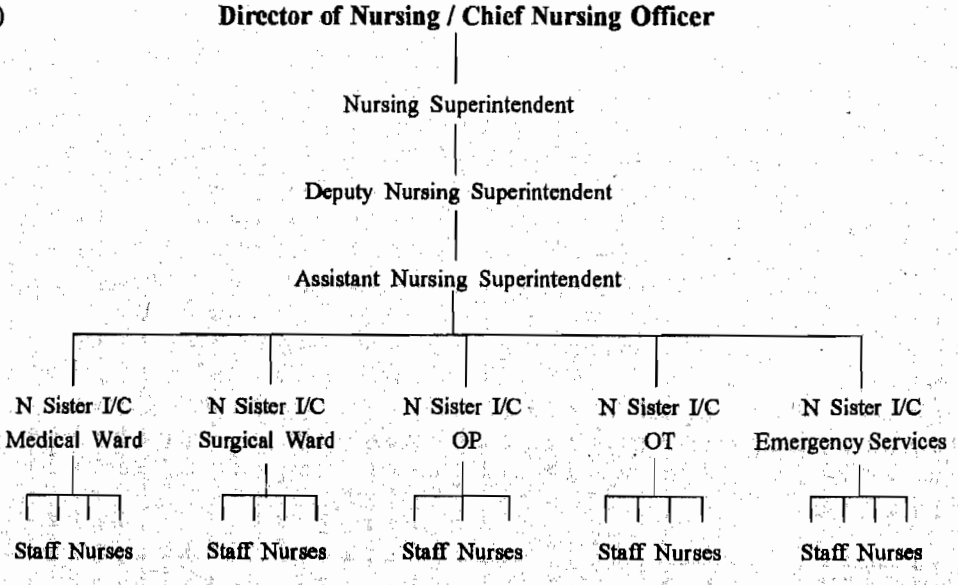
3) The conscious practice of human relationships.

4) a) Florence Nightingale
   b) Lord Buddha
   c) Ashoka

Check Your Progress 2

1) Line and functional organisation

2)



3) Maximum comfort and happiness to the patient by way of pleasant surroundings; Qualitative Comprehensive Care to the patient; care based on the patients' need.

4) Conceptual skill
   Human skill
   Technical skill

Check Your Progress 3

1) Number of beds in a hospital, the type of hospital and the available services, design and layout of the hospital.

2) i) a) ii) c) iii) b) iv) d) v) f) vi) e)

3) a) T b) T c) T d) F e) T

Check Your Progress 4

1) Functional method

Case method

Team method

2) **Functional Method:** The tasks are assigned to each nurse according to the specific function in the ward.

Case Method: A nurse is assigned to a one patient.

Team Method: Nursing staffs are divided into teams, with one acting as the team leader, looking after nursing care to a group of patients.

3) Functional method.

4) **Advantages:** More individualized care is possible and opportunity of nursing education is superior.

Disadvantages: More nurses are required for patient care and less work is done in a given period of time.

Check Your Progress 5

1) It is a process of helping a person to solve his problem by himself through advising and guiding.

2) Directive counselling, Non-directive counselling electic counselling, Group counselling.

3) Gathering the data about the counsellor; conferring with others concerning the counsellee assessing the employee's potentialities, attitude, stamina etc. for a given position; building an index to helpful information.

4) It is a combination of directive and non-directive counselling. It is most useful in emergency situations where counselling needs to be forceful. In such situations the counsellor needs to take quick decisions and when the insight and acceptance of the counsellee is minimal.

Check Your Progress 6

1) To provide data for programme planning and evaluation, as a tool of communication between the health workers, the family and other personnel and baseline data to estimate long term changes related to the services .

2) i) Records speak on the behaviour of the personnel in his/her absence

ii) Records protect the hospital employees from baseless allegations

iii) Records are beneficial for the staff as well as the patients for future reference

iv) Records help in research to the medical and nursing students

3) Records should be arranged alphabetically, numerically, geographically, and with index cards in a systematic way.

4) It helps in evaluation of nursing services with a view to improve the services on a continuous basis.

UNIT 4 PHYSICAL MEDICINE AND REHABILITATION

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- define the tenns Disability and Rehabilitation;
- discuss the role of PMR in total health care and the various rehabilitation approaches;
- describe planning and organisation of PMR services;
- discuss physical layout, staff and equipment requirements for developing and organising a PMR department; and
- understand the laws related to disabilities and their significance.

4.1 INTRODUCTION

In this unit you will learn about a comparatively newer speciality of Medicine called Physical Medicine and Rehabilitation (PMR), and its role in the delivery of total health care as defined in our National Health Policy.

During the course of your graduation studies you must have learnt various aspects of family medicine. At that time, and, even till today the component of Physical Medicine and Rehabilitation is not included in the medical curriculum at graduation level. In this unit, you will know about Physical Medicine and Rehabilitation and its components, the process of rehabilitation of a person who becomes disabled due to either congenital or acquired causes. You will also learn about magnitude of the disability problem, levels of disability prevention and why it is important to prevent disability and rehabilitate persons with disabilities. You will also briefly learn the different rehabilitation approaches, and the planning and organisational aspects. The purpose of this unit is essentially to impart you knowledge on the subject of PMR, and its importance in the total health care.

4.2 BRIEF HISTORY OF PMR SERVICES

The history of Physical Medicine and Rehabilitation is as old as the mankind. There is mention in our ancient literature of treatment of disease and disability by use of hot and

cold water, application of mud, use of various types of leaves from plants and trees, in the form of poultice etc. There is mention of use of artificial leg and artificial eye in "Atharva Veda". During the regime of King Chandragupta Maurya, people with disabilities like the dwarfs, hunched-backed used to be employed in his court to vocationally rehabilitate them. During the regime of King Ashoka, a number of non-profit organisations were started to help people with disabilities, King Harsha also employed disabled persons in his court. The Mughal regime and the Rajput administration also encouraged employability of disabled persons. The Western Civilisation gave a serious blow to these measures, and disabled persons started resorting to beggary and crime. Thereafter, revival of rehabilitation services was due to the selfless and devoted efforts of philanthropist and non-profit organisations, and the credit for this goes to personalities like Mrs. Fatima Ismail, Mrs. Kamla Nimbkar, and a number of other devoted personalities, who made efforts to sustain the rehabilitation services in India. It needs to be rnenlioned that whatever efforts were made to provide the rehabilitation services at that time, were not based on sound scientific principles, and, the services were not well organiscd and were patchy. With the development of modern medicine, Physical Medicine and Rehabilitation did not get its due importance, as more importance was laid to curative medicine. Now, with the passage of time, its importance is being realised, and, Physical Medicine and Rehabilitation is finding its place in modern medicine. It is now a growing speciality based on sound scientific principles. There is ever increasing awareness in the medical fraternity and people at large about its role, and its demand is increasing day by day.

In the last one and a half decades, awareness has increased greatly and several significant landinarks attained in the disability sector both at the international and national levels.

United Nations General Assembly declared the year 1981 as the International Year of the Disabled Persons (IYDP), and called upon the member nations to start rehabilitation programme for the persons with disabilities in their countries.

Following this, the period 1983-92 was proclaimed by the General Assembly as the UN Decade for Disabled Persons. The major outcome of the Decade was the emergence of a global movement recognising the importance of integration of people with disabilities in the society through a world programme of Action, The Economic and Social Commission for Asia and the Pacific (ESCAP), at its 48th session in April 1992 declared the period 1993 to 2002 as the Asian and Pacific Decade of Disabled Persons. The Proclamation on the "Full Participation and Equality" of People with Disabilities was adopted. The primary focus of ESCAP decade action is expansion of opportunities for the full participation of the people wit11 disabilities (PWD) in the society and their equality in the process of development.

At the country level, the nodal ministry to provide rehabilitation services to the disabled persons is the Ministry of Social Justice and Empowerment. It has developed National Institutes in each area of disability, which are engaged in providing services, training of manpower, development of educational material and research activities. Their names are mentioned in the following pages. Some institutes have regional centers in different parts of the country.

The Ministry of Health and Family Welfare is taking care of the medical rehabilitation componenl. The Ministry of Health and Family Welfare, in its 5th Conference of Central Council of Health and Family Welfare in 1997 passed the following resolutions:

- The council noted that there are a number of on going National Health Programmes run by the Health sector, which bas a direct bearing on prevention of disability. They are:

  i) National Leprosy Eradication Programme

  ii) Blindness Control Programme

  iii) Iodine Deficiency Disorders Control Programme

  iv) National Mental Health Programme

  v) National AIDS Control Programme

  vi) Universal Immunization Programme including the Child Survival and Safe Motherhood (CSSM) Programme

These programmes may be further strengthened and attention be given towards preventive and rehabilitative aspects.

- The council recommended that state/UT governments may consider establishment of centers for rehabilitation in the district hospitals and further added that the existing health infrastructure be utilised and further strengthened to incorporate the various aspects of prevention and rehabilitation of various disabilities.
- The council felt that there is need for development of trained manpower base to tackle the problem at the periphery within the community and for transfer of technology to grass root level. To achieve this States and UT's should fully utilise the opportunity for training of PHC doctors and paramedical personnel to reorient them to the various aspects of Rehabilitation with the help of training institutions under the Ministry of Welfare as well as Ministry of Health and Family Welfare as a collaborative effort.
- The council recommended strengthening of research on causation and prevalence of disability within the cominunily.
- The council resolved that Medical Council of India recommendations of starting Physical Medicine and Rehabilitation Department in every Medical College should be strictly implemented which would enable doctors and paramedical to be trained in PMR, who in turn can act as trainers for middle level and grass root level workers.

Presently, there are National Institutes of Rehabilitation under the Ministry of Health and Family Welfare and Ministry of Social Justice and Empowerment. These are:

a) Apex Instilutes under Ministry of Health and Family Welfare are:
   i) All India Institute of Physical Medicine and Rehabilitation, Mumbai (AIIPMR)
   ii) All India Institute of Medical Sciences, New Delhi (AIIMS) which is also collaborating center for Community Based Rehabilitation (CBR)
   iii) All India Institute of Speech and Hearing, Mysore (AIISH)
   iv) National Institute of Mental Health & Neuro Sciences (NIMHANS), Bangalore
   v) Deparlment of Rehabilitation, Safdarjung Hospital, New Delhi

b) Apex Institutes under Ministry of Social Justice and Empowerment are:
   i) National Institute for Visually Handicapped (NIVH), Dehradun
   ii) Ali Yavar Jang National Institute for Hearing Handicap, (AYJNIHH) Mumbai.
   iii) National Institute for Mentally Handicapped (NIMH), Secunderabad.
   iv) Institute of Physically Handicapped (IPH), New Delhi
   v) National Institute for Rehabilitation Training & Research (NIRTAR), Cuttack.
   vi) National Institute for Orthopaedically Handicapped (NIOH), Calcutta

Besides these, there is an Artificial Limb Manufacturing Corporation of India (ALIMCO), at Kanpur, UP which is engaged in mass manufacture of assistive devices for people with disabilities to assist their ambulation and improve their functional level. In addition to this a large number of non-governmental organisations (NGOs) are providing need based services especially in the area of education, training and therapeutic interventions.

Under the Ministry of Labour, there are 17 Vocational Rehabilitation Centers in the country where facilities of training for gainful employment are available, 40 special employment exchanges for people with disabilities exist; who register them for various categories of jobs.

In spite of all this progress, the rehabilitation services reach approximately to 2% of disabled population and that too concentrated to the urban areas mainly. With the result majority of rural disabled are still deprived of rehabilitation services.

Check Your Progress 1

1) Write the full form of the following abbreviations:

a) IYDP :.....

b) NIMH : .....

c) AIIPMR : .....

d) PWD: .....

e) CBR : .....

2) Write very short answers.

i) What arc the functions of ALIMCO?

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ii) Mention three National Programmes, which have a direct bearing on disability grcvention.

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4.3 DISABILITY AND REHABILITATION

The conventional medical view of disease is as follows:

Causes — Pathology — Manifestation

In chronic progressive or irreversible disorders, the sequence is

Disease — Impairment — Disability — Handicap

In order to understand the above terms, let us take the example of a person who has met with a traffic accident and has lost his one leg below *the* knee (Impairment).

The loss of one leg by this person will result in decreased mobility, like walking, running, going to place of work etc. (Functional limitation).

In addition to the physical loss of the limb, the person also suffers from psychological setback, social segregation, and it can also lead to loss of his earning capacity (Disability).

In addition to *the* consequences of the disability upon the disabled person himself, the family, the society, and the Nation as a whole also has to face the consequences of the disability. The family has to directly face the burden of supporting the disabled person physically, socially and mentally. The society has to cope up with the increased demands and the country as a whole has to spend on the care and maintenance of the disabled person, and decreased productivity because of the disability resulting in low G.N.P. (Gross National Product).

Definitions of the terms concerned with the disability process are as follows:

Impairment

An impairment is a permanent or transitory anatomical, physiological or psychological loss or abnormality, e.g., a missing limb, paralysis after polio, mental retardation etc.

Functional Limitation

Impairment may cause functional limitations which are partial or total inabilities to perform those activities necessary for motor, sensory or mental functions within the range and manner of which a human being is normally capable, e.g., walking, seeing, speaking, hearing etc.

Disability

It is defined as an existing difficulty in performing one or more activities, which in accordance with the subject's age, sex and normative social role are generally accepted as essential basic components of daily living.

There are many components that interact with each other in disability process:

1) The patient

2) The environment

The patient has two components — disease and psychological response.

The environment also has two components — social and vocational. Disease factors are reciprocally influenced by psychological factors. On the other hand social factors are mutually influenced by vocational factors. That means that the patient and the environment mutually influence each other resulting in a disability.

Recently, WHO has proposed revision of these definitions (ICIDH-2betadraft-unpublished).

These are as follows:

Impairment

An impairment is a loss or abnormality of body structure or of a physiological or psychological function.

Activity Limitation

Activity is the nature and extent of functioning at the level of the person. Activities may be limited in nature, duration and quality.

Participation Restriction

Participation is the nature and extent of a person's involvement in life situation in relationslup to impairments, activities, health conditions and contextual factors. Participation may be restricted in nature, duration and quality.

Various Approaches to Prevent Disability

The old dictum "prevention is better than cure" still holds good in the modern day world. Prevention is usually defined at three levels — primary, secondary and tertiary prevention.

Primary Prevention

Primary prevention can bc defined as "action taken prior to the onset of the disease", which removes the possibility that a disease will occur. Primary prevention may be accomplished by measures designed to promote general health and well being and quality of life of the people or by specific protective measures. It includes the concept of "positive health", a concept that encourages achievement and maintenance of an "acceptable level of health" that will enable every individual to lead a socially and economically productive life. It concerns an individual's attitude towards life and health and the initiative he takes about the positive and responsible measures for himself, his family and the community.

Common examples of primary preventive measures are:

- Proper antenatal, natal and postnatal care, to prevent child born with disability,
- Avoid consanguineous marriages.
- Prevention of accidents.
- Proper immunisation to prevent diseases like polio.

Secondary Prevention

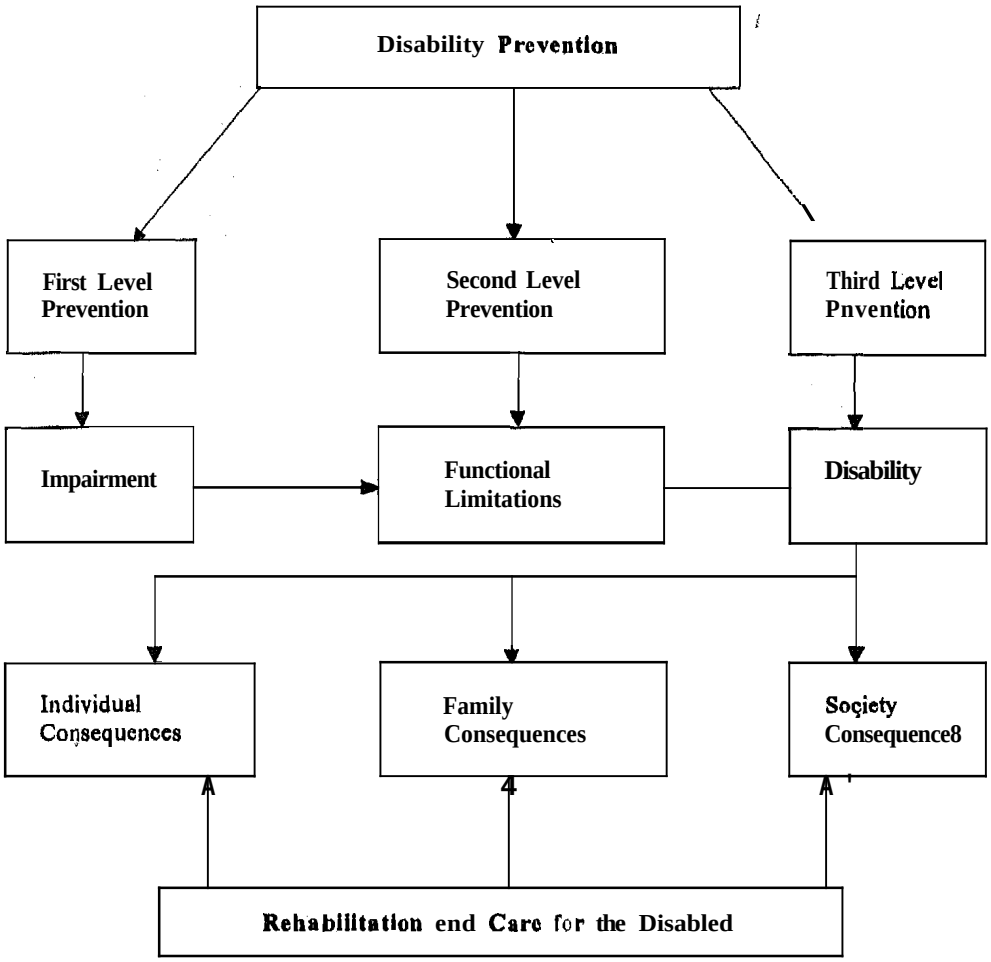
It can be defined as "action which halts the progress of the disease at its incipient stage", and prevent complications. The specific interventions are "early diagnosis and adequate treatment". It is largely the domain of the clinical medicine.

Tertiary Prevention

When the disease process has advanced beyond its early stage, it is still possible to accomplish prevention by tertiary prevention. It signifies intervention in the late pathogenesis phase.

Tertiary prevention can be defined as all measures available to reduce or limit impairments and disabilities and minimise suffering caused by existing disability. The tertiary phase of prevention is also called rehabilitation, wluch includes physical, psychosocial and vocational measures taken to restore the patient back to normal or near to normal condition.

The following flow chart depicts the various levels of disability prevention.



Rehabilitation

Rehabilitation has been defined as the "combined and coordinated use of medical, social, educational and vocational measures for training and retraining the individual to the highest possible level of functional abilily". It includes all measures aimed at reducing the impact of disabling conditions and at enabling the disabled to achieve social integration. Social integration has been defined as the active participation of the disabled person in the mainstream of community life. Rehabilitation medicine has emerged in recent years as a medical speciality. It involves discipline such as physical therapy, occupational therapy, audiology and speech therapy, psychosocial work, prosthetics and orthotics, education, vocational guidance and placement.

By medical rehabilitation we mean restoration of function.

Vocational rehabilitation means restoration of the capacity to earn livelihood.

Social rehabilitation means restoration of family and social relationships.

Psychological rehabilitation means restoration of personal dignity and confidence of the disabled person.

Rehabilitation measures include:

1) Training to increase independence in self care.
2) Educational and vocational measures aimed at achieving economic independence.
3) Social measures to ensure full integration and acceptance in community.

Independence in Self Care

Training and teaching of patients, or family members and neighbours etc.

Independence self care calls for independence in:

1) Activities related to daily life such as dressing, eating, drinking, washing, personal hygiene etc. by giving:
   - Training activities.
   - Provision of simple technical aids (at lirnes).
2) Mobility, sitting, standing, walking etc. They require the provision of shoes, crutches. ctc.
3) Physical environmental changes suited to the kind of functional limitation.

Economic **Independence**

It includes:

- Educational training
- Vocational training
- Employment opportunities

Social Intergration

It means bringing out attitudinal changes in the community at large by ratifying their misbelief and misconceptions about disability and ensuring social inlegration. It requires education of people at large through mass media and community leaders.

Check **Your Progress 2**

1) Select the correct answer:

   Loss of leg below the knee is callsd:

   i) Impairment
   ii) Functional limitation
   iii) Disability

2) Define disability?

   .....

   .....

3) What is psychological rehabilitation?

   .....

   .....

4.4 DISABILITY: TYPES, MAGNITUDE AND CAUSES

Broadly, the disabilities can be grouped into the following groups:

1) Locomotor disability i.e. Disability of moving.
2) Visual disability i.e. Disability of seeing.
3) Hearing and speech disability i.e. Disability of hearing and speaking.
4) Mental retardation i.e. Low I.Q.

The people with Disabilities Act has also included the following as disabilities:

1) Low vision
2) Leprosy cured
3) Mental illness

However, there are certain anomalies in this grouping. Pulmonary conditions like chronic obstructive pulmonary diseases (COPD), cardiac conditions like Myocardial

Infarction, Thalassemia, Loss of kidney, though cause permanent impairment are not included as disabling conditions.

As regards the magnitude of the problem, estimates of the number of disabled vary a great deal depending upon certain factors such as the definitions used, the source of information, the methodology of the survey, the extent of use of scientific observation methods in identifying and measuring the degree of disability and so on.

According to one estimate, the population with disability in India is approximately over 90 million (based on 10% prevalence of disability) of which 12 million are blind, 28.5 million are with low vision, 12 million are with speech and hearing defects, 6 million are orthopaedically handicapped, 24 million mentally retarded, 7.5 million persons with leprosy related handicaps.

A comprehensive country wide sample survey of persons with disabilities was undertaken by the National Sample Survey Organisation (NSSO) in 1981. This survey indicated that 1.8% of the total population of the country has physical or sensory disabilities.

No survey of inentally retarded persons was done at that time. Another survey was conducted by the NSSO in 1931. The suivey indicated that 1.9% of the population of the country have physical or sensory disabilities which include locoinotor, visual, speech and hearing disabilities.

Almost all the disability prevalence studies undertaken in India have been based on questionnaires. The appropriate survey of the prevalence of disability must be based not on questionnaire only, but on examination and observation of each household member. Therefore, it appears that the findings of survey conducted in India are an under estimate of the inagnitude of the problem in the country.

Furthermore, whatever the magnitude of the disability may bc, there are trends to indicate that there is anticipated rise in the number of people with disabilities, and also, the spectrum of the causation of disability is changing. As we are able to control the communicable diseases like polio, leprosy, etc., the prevalence of disability due to these causes is on the decrease. On the other hand with the ever increasing population, worsening of food situation and consequently increase in nuinbcr of cases of malnutrition, the prevalence of disability is on the rise. Similarly, with the change in the age composition, wherein there is more elderly population, work related and age related disability is on the rise. The overall scenario reveals that we are going to have more people with disabilities than henceforth. Therefore, there is a need for laying more emphasis on their rehabilitation.

Medical Causes of Disabilities

1) ***Congenital Disorders***

a) Genetic : Genetic defect

b) Non-genetic : Include consequences of disease or functional disturbances affecting the foetus during pregnancy or delivery.

a) **Genetic**

- a Mental retardation
- a Hearing impairment
- Speech disturbance
- Visual impairment
- Genito urlnary malformations
- CHD
- Malformations of digestive systems

b) **Non-genetic Disorders**

Perinatal disability, low birth weight

i) **Malnutrition, severe anaemia during pregnancy.**

ii) **Disease during pregnancy**

— **Communicable disease: Rubella**

- Syphillis
- Tetanus
- Drug Use

iii) Complications during delivery owing to low quality midwifery

- Birth trauma
- Brain damage
- Respiratory or circulatory disturbance

2) *Communicable Diseases*

Common

- Poliomyelitis
- TB
- Leprosy
- Trachoma

Others

- Meningitis
- Encephalitis
- Herpes
- Osteomyelitis
- Veneral disease
- Septic arthritis
- Chronic eye infections
- Otitis media
- *AIDS*

3) *Noncommunicable Somatic Diseases*

- Back disorders
- Paralysis
- Arthrosis
- Rh. Arthritis
- Heart Conditions
- CVA
- Pulmonary Dysfunctions
- Epilepsy
- Vision impairments
- Hearing impairments
- Diabetes
- Cancer

4) ***Functional Psychiatric Disorders***

- Psychotic : Schizophrenia
- Non-psychotic : Phobic states

5) ***Alcoholism and Drug Abuse***

6) ***Trauma and Injuries***

- Traffic accidents : rail, road, air, sea
- Work accidents : industrial, agricultural
- Home accidents
- Other sources
  - Recreation and sports
  - War and civil unrest

- Natural catastrophies
- Earthquake
- Floods
- Cyclones

7) *Malnutrition*

- Protein calorie
- Vitamin Xerophthalmia
- Nutritional anaemia

8) *Other Causes*

- Exposure to toxic substances in air, water, food.
- Unsuccessful suicidal attempts
- Crime : inflicting bodily injury, psychological disturbance
- Iatrogenic disturbance

Coinmon Causes of Disability

Visual	:	Cataract Trachoma Trauma Congenital Vit. A Deficiency
Hearing	:	Congenital nerve deafness Chronic Otitis media Noise pollution
Speech	:	Congenital Brain damage
Locomotor	:	Poliomyelitis Amputation Cerebral Palsy Accidents
Mental	:	Congenital Cerebral Palsy Cretinism

Check Your Progress 3

1) Name the two common types of disabilities.

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2) Mention two reasons which indicate increase in the magnitude of problem of disability in the future.

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3) Name three common causes of disabilities.

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.....

4.5 PROBLEMS RELATED TO DISABILITIES

The various problems encountered by persons with disabilities are:

- **Physical**
- **Psychosocial**

- Educational
- Vocational

Physical/Medical Rehabilitation

Persons with disabilities often suffer from the following physical problems:

- Motor weakness/paralysis
- Spasticity
- Sensory loss
- Pressure sores
- Deformities and Contractures
- Loss of limb or part
- Urinary and faecal incontinencelretention
- Pain

There may also be hearing, speech, visual, mental retardation or higher function problems either in isolation or combination of them.

Due to the above physical problems, there are subsequent functional limitations in the performance of activities oi daily living (ADL). For example:

- Transferring from one place to another
- Mobility, ambulation and transportation
- Self care activities like toileting, bathing, grooming etc.
- Social and leisure activities
- Work place activities

For the physical restoration and achieving maximum function and independence, rehabilitation interventions are called for. These are:

- Appropriate exercise therapy for maintaining the range of motion of the joints, regaining or improving the muscle power in the weak muscles and strengthening of normal muscles.
- Restoring the function of the affected extremity by appropriate training, including gait training.
- Provision of external appliances, splint or caliper if required.
- Relief of pain by means of physical modalities like heat, cold, electricity etc.
- Bladder/bowel training to achieve continence.
- Training in the activities of daily living in order to restore the various lost functions like transfers, self-care etc. It may require the use of self help devices, if indicated.
- Education of the patient to maintain the physical status so achieved preventing any coinplications.

Artificial limbs (prostheses); splints/calipers (orthoses), walking aids like crutches, sticks, canes, walker or wheel chair may be prescribed depending upon the physical status of the patient. These are to be fabricated or made available to him and patient trained in their use.

Patients with physical disabilities cannot afford to negotiate narrow entrances and lanes, elevated platforms, cemented or wooden doorsteps and stairs. To facilitate their unimpeded mobility, it is necessary to provide special ramps, remodeling of entrances, widening of doors, construction of slopes instead of stairs; creation of flat plain floors without raised platforms or barriers. These modifications are required not only at the place of residence of patient, but also in the public places visited by the disabled persons. This type of barrier free environment will improve their mobility and consequently provide more opportunities in life by limiting their handicap.

Psycho-social Rehabilitation

Indeed, the process of rehabilitation is never complete unless the psycho-social aspects are duly taken care of. Psychological, social and economic rehabilitation of patients with

disabilities is intimately interrelated. Together, they provide the crowning glory to the entire success story of a patient's ultimate rehabilitation. The attending doctor is the fulcrum of such efforts. The key to success is the right attitude of the doctor and other members of the team. The doctor must extend his horizons beyond the diagnosis and treatment of the patients. They benefit from such treatment only when it is conceived and planned from the outset with the effect on the patients working capacity and his home life in mind, The likely residual disabilities, their effect on his work/occupation and the need for retraining must be assessed with the most compassionate attitude.

Illness and injury always induce some anxiety in the patient and relatives, and the response to incapacity depends on the patient's personality, education, and social and economic situation. Motivation may be dcscribcd as the expression of the patient's personality when striving to overcome adversity, and thus, it is also an expression of his response to rehabilitation. Evaluation of the premorbid personality and adequate assessment of the social, educational and economic circumstances are as important in rehabilitation as a realistic delineation of the prognosis and likely functional handicap. It is within this area that the art of medicine is as important as the science for the methodology available for the quantitative assessment of personality and motivation of the disabled person is not readily achieved and not generally acceptable and simply applied techniques have been described. Disabilities undoubtedly bring about reactive dcprcssion. Severe disability limiting social activities and contacts will clearly be accompanied by personality changes. The psychological trauma of amputation is obvious and the appropriate preparation of patients for ablative surgery is being increasingly introduced.

Specific psychological problems of patients with disabilities include — depression, anxiety, feeling of insecurity, loneliness, behavioural disorders, affective disorders, personality disorders, suicidal tcndcncies, dependence, low self esteem, irritability, impaired psychomotor coordination, malingering and hysteria.

Although patients with disabilities undergo a variety of personality changes in response to their disabilities, no specific personality types have been identified which may be more prone to physical handicaps or an impaired response to it.

There is no gain saying the fact that economic independence is the single most important measure contributing to a sound psycllological and social restoration of the disabled. It goes a long way in ameliorating the specific problems of insecurity, dependence, anxiety, depression, social isolation, low self-esteem and emotional disorders.

The clinician, besides his role in the diagnosis and cure of patients has to carry out the sacred duly of explaining and reassuring his disabled patient about his disabilities, their effect on his work and its possible solutions. This may not necessarily require the services of a specialised rehabilitation unit or an expert psychiatrist. A little change in the attitude of the treating doctor can easily accomplish this supposedly difficult task. A genuine interest in the patient's welfare is the key to success in this hallowed work.

Educational Rehabilitation

The disability may hinder the educational process of the disabled child. Attempts should be made so that the education process continues without any hindrance, in spite of certain difficulties that might come in the way. Normally, a child with a physical disability can pursue his education in a normal school. At the most, he may require ***some assistance*** in overcoming the physical bamers as far as children with other disabilities like visual, hearing, speech and mental retardation or a combination of above, they need admission in special schools for their education. Most of such special schools are run by NGOs with assistance from Stale and Central governments. The greatest disadvantage of being in special school is that the children live in secluded and sheltered environment, which turns out to be a disadvantage later on in their social adjustment. In order to take care of this problem, a scheme of Integrated Education of the Disabled Children (IEDC) was initiated by the Government of India to provide educational opportunities for the disabled children in normal schools. The scope of this scheme includes pre-school training for the disabled children, counselling for the parents, special training in speech and language for the hearing impaired children, orientation and mobility training for the visually impaired children, daily living and communication skills training for children with other disabilities, and training in home management.

Vocational Rehabilitation

Whatever the stage of economic development of country, none of its citizens (above all, the disabled people) can be left out of the planning for the care and improvement of conditions for them, certainly not in a welfare state.

While even the able-bodied are handicapped in doing one thing or the other, the disabled have certain obvious limitations. Those limitations however, do not warrant their being labeled as 'Vocationally' handicapped, With increased emphasis on the utilization of all man-power and the obvious need to offer opportunity to everyone to utilize his capacities, the productive potential of the disabled has to be developed to enable them to find their places in national economy.

Despite tremendous progress in rehabilitation medicine and a marked change in our attitude towards the rehabilitation of the people with disabilities, much headway has not been made in their placement. Most of them are unaware of their productive potential and available opportunities. Many take to begging or lead a forsaken life of hopeless gloom. The disabled and his family certainly deserve a caring sympathetic and positive attitude from the attending doctor and other medical personnel. Above all, the doctor must express a genuine interest in the overall well being of his disabled patienfs, including their financial well being. They benefit to the fullest extent from treatment only when that treatment is conceived and planned from the outset with the effect on the patient's working capacity and his home life in mind.

Vocational rehabilitation is the process of exploiting the avenues for gainful occupation of a disabled individual.

The clinician's responsibility is not restricted simply to the diagnosis and care of the patient. There is a further responsibility of assessing the patient's capacity and recommending the appropriate rehabilitation and training for any patient likely to be left with some locomotor disability. These patients will need assessment of

1) What work can be done;
2) Whether new employment is necessary and, if so, whether retraining is indicated;
3) What assistance is needed at home;
4) Whether the expected earning will be enough for sustenance;
5) What other Govt./Agencies aids and facilities are available.

The team approach to such problems is mandatory and many involved are the medical social worker, vocational advisor, employment officer, occupational therapist, NGOs etc. besides the doctor.

In India, Vocational Rehabilitation centers, working under the Ministry of Labour, Directorate General of Employment and Training,are entrusted with the work of vocational assessment, training and placement of the disabled.

Check Your Progress 4

1) Enlist three physical problems faced by a person with disability.

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2) Enlist three activities of daily living.

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3) What is the role of barrier free environment?

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4.6 GOALS AND OBJECTIVES

The main goal of rehabilitation is the restoration of the physical, social, psychological and vocational potentials of the disabled person to the maximum extent possible, so that he can function in as normal way as possible.

The three main objectives in rehabilitation are:

i) prevention of disability, if possible

ii) maximum reduction or elimination of the disability

iii) training the disabled person with residual abilities to achieve independent living.

4.7 REHABILITATION APPROACHES

There are three major strategies for carrying out rehabilitation programmes:

1) Community Based Rehabilitation (CBR)

2) Institution Based Rehabilitation (IBR)

3) Out Reach Programmes

1) Community Based Rehabilitation (CBR) is a strategy within tlie community for the development of the rehabilitation services, equalization of opportunities, and social integration of people with disabilities. CBR is implemented through the combined efforts of disabled people themselves, their families and communities and the appropriate health, education, vocational and social services.

2) Institution Based Rehabilitation (IBR) takes place in institutions. People with disabilities attend the rehabilitation institution in order to undergo training under the direction of staff in the institution. Institutions also serve as referral centers to a CBR programme,

3) Out Reach Programme for rehabilitation is one in which the professionals in the rehabilitation field provide services lo people with disabilities, who visit the community, or the homes of people with disabilities. Advice is given on how to improve in specific activities such as self-care, moving around or communication. The out reach services could either form an extension of the institution to the neighbouring area or by organising camps in the neighbouring area from time to time.

Check Your Progress 5

1) Enlist one objective of rehabilitation.

.....

2) What is CBR?

.....

3) What is camp approach?

.....

4.8 PHYSICAL LAYOUT, STAFFING AND EQUIPMENT

In order to provide PMR services, these have to be developed at all the three tiers of health care i.e. PHC, District and State/Medical College Hospital level.

The manpower, space and equipment requirements at the tertiary level i.e. State level/ Medical College Hospital level are enumerated below:

At the tertiary level each Medical College Hospital should have a Department of Physical Medicine and Rehabilitation as recommended by the Medical Council of India.

a) **Manpower**

1) New

— Director Professor (PMR): 1

- Associate Professor (PMR): 2
- Assistant Professor (PMR): 2
- Senior Resident (PMR): 4
- Junior Resident (PG students): 4
- Junior Resident (house surgeon): 10
- Senior Physiotherapist: 2
- Physiotherapist: 10
- Senior Occupational Therapist: 2
- Occupational Therapist: 10
- Audiologist and Speech Therapist: 2
- Multi Rehabilitation Worker: 10
- Sr. Medical Social Officer: 1
- Medico Social Worker: 1
- Psychologist: 1
- Vocational Counsellor: 1
- Workshop Manager: 1
- Sr. Prosthetist and Orthotist: 2
- Prosthetist and Orthotist: 4
- Prosthetic and Orthotic Technician: 12
- Teacher: 2
- Craft Instructor: 2
- Technicians in various trades: 4
- Administrative Officer: 1
- Head Clerk: 1
- Accounts Clerk: 1
- Stenographer: 2
- Typist: 2
- Personal Assistant: 2
- U.D.C.: 2
- L.D.C.: 4
- Nurses: 2
- Nursing Orderly: 10

Safaiwala: 6

- Driver: 2
- Peon: 2

The above requirement of the manpower is ideal to establish a PMR Department in a Medical College Hospital. The Department shall deal with the patients suffering from various types of impairments. It will also cater to the referrals receiving and group 'D' staff shall be required for the wards.

2) **Existing Manpower**

The existing manpower of the hospital viz. doctors of other departments, nurses and the other auxiliary staff can be provided orientation training in PMR in order to impart them basic idea about the activities and the usefulness of the PMR services in the total health care of the patients visiting the hospital.

b) **Infrastructure and Space Requirement**

A full-fledged PMR Department shall require space for the following sections:

- Medical Section and OPD Services
- Physiotherapy Services
- Occupational Therapy Services
- Hearing and Speech Therapy Services
- Medico Social Services

- Psychological and Vocational Services
- Prosthetic and Orthotic Services
- Indoor Services
- Operation Theatre Services
- Administrative Block
- Public Utility Services
- Wheel Chair and Trolley Services
- Waiting Space
- Dharamsliala for Attendants

While planning the building for a PMR Department, the following things have to be borne in mind, because the department has to primarily have disabled persons as its clients, most of whom shall be walking with the use of aids and appliances or wheel chair bound or geriatric age group.

Therefore, the department area sliould be barrier free with wide door, smooth flooring which is non-slippery. Ramps if required may be provided of the appropriate dimensions. Preferably the building should be single storied, and if the same is not possible because of constraints of land area and vertical expansion is must, there should be provisions of lifts with wide doors with back-up generator facility. There should also be a climbing ramp instead of stairs in addition to the lifts. The doors may be electrically operated, so that the patient does not have to maneuver them himself.

In general hospital setting, it is preferable that a 75 bedded rehabilitation unit is made available, for admitting people with disabilities for medical rehabilitation intervention. Physical layout of a PMR department is enclosed to have a general idea about the location of its various sections.

c) Equipment

The department sliould be equipped with following types of equipment:

- Diagnostic equipment
- Therapeutic equipment
- Surgical equipment

In the diagnostic equipment there should be electro neuro muscular diagnostic equipment and urodynamics equipment.

It is presumed that the other radio diagnostic facilities, clinical laboratory facilities and other diagnostics facilities shall be available in the main Medical College Hospital. In the therapeutic equipment, there should be equipment for Electrotherapy, Hydrotherapy, and Gymnasium. For occupational therapy activities, sensory perceptual training and training in activities of daily living, there sliould be appropriate equipment available.

For the prosthetic and orthotic workshop, tliere should be equipment for measurement, fabrication and manufacturing of aids and appliances and the materials and supplies required for their manufacturing. Similarly, for psychological testing there should be appropriate tools available for assessment and in the vocational training section, there should be availability of equipment for the various vocational training activities. For hearing and speech section, there should be a fully equipped hearing and speech assessment laboratory and therapy room.

The other essential office equipment and materials like computer, typewriters, furniture etc. will also form part of the overall equipment. A vehicle will be required for home visiting of people with disabilities.

Check Your Progress 6

1) Classify the equipment required for a PMR Department.

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2) Discuss the paramedical manpower requirements of a PMR Department.

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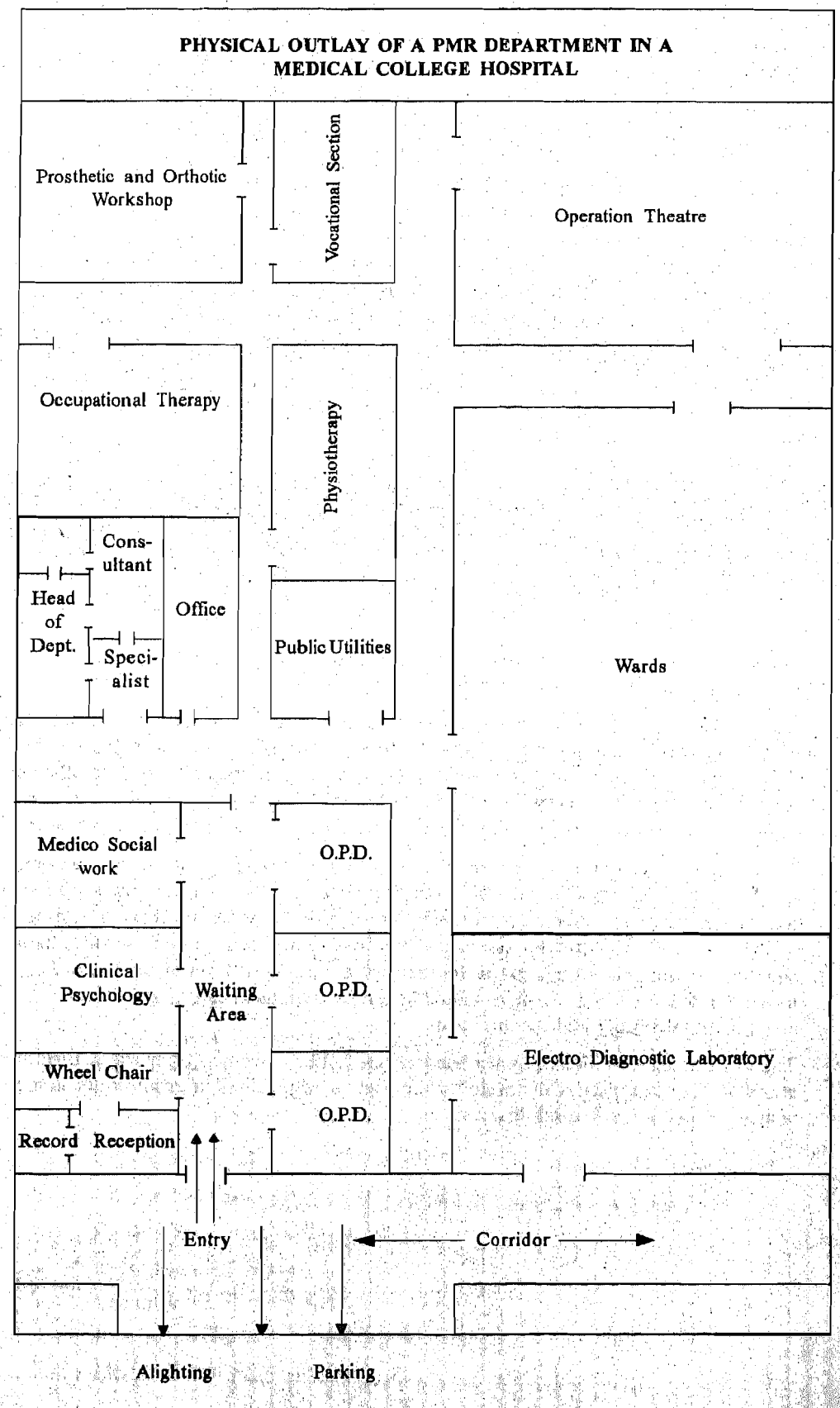

4.9 POLICY AND PROCEDURES

As enumerated in Section 4.5 a person with disability encounters psycho-social, educational and vocational problems in addition to the physical problems. In order to rehabilitate him, a comprehensive team approach is essential. A comprehensive rehabilitation team approach envisages rehabilitation management of person with disability to train and to re-train him to the maximum extent possible in terms of physical, psycho-social, educational, and vocational functions by a team of personnel, which include doctors (Physiatrist), physiotherapist, occupational therapist, medical social worker, psychologist, vocational counsellor, speech therapist, special educator and prosthetist and orthotist.

Such comprehensive rehabilitation management services can only be accomplished in a hospital setting where a separate rehabilitation department exists.

Thus, it is essential that each medical college hospital or a major services hospital should liave an independent Department of Physical Medicine and Rehabilitation, which can, in addition to providing the services, also act as a teaching centre for human resource development in physical medicine and rehabilitation. At the same time, it has to bc considered that such departments can only serve limited number of persons with disabilities either as out-patient or while patients are admitted in other specialities and required services of rehabilitation department. Alsa through such department in a hospital setting, it is mainly the medical rcliabilitation component i.e. physical restoration which can be accomplished. For meeting educational and vocational needs person with disability has to be referred to the appropriate institution.

Further, considering the magnitude of 'the problem of the disability, a large number of persons with disabilities cannot come to the hospital for availing the rehabilitation services due to variety of reasons, neither the hospital based department can cater to a very long case load. As such, either the hospital based rehabilitation department has to make provision for extending the services to the nearby community, or community based rehabilitation services have to be organised in order to provide for larger coverage as been mentioned in Section 4.7.

The function of a physical medicine and rehabilitation department in a hospital setting consists of medical measures, in the form of diagnosis and treatment of'neuro-muscular and musculo-skeletal problems. The patients either report directly in the department or may be referred by other'specialily doctors, if they feel that the patient will be benefited by rehabilitation services; As mentioned earlier it'can be both for outdoor as well as indoor patients. In the Department of Physical Medicine and Rehabilitation, the Rehabilitation Specialist examines and'diagnoses the condition and prescribe the treatment which is usually in the form of therapy or provision of certain aid and appliances. In certain cases, need may arise for rehabilitative surgery e.g. correction of a contracture or deformity, or revision of a bad stump in order to achieve better fitting of the artificial appliances. The Physiotherapist works with the aim of physical restoration of the patients in the form of improvement of power in the weak muscle, improving the range of motion of a joint and application of various modalities to relieve the pain. Occupational Therapist works with the aim of training the patient through a range of activities in order to achieve maximum independence and make him as functional as possible, so that he can carry out his day to day activities with as much independence as possible, thus minimizing dependence on the family member or the community. The Prosthetist and Orthotist measures, fabricates and manufactures the artificial appliances as prescribed by the Rehabilitation Specialist. Thereafter, the patient has to be trained to use it to achieve the desired function like ambulation, feeding, writing etc. The speech therapist works with the aim of assessing the speech defects and providing for any aid, if indicated, and to give speech therapy to improve communication. The psychologist evaluates the intelligence and any psychological disorders like depression, anxiety etc. which may be associated with the physical disability and provides the required counselling as and when indicated. The medico-social worker act as a liason person between the treating team and the patient, as she/he acts as a friend and philosopher of the patient, gains his full confidence and assists the rehabilitation process. The medico-social worker also evaluates the economic and social problems encountered by the patients and tries to resolve them to the best of his/her potential.

For patients who are admitted to the various wards, and who need rehabilitation services, a referral system is required to be developed so as to attend to their needs

either on the bed side or by bringing the patient to the rehabilitation department depending upon the disability of the patient and the acuteness of the problem. A close liasoning has to be developed with the various other specialities in order to provide the maximum benefit to the persons with disabilities.

In some hospitals, where independent department of physical medicine and rehabilitation do not exists but there is a nucleus of physiotherapy and/or occupational therapy, ideally such nucleus has to be upgraded to a full-fledged department of physical medicine and rehabilitation, but till such time the therapy can be prescribed by the treating specialist which in turn can be executed by the therapist.

Ideally speaking, each major hospital/medical college/teaching hospital should have a physical medicine and rehabilitation department and rehabilitation centres at district level, with the community based rehabilitation services at the grass root level, and there should be two way linkages at all the three levels. Only then, we can hope to provide rehabilitation services to all the persons with disabilities.

Check Your Progress 7

1) What type of rehabilitation services can be made available in a hospital based rehabilitation department?

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2) Enumerate two functions of Medical Social Worker.

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4.10 MANAGERIAL ISSUES

Rehabilitation is a team work, where in the skills of the rehabilitation team consisting of the physiatrist, physical therapist, occupational therapist, nurse, medical social worker, prosthetist and orthotist, speech therapist, vocational counsellor, psychologist etc. are integrated as a single force to assist the persons with disabilities in reaching the maximum of their physical, emotional, social and vocational potentials. As a matter of fact, good team work is the key to successful rehabilitation.

One of the most important managerial issues, therefore, is that the multi disciplinary team should work effectively, and for this purpose, effective leadership is needed. The appointment of a leader helps to clarify the aims of team work. The team leader has to assume responsibility for the coordination of the team activities, without which the team will lack cohesion and sense of common purpose,

The leader ensures that there are adequate opportunities to discuss issues relating to team work and tries to encourage all team members to participate.

The leader has to assume responsibility for developing and maintaining a 'unit culture'. The leader of the team should not be 'autocratic'. The leader should actually clarify for all members of the team where independent action is to be encouraged, where joint decisions are to be made, and in the event of differing views, unify the team behind a common decision. In a team work situation, it is important that every one tries to understand what individuals are suggesting rather than opinions being dismissed out right. There should be a genuine interest expressed in each other's views. A team should exhibit a balance between agreements and disagreements. This balance is called cohesion and this hinges on the team's ability to accommodate disagreement, which is necessary before roles, tasks and goals can be clarified. Someone has rightly said that 'Teams are Built, Not born'. And, the one way to build good teams is by finding solutions to various issues that come in way to effective team functioning.

The second important managerial issue is the management of machinery and equipment. A PMR Department, in addition to the multi disciplinary team approach, has to depend

heavily on the various diagnostic and therapeutic equipment and machines in order to provide patient services.

An effective planned approach towards purchase of new equipment and most importantly the maintenance of the equipment in functioning order through annual maintenance contracts (AMC), so that the idling time of the machine or equipment is kept to the minimum possible. It will help in providing uninterrupted patient services.

The third managerial issue is the material management because a variety of materials have to be stocked in a PMR Department, specially for the fabrication and manufacture of artificial limbs and appliances for the people with disabilities. An uninterrupted supply of good quality materials will ensure proper and timely delivery of aids and appliances to the people with disabilities for their rehabilitation.

The fourth managerial issue is the record keeping. The clients visiting a PMR Department usually suffer from chronic problems and visit the department frequently to avail the various facilities like physical treatment, counselling, certification, repair of aids and appliances etc. Therefore, effective and systematic record keeping is essential for smooth functioning of the department.

Check Your Progress 8

1) Enlist two most important managerial issues encountered in a PMR Department.

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2) Discuss the team approach in Physical Medicine and Rehabilitation.

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411 LAWS RELATED TO DISABILITIES

Article 41 of the Constitution, which is one of the Directive Principles of State Policy, reads, 'Right to work, to education and to public assistance in certain cases—Thestate shall within the limits of its economic capacity and development, make effective provision for securing the right to work, to education and to public assistance in cases of unemployment, old age, sickness and disablement and in other cases of undeserved want, Here again, the right to public assistance in cases of disablement, subject to the economic capacity of the State has been recognised. There has, however, been a sea-change in the attitude and perception of the society regarding the disabled over the years. The disabled who, were classed along with unemployables and were made entitled to public assistance in the Constitution, have now been favoured with job reservation in State sector and all round promotion of rehabilitation to government providing grants, setting up of institutions and infrastructure etc. This significant change needs to be reflected through suitable amendments.

First Central Act

The first Central legislation enacted by the Government of India is the Rehabilitation Council of India Act, 1992. This Act provides for the constitution of the Rehabilitation Council of India for regulating the training of rehabilitation professionals, and the maintenance of a Central Rehabilitation Register and for matters connected therewith or incidental thereto. The Act provides statutory basis to the Rehabilitation Council, which was set up earlier, in 1986, as a registered society. The Council is expected to undertake the functions of recognition and derecognition of qualifications granted and training courses run by institutions/universities and of registering rehabilitation professionals who possess the recognised rehabilitation qualification. Practice by persons not

possessing recognised professional qualification has been made illegal and punishable under this Act. The Act thus, aims at ensuring quality of rehabilitation services. The Act is modeled on the pattern of Medical Council of India Act and like the medical discipline, rehabilitation, too has acquired the status of a discipline, in which education and training is to be regulated in order to ensure quality.

Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995

In the year 1995, a Bill entitled "Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995" was passed by the Parliament which was made into a law in 1996. The purpose of the Bill is to fix responsibilities on the Central and State Governments to the extent their resources permit, to provide services, create facilities and give support to people with disabilities in order to enable them to have equal opportunities in participating as productive and contributing citizens of the country to their fullest extent. It fixes its responsibilities on the governments (Central and State) to ensure that disabilities do not prevent individual citizens of this country from living a dignified life and making full contribution by each in accordance with his/her ability. This Act provides a framework within which specific demands can be made by the disabled persons in order to ensure that the Government honors the promises made in this Act.

It is hoped that the Act will enable the fellow citizens with disabilities to become equal partners in Nation building and valuable contributors to socio-economic development of the country. The Government has from time to time announced concessions and facilities for the people with disabilities to facilitate their lives, such as concession in travel by rail, road and air, incoine-tax rebate, priority in house allotment, reservation of jobs in governinent sector, age relaxation in jobs, scholarship to students, conferring National awards to outstanding disabled employees in government and those who are self einployed, best employer of disabled, best individual working for disabled welfare, best institution for disabled welfare, placement officer of disabled, and National technology award for welfare of the disabled. Besides these there is a Scheme of assistance (ADIP, 1981) for disabled persons for purchase and fitting of aids and appliances.

Check Your Progress 9

1) Mention two concessions to which the disabled persons are entitled.

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2) Write a brief nolc on RCI ACT, 1992.

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4.12 LET US SUM UP

In this unit you have learnt some basic concepts about disability prevention and rehabilitation and, the discipline of Physical Medicine and Rehabilitation, and the growing need of this discipline, keeping in view the increasing incidence and changing spectrum of disabling conditions.

You have also learnt about the problems related to disabilities and their solutions. Keeping in view the gigantic problem of disability, the various rehabilitation approaches have been explained, of which, the community-based rehabilitation (CBR) deserves special mention. As through this approach approximately 70% of the problems can be handled at the community level itself. The integration of CBR into the country's existing health care delivery system is perhaps the crying need of the time, so that universal coverage can be provided to the disabled masses.

While mentioning this, the role of the State/Medical college level PMR Department cannot be undermined, as without them, there cannot be generation of more manpower which is so much required, and availability of referral services, which these centers provide.

4.13 ANSWERS TO CHECK YOUR PROGRESS

Chcck Your Progress 1

1) a) International Year of the Disabled Persons
   b) National Institute for Mentally Handicapped
   c) All India Institute of Physical Medicine and Rehabilitation
   d) People with disabilities
   e) Community Based Rehabilitation

2) i) Mass manufacture of assislive devices for people wilh disabilities, lo assist their ambulation and improve their functional level.

   ii) — National Leprosy Eradication Programme
   — National Programme for Conlrol of Blindness
   — National Programme for Conlrol of Iodine Deficiency Disorders.

Check Your **Progress 2**

1) i)

2) An existing difficulty in performing one or more activities which in accordance with the subjects' age, sex arid normative social role are generally accepted as essential basic components of daily living.

3) Restoration of personal dignity and confidence of the disabled person.

Check Your Progress 3

1) Locoinotor Disability and Visual Disability.

2) With ever increasing population, worsening of food situation and consequently increase in the number of cases of malnutrition, the prevalence of disability is on the rise. With the change in the age composition, wherein there is more elderly population, work related and age related disabilily is on the rise.

3) Congenital Disorders, Communicable Diseases and Non-communicable Somalic Diseases.

Chcck Your Progress 4

1) Motor weakness/paralysis, spasticity, sensory loss.

2) Transferring from one place lo another; mobility; ambulation and transportation; selfcare activities like toileting, bathing, grooming etc.

3) It improves the mobility of patients with physical disabilities and consequently provide more opportunities in life by limiting their handicap.

Chcck Your Progress 5

1) Prevention of disabilily.

2) Commnunity based rehabilitation is a strategy within the community for the development of the rehabilitation services.

3) It is a type of outreach programme in which professionals in rehabilitation field provide services to people with disabilities in the neighbouring area from time to time.

Check Your Progress 6

1) Diagnostic, Therapeutic and Surgical Equipments.

2) Physiotherapists, Occupational Therapists, Multi Rehabilitation Workers, Medical Social Workers, Psychologist, Vocational Counsellor, Prosthotist and Orthotist, Prosthetic and Orthotic Technician, Teacher, Craft Instructor, Technicians.

Check Your Progress 7

1) Mainly the medical rehabilitation component of the rehabilitation services can be made available in a hospital based rehabilitation department.

2) Liason between the training team and the patient and evaluation of the economic and social problems encountered by the patients.

Check Your Progress 8

1) Providing leadership for effective functioning of the multidisciplinary team.

   Management of machinery and equipment.

2) Team approach is a method to achieve effective functioning. The leader of the team assumes responsibility for developing and maintaining a 'unit culture'. There is balance between agreements and disagreements leading to cohesion.

Check Your Progress 9

1) Concession in travel by rail, road and air and income tax rebate.

2) Rehabilitation Council of India Act, 1992 provides for the constitution of the Rehabilitation Council of India for regulating the training of rehabilitation professionals and the maintenance of a Central Rehabilitation Register and for matters connected therewith or incidental thereto.

4.14 FURTHER READINGS

Ministry of Welfare (1992), *The Rehabilitation Council of India Act, 1992,* New Delhi.

Manual for Training of PHC Medical Officers, Rehabilitation Council of India, 1999.

Proceedings of Orientation Workshop of National Trainers for Medical Rehabilitation, October, 1997.

The Persons with Disabilities Act, 1995, The Gazette of India, New Delhi, 1996.

The World Health Report 1998, **WHO,** Geneva, 1998.

World Programme of Action Concerning Disabled Persons, United Nations, New York, 1981.

UNIT 1 LABORATORY SERVICES

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- list the roles und functions of laboratory:
- describe the types and functional components of a laboratory service;
- discuss the planning concepts in organisation of laboratory services;
- describe the policies and procedures concerned with laboratory services: and
- identify the key managerial issues in planning and organisation of laboratory services.

1.1 INTRODUCTION

In this unit you will learn about definition, types and characteristics of laboratory services and also about planning consideration, physical facilities and layout, You will also learn

about the use of equipment for various types of laboratories and staff requirement, need for training and research requirements. Further you will learn about the maintenance of minimum standards of lnboratory quality assessment and various programmes of the country. Towards the end you will learn about the application of sound principles for personnel management, efficient and cost effective operation of a clinical laboratory with timely, effective delivery of medical laboratory services to clinicians and patients.

1.2 ROLE AND FUNCTIONS OF LABORATORIES

The laboratory as you know exists for the sole purpose of providing diagnostic and management information for the physicians to aid in the patient care, The ultimate goal of laboratory is to attend to the ailing patients, carry out the investigations asked and prompt issue of accurate results for favour of diagnosis and treatment.

The clinician uses the laboratory to get assistance in diagnosis and management of the patient. Infact, a test requisition is a request for consultative services which sets in motion a vnst array of activities to generate a laboratory report. Usefulness of the data in making clinical judgements depends upon prompt, accurate reporting of the result. Each procedure to generate a result consists of series of steps, or processes. An adequate understanding of each process enables the laboratorian to achieve more nearly optimal conditions and, consequently, to improve the accuracy and precision of each measurement. Collection, handling and processing the specimen prior to analysis must receive prime consideration. Validity of data obtained on the specimen itself is highly dependent upon the excellence of laboratory technique, including proper manipulation of equipment, use of reagents of specified purity.

Check Your Progress 1

1) Define laboratory,

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3) Enlist three functions of laboratory.

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1.3 TYPES AND FUNCTIONAL COMPONENTS OF LABORATORIES (LABORATORY MEDICINE)

Having learnt the definition and functions of laboratory, now you will learn the functional components and types of laboratories.

1.3.1 Functional Components

The Functional components of a clinical laboratory are:

i) Histopathology
ii) Clinical Pathology
iii) Microbiology
iv) Haematology
v) Biochemistry
vi) Research laboratories

There are further subdivisions of each of the above components related to sub or super

specialisation. However, these are not enumerated here. Only the functional laboratories in routine day to day diagnostic work are summarised.

i) Histopathology

Laboratory performing organ, tissues, cell examination for the diagnosis of various types of abnormalities/diseases is called as Histopathology Laboratory. Examinations of tissues/organs are from living/dead body, in the form of either surgical specimen; biopsy or autopsy.

ii) Clinical Pathology

This is the branch of pathology in which all body fluids such as blood, urine, sputum, stool, pleural, peritoneal fluid are examined for physical, chemical, bacteriological and microscopic examination for normal or abnormal contents.

iii) Microbiology

This is the science which deals with study of microbes such as bacteria, viruses, parasites etc. The study involves the identification, morphological and cultural studies, serology and sensitivity of organisms responsible for causing the disease or commonly found as commensals.

iv) Haematology

Branch of laborntory Medicine in which the study of blood and blood components is done for detection of various abnormalities in normal and ill health.

v) Chemical Pathology (Biochemistry)

Science which determines and measures various chemical substances in normal and abnormal amounts produced during disease process. The study includes examination of various groups of clinical substances, hormones, enzymes, isoenzyme, vitamin and metabolites etc.

vi) Clinical Research Laboratories

Are those laboratories which deal with research related to patient care system or services, research related to development of techniques, methods and applications, therapeutic trials of drugs, reagents, kits, equipment development and animal experimentations. Research nnd development is an integral part of patient care services and such laboratories are designed for research and academic purpose.

1.3.2 Types of Laboratories

Most of the hospital laboratories function as:

i) OPD Services

ii) Ward Services

iii) Emergency Services

i) OPD Services

OPD Laboratories are basically Central laboratories in a large hospital which caters to the need of out patient department during OPD hours.

ii) **Ward** Services

Ideally each ward is attached with functioning laboratory catering to needs of the ward for routine investigations. However, some ward laboratories are attached to respective specialities (Block system) i.e. Surgical; Medical; Paediatric; Orthopaedics; Obstetrics and Gynaecology etc. The investigations other than bed side/routine tests are referred to central ward laboratories of specific departments between 9-10 AM to 4-5 PM, normal duty hours of hospital.

iii) Emergency Services

These can be 24 hours (round the clock) services or restricted emergency services,

a) ***Round the Clock Services***

Majority of hospitals having 100 bed capacity and above should give round the clock emergency services. Each Emergency Service includes 3 shifts of duties (24 hours).

b) *Restricted Emergency Services*

These types of emergency laboratory services are restricted to one or two shifts excluding public holidays and national holidays.

These services are restricted to augment manpower in particular specific organisation and depends on structural and functional requirements of hospital.

Check Your Progress 2

Name the functional components of the Clinical Laboratory.

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1.4 CONCEPTS OF PLANNING ORGANISATION

The efficient operation of clinical laboratory and effective delivery of medical laboratory services to clinicians and their patients require a complex interaction of expertise in medical, scientific and technical areas, of resources in the form of personnel, laboratory and data processing equipment supplies and facilities, and of skill in organisation, management and communication. Awareness of accreditation standards and Governmental regulations of laboratory practice should be known to I-Iead of laboratory services and he must ensure quality laboratory performances.

The steps in systemic approach to the orgnnisation and management is to establish general goals and specific objectives, To maxirnise the effectiveness and efficiency of operations. the functioning laboratory must have the following:

a) Adequate facilities (including Lab, wash rooms, store, reagent preparation rooms, staff common library. toilets, conference room etc.)
b) Approprinte Equipments
c) Standurd Reagents/Chemicals regular supply
d) Adequate number of qualified staff.

1.4.1 Physical Facilities and Layout

Physical facilities for laboratory function and its complete layout depends upon the structure, culture and environment of organisation. Specific design considerations include:

1) The concern of size in planning a laboratory is always a major question. Factors for consideration in dotermining space requirements include the scope of procedures to be performed, intended operationnl approach for performing procedures, and the anticipated size of the laboratory depnrtment.
   a) **Square Footage:** Depending on design of the laboratory, the net square footage in the modern laboratory varies approximately 65-90% of gross square footage.
   b) **Scope of Services:** Depends upon type of hospital and facilities to serve e.g. teaching hospital, research hospital etc. Adequnte scope for future expansion must be kept.
   c) **Mechanical Services:** Proper planning for mechanical services essential specially civil and electrical work of PWD (CPWD), provision of safety devices etc.
   d) **Operational Approach:** The amount of space required in laboratory somewhat depends upon how tests are being performed, the space requirement gradually reduced with use of automation computerised technology. The interior design to be suitably modified with consultation and coordination of architect engineer and Laboratory Manager.
   e) **Laboratory Information System:** Provision of communication between laboratory with ward/OPD and treating physician be maintained.

f) **Laboratory Safety:** Various safety measures for staff and property etc. as against fire, biological toxic waste, radioactive material, following the universal precaution etc. be made adequately.

2) Functional Consideration in Laboratory Design

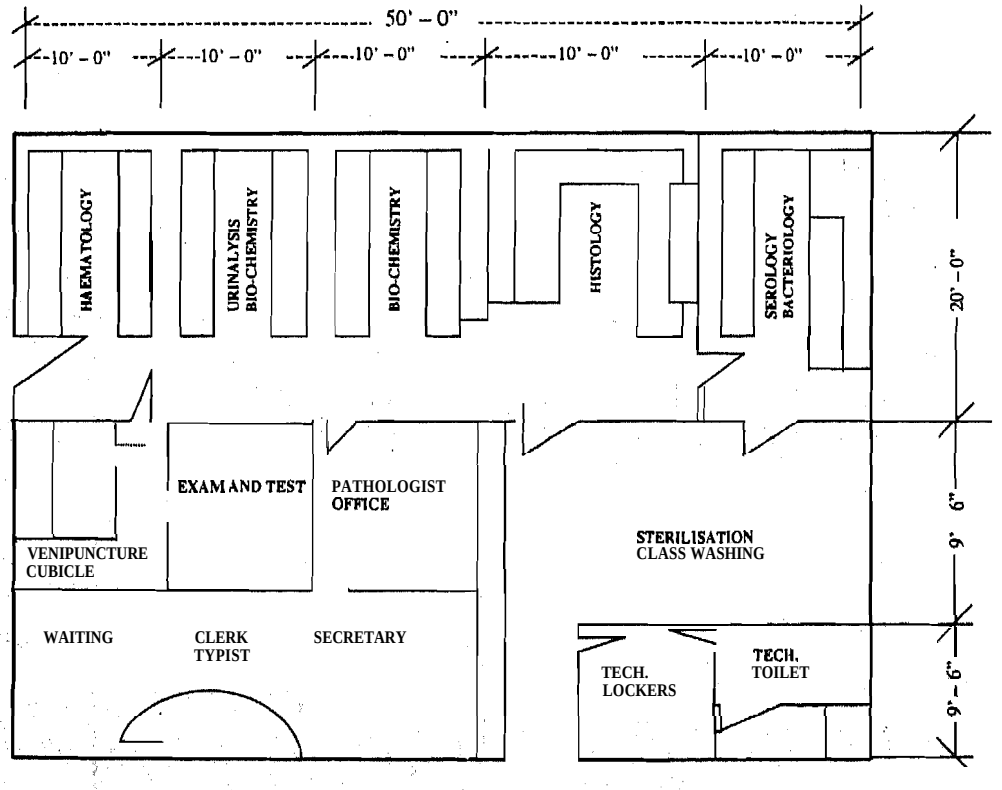
Considering recent trends and advanced technology, changes from traditional laboratory set up to be made in relation to clinical problems, disease orientation nnd functional efficiency. Various sub-units of laboratory medicine viz. Clinical Chemistry, Clinical Pathology, Microbiology, Histopathology, Haematology etc. have different functional set up of orientation. The organisational approach must have its value in future along with alternative functional approaches being considered.

Pathologist having the opportunity to design a new laboratory or make major renovation in older laboratory, should,think in functional terms about the laboratory operations and their facility needs.

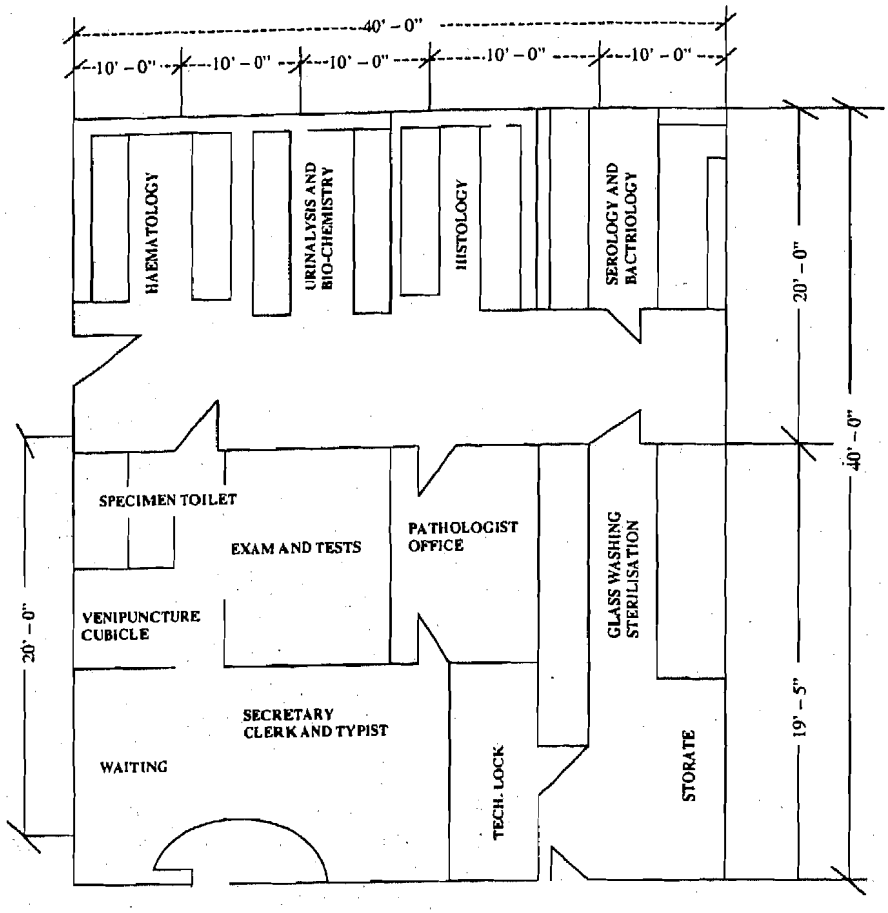
Traditionally laboratories have been organised without due regard to the functional requirement. The whole concept of a laboratory has changed during the last decade. Unfortunately there has been a lot of proliferation of laboratories which are sub-standard and with no knowledge of quality control. The only way to curb such practices is to start good laboratories and provide facilities at reasonable costs, by qualified pathologists. Today, a planned laboratory can be started with a budget of one lakh rupees. The basic needs to start a laboratory can be worked out on the basis of a survey made which will give the probable sample turnover.

The accommodation initially, should be reasonably good to start the common tests that are in demand and should be properly planned so that it will be functional and convenient.

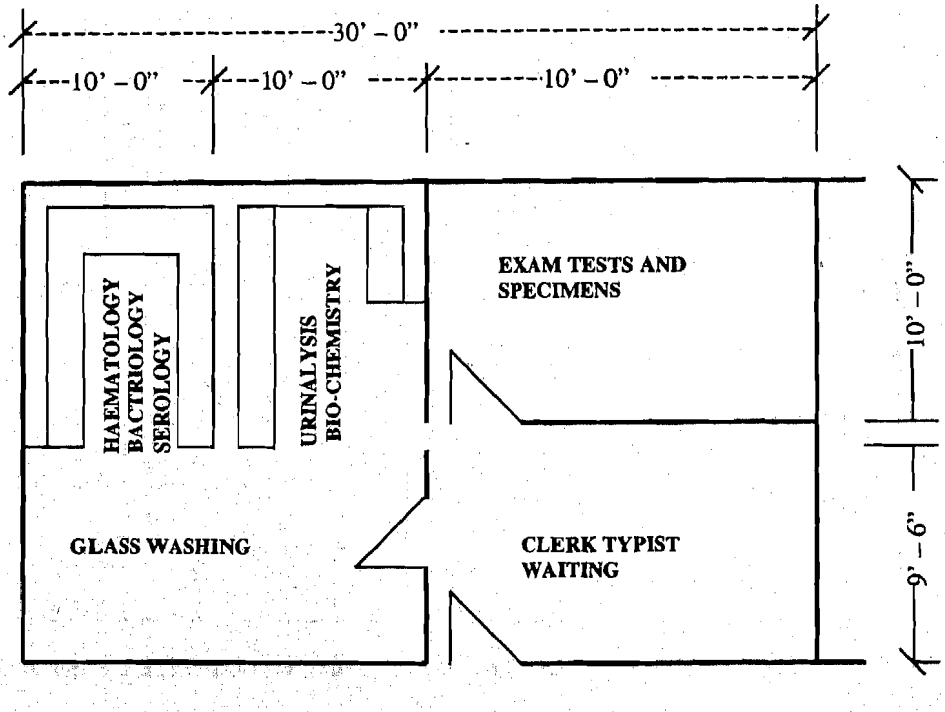
A few samples of plan (Plan **A,** Plan B, Plan C) are given below which are scientifically developed. Depending upon the area available, these plans may be applied suitably.



PLAN – A (70,000-1,20,000) TESTS ANNUALLY FOR AVERAGE SIZE OF 150-200 BEDS



PLAN– **B (40,000-75,000)** TESTS ANNUALLY FOR AVERAGE **SIZE** OF **100-150** BEDS



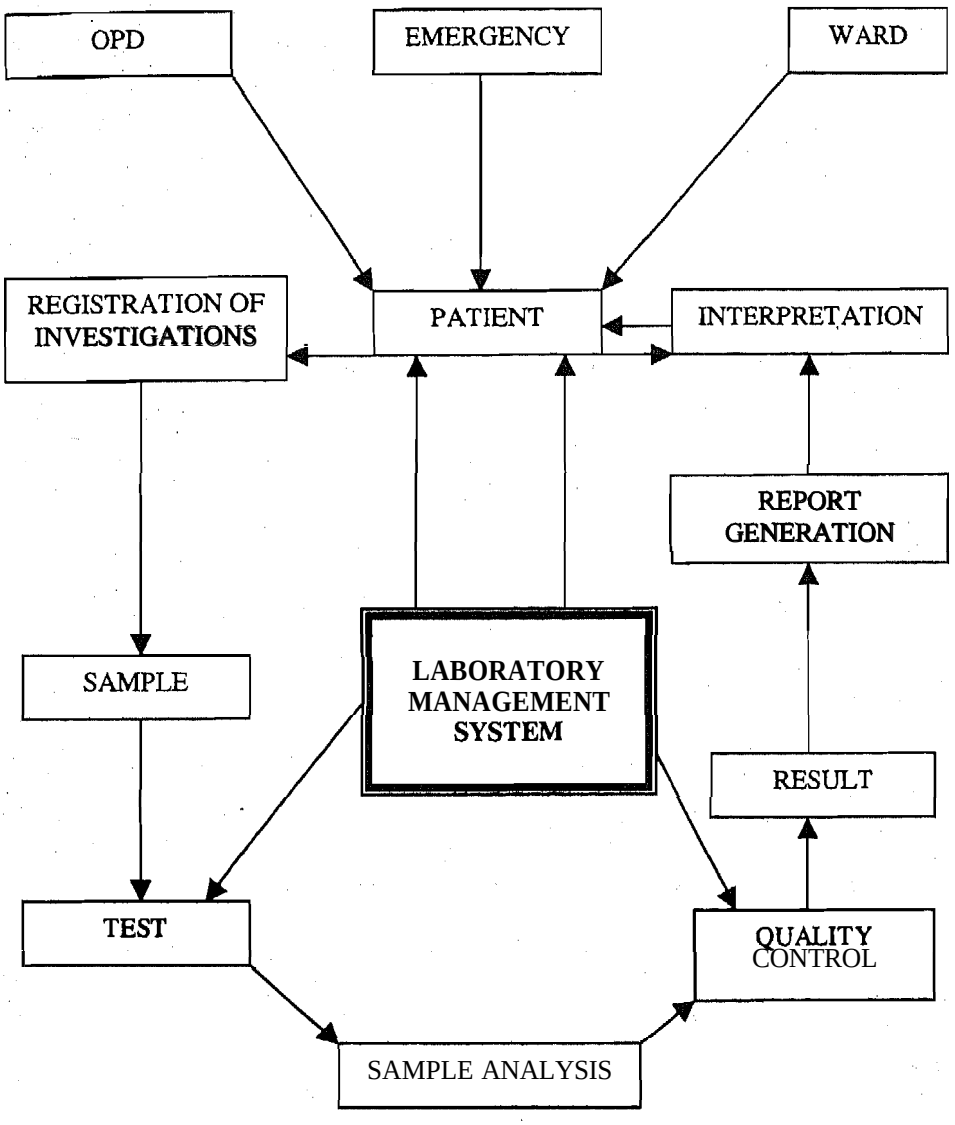
PLAN – C (20,000-30,000) TESTS ANNUALLY FOR LESS THAN 100 BEDS

3) Spatial Considerations in Laboratory Design

Spatial relationships within the institution are important. It is critical that location of the laboratories be studied in relationship to the other hospital services, traffic, supporting services, and users. Emergency laboratory system should be readily accessible to emergency, surgical, medical, orthopaedic, gynaecology etc. wards, ICU, ICCU and casualty.

Organisation in the clinical laboratory refers to both structure and process whereas structure exemplifies stated relationship or framework and process deals with interaction.

The following is the flow diagram in Laboratory function system:



Three key elements of organisation are:

A) ***The clinical laboratory:*** as a work place

B) ***Staff***: who performs the test

C) *The* task: to be performed (Investigations and Reporting)

A) The Clinical Laboratory

The first important object is:

i) **Traffic flow planning:** The intra laboratory traffic is separated from out side traffic. Adequate provisions should be made for ambulatory patients and blood bank donors where ever applicable. Usually blood bank has separate building in majority of, hospitals with provisions of independent functioning unit.

ii) Specimen and Data flow: The authentic schematic layout to be available with Head of Department for strict compliance.

iii) Process and Storage: Pre-analytical process and storage of specimen/material to be done with each laboratory or to be done centrally if organised.

iv) Emergency Sample: Provision of emergency samples to be arranged.

v) LIS: The laboratory information system to develop according to available resources.

B) Staff Requirement

There use to be a relation between number of tests and staff requirement, given in old text books, Now due to development of automation in clinical, chemical pathology and all branches of laboratory medicine the conventional techniques are being replaced by automated techniques. Hence it is difficult to calculate the number of test performed by an individual per day and relate it to day to day activities. A time study format has been developed by Rappoport in 1975 in which standard time of each investigation (job activity) to be calculated and related to time availability of working technical personnel on day to day basis to evaluated per day investigations.

The following formulae are used to determine average investigation/day/technical staff.

Standard time = Total basic time x Time allowance

i) Total basic time = Total average basic time of job element
Basic time = Average observed time x Rating

ii) Time allowance = Contingency allowance (5% of the total basic time) x Relaxation time (12% of the basic time)

Parameters

i) Element/job description steps (which should also include job elements other than investigation steps)

ii) Observation 5-10 times

iii) Total observed time in each step

iv) Average observed time of one test

v) Rating of individual as 100% by an average working

Total laboratory functioning job activities from reception of sample, registration, solution preparation etc., processing, reporting entry, indexing, despatch, laboratory waste disposals etc. are considered in job element per day.

Day functioning technical staff = 6½ hour of duty (36 hours per week)

Observed work/day/technical staff when both automation/conventional techniques are shared in mixed type of spectrum of investigations } =60-70 tests/day

1.4.2 Equipment/Reagents and Facilities

While planning equipments, reagents and other facilities for laboratories following need to be considered:

a) Basic instruments and equipment should be made available. All vital equipment to be in duplicate or alternative arrangement for its applicability to be provided.

The following instruments are basic equipments for all types of routine investigations:

i) Colorimeter/photoelectric colorimeter
ii) Centrifuge
iii) Water bath

iv) Microscope – Mono occular/Binoccular
v) Hot air oven
vi) Autoclave
vii) Incubator
viii) Ph-Meter
ix) Automated Biochemistry analyser
x) Automated Haernatology analyser
xi) ELISA – Reader
xii) ELISA – Washer
xiii) Microtome
xiv) Wax melting bath
xv) Hot plate

The requirement of specialised functions of laboratory depends upon the type of speciality developed in organisation. The spectrum of investigations and number increases accordingly. The advances in laboratory medicine is tremendous, more sophisticated, technology equipments are being added day by day. The need to acquire depends upon:

i) Type of hospital/organisation and structure of the institute

ii) Daily attendance of patients either from out patients/inpatients with available speciality are important factors in deciding procurement of high sophisticated automated equipment. The cost effectiveness to be evaluated as per standard parameters. The choice of high technology equipment to be related to number of test performed per day and spectrum of test needed to be performed on day to day basis, The specification of equipment for procurement is a very vital parameter in decision of choice of equipment and procurement. The head of Deptt. and hospital/institute procurement authorities should discuss at length the use coefficient, the need and justification before placing order.

b) Purchase and product specification should be viewed justifying the need of the equipment and the use of instrument in relation to number of investigations and spectrum of investigations.

c) Type of automation and availability facilities which are essential pre-requisite for installation of equipment.

d) After sales service, availability of reagents as open system, warranty and availability of spares till life of instruments and possibility of upgradation of instrument in due course of time.

e) Every person working in a laboratory should be thoroughly familiar with storage specifications, irrespective of chemicals, reagent or instruments, A constant check is maintained on expiration dates. Chemicals and reagents after the expiration dates should be disposed without delay to prevent impending hazards.

f) Apart from basic amenities like water, electric supply the measures should be taken for condemnation and disposal of all items as per inventory.

g) Laboratory wastes and its disposal is an essential element of focus to all laboratories for early and immediate compliance,

h) Basic record cards or register should be maintained as per laid down guidelines issued from time to time from the organisation of the structure. Computerised inventory system if available should be encouraged for constant use.

Check Your Progress 3

1) What are the minimum facilities, a laboratory should have for its better functioning'?

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2) List three key elements of organisation of a Laboratory?

i) .....

ii) .....

iii) .....

3) Enumerate the provisions necessary for working of a Laboratory.

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1.4.3 Research and Training

Research

Research is an integral part of laboratory system. Various research projects pertaining to hospital's functioning, equipment development; technology upgradation; disease incidences; treatment progress and all matters in relation to diagnosis and monitoring of patient are part of the system management.

Training

Training of technical personnel either in service or who intend to join service or engaged in practice of technology should undertake complete, prescribed, identified, recognised course of stipulated period before rendering any type of service in the field of laboratory medicine. Continuing Medical Education (CME) programme for technical people should be made compulsory if not mandatory. Participation in training programmes, workshops, seminars are to be encouraged amongst all working technical personnel from time to time.

Orientation

Early introduction to laboratory staff of the new employee contributes to the development of an effective inter personal relationship, which is necessary to build teamwork. An orientation programme is one of the most over looked management tools. Apart from institutional orientation, each laboratory should have a defined programme of orientation for all new employees to make them aware of policies, SOP (Standard Operative Procedures) and standard performance are expected in laboratory environment and culture. Orientation serves to correct potential misunderstanding that are so often present with new employees and establish channel of communication between management and the new employee. During orientation, rules and regulatory demands regarding quality assurance, universal precautions, hazardous waste, the right to know etc., are clearly defined and expectations well presented.

1.5 POLICIES AND PROCEDURES

The provisions of quality laboratory services with efficient reporting, interpretive diagnosis depends on the application of sound principles for personnel management. Efficient and cost effective operation of a clinical laboratory with timely, effective delivery of services requires a complex balance of expertise in medical, technical and scientific activities.

1.5.1 Laboratory Administration

There are four basic elements of laboratory administration:

1) **Objectives:** Goals and purposes consistent with high quality and cost effective delivery of laboratory services.

2) Guiding People: Leading and directing in such a manner that professionals feel sense of responsibility, achievement and appreciation of work performed.

3) Resources: Proper utilization of physical resources such as instrumentation, desk top computers, space, Laboratory Information Service (LIS) etc.

4) Organisation: The dynamic organisational unit where labour policy, procedure and operations are managed in a reasonable cost effective, safe and productive manner.

1.5.2 Quality Control and Assessment, Accreditation and Total Quality Management (TQM)

Quality Control and Assessment

Quality Control and Assessment is the process to ensure a test from being done wrongly. The primary aim of Quality Control and Assessment is to see that the very purpose for which a test is performed is not defeated due to unreliability of the result. Quality assessment of all process of testing sample, analysis pattern, check of reporting and result with precision and accuracy has to be done. The following are techniques of Quality Control:

i) ***Internal Q.C. (Intra Laboratory Q.C.)***

- Performed by individual laboratory at their own level.
- Forms the basis of day to day work of quality assurance.

ii) ***External*** Q.C.

- Performed by many laboratories at the same time monitored by one.
- Periodic monitoring for the performance of the laboratories.

Accreditation

Laboratory accreditation is a procedure by which an authoritative body gives formal recognition of technical competence (including qunlity system management) of testing and or calibration for a laboratory to carry out specific tests. This is based third party assessment against set standards.

Accreditation is considered to be the essential first step toward mutual acceptance of test results and test certificates. An increasing number of health care organisations now require that diagnostic laboratories meet national standards for accreditation. The laboratory accreditation is a means to improve customer confidence in the calibration and testing reports issued by the laboratories so that all interested parties shall accept the reports with confidence.

Total Quality Management (TQM)

This is one of the most promising managerial innovations introduced within the health sector within the last several decades. TQM increases the efficiency and effectiveness of health care services.

The following factors are to be considered:

- Top Management Leadership
- Creation of an organisational frame work for quality improvement in hospitals
- Transformation of hospital work culture
- Customer focus
- Process focus
- Employee education and training
- Learning by practice and teaching
- Bench marking

- Quality measurement and statistical reports at every level
- Recognition and reward
- Management integration

1.5.3 Leadership and Motivation

It is the integral part of laboratory management system. Studies have been conducted to know the effects on productivity and concluded that the administrative process of management includes planning, decision-making, organising, directing and controlling. This process completed with management inputs (financial, physical, and human) has a direct effect on outputs (cost benefit, performance, products and behaviour).

1.5.4 Personnel Management

Personnel policies, procedures and records are vital to the efficient and cost effective operation of any laboratory. In addition, policies and procedures are necessary to meet accreditation and regulatory requirements. In fact, a proper staffing and effective scheduling have more impact than any other management tool in establishing quality laboratory service and cost reduction.

1.5.5 Personnel Policies

With regard to personnel policies following must be taken care of:

i) Qualified persons should be recruited.
ii) A good rapport should be maintained between person-in-charge and the working staff.
iii) Basic needs and comforts should be provided.
iv) The person is given the job description.
v) Duty allotment schedule among the staff should be carefully prepared.
vi) Opportunities should be provided for betterment of skills and position.

1.5.6 Job Description and Staffing

Staff pattern depends upon member and spectrum of investigations in clinical laboratory, Scheduling and staffing are important management responsibilities that must be reviewed and revised as often as necessary to maintain efficient and cost effective services,

Job description is a summary of all important and significant facts about a particular job, Duties and responsibilities of working technical personnel to be clearly defined and illustrated and should be confined to gazette notification of recruitment rules approved by Department of Personnel in Government Organisation. For other organisations it is between employee and employer with clear understanding and written document contract mutually agreed upon. Finally, although job descriptions are essential management tools for staffing process, they also sense as both training and evaluation guides for establishing employee incentive,

The basic job description as you know should include a job title, duties, qualification, job relationship, and necessary work aids. (Conventional techniques and Automation.) Day and hours to be worked out as per existing norms laid down by institutions/respective Government.

1.5.7 Recruitment, Policies and Procedures

Recruitment policies differ according to organisation structure. However it is advised to follow strictly the Recruitment Rules of the designated post and appointment to be done strictly under rules of the institution/Government by competent authorities to avoid legal complications. Adhoc appointments for vacent position whenever filled up to be regularised within limited period.

It is recommended that prior to interview process a list of establish criteria and interview question based on job description, be prepared, qualitative criteria be made to ensure that

all candidates are compared equitably and the laboratory is generally able to recruit quality personnel.

Check Your Progress 4

1) Enumerate basic elements of laboratory administration.

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2) Define accreditation. What are the advantages of accreditation'?

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3) What is Total Quality Management (TQM)? Give important factors necessary for consideration of TQM.

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4) What role leadership and motivation play in laboratory management?

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1.6 INFORMATION MANAGEMENT

Laboratory management is a complex process involving quality control, work flow allocation etc. Information system within the laborntory and inter laboratory are order of magnitude, more complex than the communications with outside world.

Day by day, there is addition to technology information nnd transaction to users. Data transfer at much higher rate is in common use. A properly selected and installed laboratory information system, can provide valunble benefit in improved laboratory operation and higher quality patient care.

The following are benefits of laboratory information system:

- Reduces errors such as mix up specimen, calculation errors, transaction errors etc.
- Improved staff productivity.
- Rapid availability of results and improved tum around time.
- Transformation of reports to patient.
- Improved patient reports legibility; duplicate reports, interpretive diagnosis, graphics etc.
- Improved management information.
- Quality assurance data record maintenance.

Check Your Progress 5

1) What is the role of information management in laboratory services?

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2) Enlist the managerial issues which require more attention in laboratory management?

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3) What are the problems which affect laboratory reports? Wow do you solve them'?

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1.7 MANAGERIAL ISSUES

Laboratory as you know exists for the sole purpose of providing diagnostic and management information for the beating medical official, to aid in the care of patient. During the past few years there has been a considerable increase in the clinical demand for laboratory investigations both in number and spectrum of tests.

The following managerial issues are essential to consider:

1) In recent years, there has been an alarming increase in the error of judgement, errors of omissions'and commissions on the part of technical staff, Pathologist/Microbiologist, Biochemists and other working laboratory staff in processing and reporting the wide spectrum of routine and sophisticated investigations.

2) Advances in early diagnosis, quick reporting, use of high sophisticated microprocessor based instruments, microtechniques are in practice without adequate quality control. Maintenance programme methods "that identify and minimize sources of variation in test system are. therefore, essential.

3) For a good laboratory, appropriate planning, procurement and controlling of resources will ensure efficient, quality operation in performances. Personnel policies, procedures and records are vital to the efficient and cost effective operation of any laboratory. In addition policy protocols and procedures are necessary to meet accreditation and regulatory requirements.

4) Proper staffing and effective scheduling have more impact than any other management tool in establishing good quality and cost effective laboratory services.

1.7.1 Problems of Management

The following are the problems which are major issues in day to day practice of laboratory medicine:

i) Lack of technical knowledge amongst working personnel
ii) Non-availability of uptodate modern technology.
iii) Lack of resources.
iv) Inability to maintain an adequate staff.
v) Frequent rush orders for reports and work load beyond capacity.
vi) Low morale among the working laboratory staff.
vii) Irregular supply and increase lead time of material supply from stores and purchase of substandard material.
viii) Lack of recognition of dignity of work.
ix) Lack of job satisfaction.
x) Lack of work attitude, sincerity and devotion to work.
xi) Indifferent personnel behaviour
xii) Communication gap between officers and subordinate staff
xiii) Lack of Quality Control and standardisation of procedures; absence of protocols, SOP and manuals.
xiv) Paucity of in service training programmes; CME and lack of technology transfer.
xv) Lack of norms of technical staff.
xvi) Lack of promotional avenues and revision of cadre at par with similar services.
xvii) Lack of laboratory information system.
xviii) Absence of rationalisation of reporting pattern.
xix) Absence of integrated approach of patient care system for laboratory management.
xx) Different kinds of malpractices.
xxi) Lack of medical audit.

1.7.2 Laboratory Hazards

Now you will learn about some of the laboratory hazards. Today a laboratory personnel is exposed to various kind of infectious material which are of great risk to life. All can not be described here and is beyond the scope of this unit. The following are some of the dangers to a laboratory worker:

i) Handling of infectious material.
ii) Handling of broken glassware.
iii) Accidental spill over of corrosive reagents.
iv) Swallowing of corrosive material such as concentrated sulfuric acid, Hydrochloric acid, sodium hydroxide; Trichloro acetic acid etc.
v) Inhalation innoculation, swallowing of infectious material — bacteria; viruses (HbsAg, HIV etc.)
vi) Inhalation of poisonous fumes.
vii) Potential hazards in the form of inflammable chemicals and gas leakages.

1.7.3 Safety Precautions in the Laboratory

The infection as you know can occur through ingestion, inhalation, injections or aerosols. In laboratory acquired infections the route could be any of the above. Bio-safety in a laboratory is very essential and basically depends on three components:

a) Basic standard of laboratory design, operation and equipment.
b) Selection and use of essential bio-safety equipment.
c) Safe laboratory procedures.

1.7.4 Laboratory Waste Management

Laboratory waste can be classified into following main categories:

i) General waste
ii) Pathological waste
iii) Radioactive waste
iv) Chemical waste
v) Infectious and potentially infectious waste
vi) Sharps.

The management of laboratory waste involves following steps:

i) Collection and segregation at storage site
ii) Storage and pretreatment (disinfection)
iii) Transportation
iv) Disposal

The above steps could be applied to hazardous and non-hazardous waste. The bio-medical waste handling rules are tabulated in Table 1.1 and various methods of the disposal of blood and laboratory material are tabulated in Table 1.2.

Table 1.1: "Bio-Medical Wastes (Management and Handling) Rules, 1995"

Colour of Containers	Types of Wastes
Yellow	Clinical waste for incineration only
Yellow with black stripes	Clinical waste which is suitable for landfill disposal
Light blue or transparent with Light blue lettering	Wastes for autoclaving or equivalent treatment before final disposal
Red	Human anatomical wastes
Black	Normal household waste

Table 1.2: Disposal of Blood and Laboratory Material

Hyperchlorite detergent solution	0.5-1.0 per cent solution of hypochlorite dissolved in 0.5% anionic or non-ionic detergent is the best general purpose disinfectant if contact is maintained for atleast 30 minutes.
Sterilisation	Autoclaving for 60 min. 121^{0}C (68.5 cm Hg) is the method of choice.
Incineration	Materials may be disposed of by burning in incinerator.
Disinfection of glassware	All reusable glassware must be disinfected by treating with Hypochlorite detergent before cleaning.
Spills on the table tops/sinks	Remove the spills with swabs soaked in hypochlorite solution immediately.

For your guidance minimum and more practical, easily achievable safe laboratory rules are listed here:

i) Avoid mouth pipetting as far as possible.

ii) Avoid enting, drinking, smoking and storing eatables in the laboratory.

iii) Decontaminate the working area atleast once a day and more frequently after the spillage of potentially infective material.

iv) Wash hands with soap and water after handling the infectious material.

v) Wear laboratory gowns/coats in the laboratory and these should not be taken outside the working area.

vi) Use gloves for all those procedures that may involve accidental direct contact with blood or infectious material.

vii) Decontaminate all liquid or solid waste materials as per the guidelines issued by Environment Ministry and Directorate of Health Services for proper directed disposal.

viii) Use of gloves for all those procedures that may involve accidental direct contact with blood or infectious materials.

ix) Perform all technical procedures in a way that minimizes the aerosol formation.

X) Provide adequate training to staff in laboratory safety procedures.

xi) As far as possible, actively immunize the workers against the diseases, the materials of which they are handling.

xii) Employ medically fit staff only to work in clinical laboratories and staff to be subjected for regular health check up at least twice a year.

xiii) Provide ample space and illumination for safe conduction of laboratory procedures.

xiv) Ensure constant and adequate water supply for immediate washing and cleaning of glasswares and premises for adequate safety from infectious materials.

Check Your Progress 6

1) Mention the infectious laboratory hazards which can be prevented?

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2) Whnt steps should be taken for safety of laboratory in above infectious hazards'?

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3) Mention the components on which biosafety of the laboratory is dependent?

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1.8 CONTROL AND EVALUATION

Perfection in the management of laboratory issues are essential. Every problem has its own solution and control. Quality control and assessment is integral part of management. Maintenance of services, material supply, equipment maintenance, personnel management are components of evaluation in the procedures. A quality report and consumer satisfaction is final goal of evaluation programme.

1.9 LET US SUM UP

In this unit you have learnt that laboratory and laboratory services play an important role in patient care services and also the types and functions of laboratory; the physical facilities required for laboratory existence. You have also learnt the important'concepts of planning policy and procedure, information management in laboratory. Further you have learnt various problems in management of laboratory system, quality control, assessment and total quality management. The importance of trained qualified staff, laboratory accreditation, performance appraisal and methods of evaluation has also been emphasized in this unit.

1 . 1 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Laboratory is a place of work for testing patients sample for results in favour of diagnosis and treatment.

2)
- To provide diagnostic management information to treating physician.
- To generate results of samples for investigations.
- To report samples with accuracy, precision and reliability.

Check Your Progress 2

- Histopathology
- Clinical Pathology
- Microbiology
- Haematology
- Biochemistry
- Research Laboratory

Check Your Progress 3

1) Adequate space provision, regular supply of water, electricity reagents, chemicals, **kits** etc. and appropriate instruments, glasswares for use.

2) A) The clinical laboratory: as a work place.

B) Staff: who performs the test

C) The task: to be performed

3) Adequate functioning space of work for staff, space for wash room, store items, **toilets,** reagent, preparation rooms etc.

Check Your Progress 4

1) There are four basic elements of laboratory administration:
a) Objectives
b) Guiding people
C) Resources
d) Organisation

2) Accreditation is a procedure by which an authoritative body gives formal recognition of technical competence (including the quality system management) of testing and or calibration laboratory to carry out specific test.

The advantages of accreditation are:

a) It maintains standard and quality which creates confidence of customer and laboratory manager.

b) Mutual acceptance of reports between laboratory and the user.

C) Accredited laboratory is accepted in inter laboratory net work system.

3) This is the most promising managerial innovation which increases the efficiency and effectiveness of health care session. The following important factors are considered in quality management:

a) Top management leadership

b) Customer and process

c) Learning by practice and teaching

d) Quality measurement and statistical reports at every level

e) Recognition and reward.

4) Leadership and motivation are prime important factors in planning management without which productivity is negligible.

Check Your Progress 5

1) Information management is essential component and high order of magnitude complex communication system within and outside laboratories of the country and world. It reduces errors, mix-up specimen, calculation errors etc., improves staff productivity, quality assurance and interpretive diagnosis for the patients.

2) The following are the important managerial issues which require more attention in laboratory management:

a) Quality control and management

b) Technological updates

c) Human Resources

d) Staffing pattern and promotional avenues

e) Automation

f) Total Quality Management (TQM)

4) The following problems which affect the laboratory report are:

a) Unqualified staff functioning

b) Inadequate input and processing unit functioning

c) Lack of resources

d) Absence of Quality Control

e) Lack of work attitude, sincerity and devotion of work.

The above problems are definitely solved if the authorities concerned provide the above and the laboratory workers attitudes are changed and they work with sincerity and devotion.

Check Your Progress 6

1) a) Hospital acquired (nosocomial) infections

b) Hepatitis B infection

c) HIV infection

2) a) Proper discard of laboratory waste as per the guidelines issued by Directorate General of Health Services and Ministry from time to time.

b) Personal precautions such as washing of hands with soap and water before and after for any sample handling in laboratory; use of gloves; use of Hypochlorite solutions for discard etc. Wear Laboratory gown/coats in laboratory.

3) Bio-safety of the laboratory is dependent on the following components:

a) Basic standards of laboratory design. operation and equipment

b) Selection and use of essential bio-safety equipment

c) Safe laboratory procedures.

1.11 PURTHER READINGS

Burns, J.M., *Leadership,* New York, Harper and Row, 1978.

Chou, D., and McLendon, W.W., "Information Management", In Henry; J.B. (ed.), *Clinical Diagnosis and Management by Laboratory Methods,* 17th **ed.,** Philadelphia, W.B. Saunders Company, 1984, pp. 1401-15,

College of American Pathologists (CAP), *Selected Readings in Laboratory Management, A* loose-leaf binder available from the College of American Pathologists, Skokie, IL, 1982.

Feegel, J.R., *Legal Aspects of Laboratory Medicine,* Boston, Little, Brown and Co., 1973.

Rakich, J.S., Longest, B.B., Jr., and Darr, K., *Managing Health Services Organisations,* 2nd ed. Philadelphia, W.B. Saunders Company, 1985.

Rappaport, A.E., "Laboratory Design", in Race, G.J. (ed.), *Laboratory* **Medicine,** Vol. *IV* (rev.) Chapter 36, Hagerstown, MD, Harper and Row, 1979.

Rappoport, A.E., Gennaro, W.D., and Berquest, R.E., *A Computerized International* **Audio** *Response* **Telephone** *Communication* **System** *Serving: A Centralized, Computer Coupled, Automated Clinical Laboratory,* **Can.** J. Med. Tech., 37:150, 1975.

Snyder, J.R., Senhauser, D.A. (ed.), *Administration and Supervision in Laboratory Medicine,* 2nd ed., Philadelphia, J.B. Lippincott, 1989.

Talib, V.H., *Essentials* of *Laboratory Medicine,* Interprint Publication, Edn. 1999.

UNIT 2 RADIO DIAGNOSIS AND IMAGING SERVICES

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- enumerate various radio diagnostic and imaging modalities;
- discuss planning premises to establish nny modality;
- evolve organisation details; and
- develop policies to ensure effective and efficient output, including detail maintenance schedule.

2.1 INTRODUCTION

The Radio Diagnosis and Imaging Services as you know are one of the most important diagnostic armament with any medical practitioner. With increasing complexities of disease profile, there is increasing need to improve diagnostic approach (early and precise) and therapeutic modalities to achieve best patient care. The metamorphosis in medical technology, with application of bio-physics and computer sciences, have made available the newer modalities in the field of Radiology and Imaging Services. You wil! also appreciate that these changes have made these services more and more informative, dynamic and accessible. However, with advancement, the service has also become more expensive and at times un-affordable and hence it is very essential to manage these activities very effectively and efficiently.

In terms of financial effect radiology services consume major chunk of financial resources. For consideration of financial management it is experienced that the budget provision is to be kept for both recurrent budget and capital investment.

The following components should be given due regards for better planning and management of these services:

- Erection of physical facilities;
- Planning, procurement and maintenance of equipment;
- Appointment and training of human resource;
- Scheduling (work planning or utilisation of services); and
- Utilisation of financial resource.

In this unit, you would learn in details about planning and management of Radio diagnostic and Imaging Services.

2.2 TYPES OF SERVICES

Conventionally radiology services are linked with x-rays. However ever changing need for more and more information and introduction of newer technology has definitely revolutionalised these services to a great extent. The radiology is linked to images of human body, and these images can be achieved either by transmission or by emission from a source.

Transmission is a technique where there is a source which emits rays and which are picked up after reflection from body part and taken on plate or on screen (films) and studied by competent professional. The modalities under this group are : X-rays, CT Scan, Ultrasound.

Emission is a technique which involves giving a dose of radioisotopes or radionuclides to the patient, which are picked up by target organs or cells and emitted gamma rays are recorded by gamma or scintillation camera.

2.2.1 X-rays

X-ray is oldest radio diagnostic tool. The principle is transmission of rays from a source to the specified part of body and images are taken on films. It still remains main modality and number of x-rays performed has been on increase, but total percentage has been declining with the advent of newer modalities.

2.2.2 Ultrasound and Colour Doppler

It is no longer a newer modality but its role has been ever increasing since its introduction, because of continuous improvement in results by introducing improved version transducer, machines and also expertise. This modality is also increasingly accepted, because of lack of significant biological hazards associated with this modality and easy accessibility.

2.2.3 Computer Assisted Tomography

With introduction of CAT Scan, which is considered as most significant advancement in the x-ray field, as this modality has astonishing clarity details of morphology, previously seen only at necropsy or anatomy atlases. Although conventional roentgenography is valuable in evaluating tissues with large differential densities, it cannot clearly distinguish most soft tissue structures, and display overlapping superimposed shadows of the area under investigation, but CT images has overcome this limitation and provides sensitive, well demarcated and detail images. The CT scanning plays vital role in CNS (Brain and Spine) diseases or injuries to decide treatment plan particularly in emergency situations.

2.2.4 Magnetic Resonance Imaging (MRI)

This non-invasive modality has further facilitated diagnostic approach by providing even clearer images of human body without any biological burden. The concept is, a magnetic field is created over part of body being evaluated by a strong magnet which results in emission of RF (Radio Frequency) signals by hydrogen nuclei of tissues after they have been perturbed by RF pulses in presence of strong magnetic field. The RF signal so emitted has characteristics called *relaxation time*: T1 relaxation time (longitudinal

magnetization) and T2 transverse magnetization. These properties are variable among tissues and are the predominate factors responsible for tissue characteristics and images. The modality helps in obtaining both structural (anatomy) and functional (physiology) aspect of tissues studied. The contrast study further helps in getting more details. It is extremely useful in not only in CNS disorders but also for other systems e.g. cardiology, gastrointestinal.

2.2.5 Positron Emission Tomography (PET)

Its more dynamic modality which helps in studies of physiology of human body e.g. isotopes of short half life can be utilized by PET scanner in obtaining information regarding fundamental metabolic process. The equipment also needs a cyclotron to complete the study. The PET is based upon three dimensional restructure of brain section using positron emitting radionuclides. By utilization of a number of individual radionuclides and radiolabeled moieties, it provides an opportunity to measure quantitatively: regional cerebral blood flow, blood volume, oxygen metabolism, glucose transport and metabolism, neurotransmitter metabolism and it permits neurotransmitter localization. Though this is a highly selective modality in imaging field but not,available for routine use as on date.

2.2.6 Mammography

An x-ray based modality commonly used to detect breast diseases. The role of this technique has assumed great importance particularly in screening the breast cancer, incidence of this cancer is very high in Indian population.

2.2.7 Nuclear Imaging

The nuclear medicine is the speciality in which radioactive tracer (Radionuclides) are applied to medical situations. In broader sense, the nuclear medicine speciality should be part of diagnostic imaging team. As such the Nuclear Medicine expert should be part of diagnostic imaging team. However, this practice is not commonly seen in our country. The nuclear medicine studies include all radionuclides use in medicine. These studies can be *Invivo* i.e. studies requiring injection of radionuclicles into patient involving absorption, excretion and haematology uptake and imaging studies, such as renal scan, liver scan, bone scan, thyroid scan, thallium scan for myocardial perfusion and others. The vitro studies which do not require any injection to patient and use of radionuclide is done in laboratory setting, such as thyroid hormone assay by radio immune assay method. Internationally the nuclear medicine services have not a uniform organisation position more so in our country. As these are complete independent units, but at places some of the activity is spread to x-ray diagnostic unit, radiotherapy, clinical chemistry. Techniques in use are Single Photon Emission Computed Tomography (SPECT) and Gamma Camera.

2.2.8 Single Photon Emission Computed Tomography (SPECT)

This is widely available and less expensive system of obtaining images of gamma-emitting radionuclide molecules in the body those can also cross blood brain barrier. For example isopropyl amphetamine (IMP) and other radionuclides have been used to demonstrate abnormalities in epilepsy, Alzheimer's disease and in Parkinson's disease. However present SPECT technology is relatively non-quantitative and insensitive in demonstrating changes and its spatial resolution is considerably less than that of PET. Most of nuclear medicine centres have SPECT installed along with Gamma Camera.

2.2.9 Futuristic Scenario

The development of radiology and imaging services revolves around acquisition, manipulation, storage, retrieval and analysis of images. Keeping these concepts in mind the future of these services largely depends upon technology advancement in bio physics and its application on human systems. Cardiac MRI is recent modality being used to evaluate coronary vessels non invasively. There are many modalities in pipe line to be introduced in practice e.g. PET (Positron Emission Tomography); NMRS (Nuclear Magnetic Resonance Spectroscopy) — which offers the potential of assessing brain function at metabolic and molecular levels.

Check Your Progress 1

1) Define radio diagnosis and imaging services?

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2) Give concept of nuclear imaging?

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23 PLANNING AND ORGANISING RADIO DIAGNOSIS AND IMAGING SERVICES

The basic question for planning an activity is 'WHAT' and 'FOR **WHOM'** meaning here is that we are aware of the activity i.e. radio diagnosis and imaging services but for whom remains vague as these services can be rendered from a small diagnostic unit to tertiary care hospital, implications are well understood. Hence it is proposed to deal with planning of radio diagnosis and imaging services for 500 bedded teaching hospital. Keeping national scenario and present trend of the patients and doctors requirement in mind following equipment are proposed to be installed:

a)	X-ray Machines:	500 MA	: 2 Number
		200 MA	: 1 Number
		Portable 100 MA	: 2 Number
b)	Ultrasound		: 4 Number (One with Department of Gynae. & Obst.)
c)	Doppler		: 1 Number
d)	Mammography		: 1 Number
e)	CT Scanner		: 1 Number
f)	MRI Scan		: 1 Number
g)	Gamma Camera		: 1 Number
h)	SPECT		: 1 Number

2.3.1 Physical Facilities

Physical facilities is one of the important consideration in establishing any service, more so in radio diagnosis department as it is highly equipment based, which are very sensitive, specific, sophisticated, and costly. Hence needs in depth planning to match available resources to achieve maximum in terms of output, without compromising the quality. The points (planning premises) to be considered are discussed as under:

a) Expected Work Load

These services are increasingly in use, in arriving at early and correct diagnosis. Though it is difficult to forecast exact work load, as there are wide variation in various establishment and countries. An international statistics, according to CBA Puijlaert (International Symposium on the Planning of Radiology and Imaging Sciences, Lisbon, May, 1978— expansion of radio diagnosis services and diminishing work loads) the average work load of all modalities in various western countries are:

Italy	7000/Year/Radiologist
Sweden	6000-8000/Year/Radiologist
US	8000/Year/Radiologist
UK	15000/Year/Radiologist

Since we in India do not have any national statistics on average work load, the figures available indicate that there is tremendous work pressure on this facility. As a rough guide in a 500 bedded hospital with availability of above mention modalities the per working day work distribution will be as: Routine X-rays 100-120, Special X-rays 15-20, Ultrasound (All Category) 35-45, CT Scan 6-8, MRI 4-6, Mammography 3-4, Nuclear Imaging 4-6. Over and above there will be some emergencies from within hospital or from places where these facilities are not available. The work volume will be on rise in times to come and hence planning of services should be accommodative and flexible for future expansion.

b) Location

The department should be located in such a way that it is easily accessible to in patients, out patients and emergency patients. Ideally it should be at one end of establishment to avoid criss cross movement of personnel. Ground floor is most suitable to accommodate heavy machinaries and their scaffoldings. A high power or with appropriate wattage electricity connection should be made available, preferably direct from source with proper earthing.

c) Areas

There should be proper demarcation of work areas for each activity. Approximate space requirement is proposed on the basis of information available. However one has to be flexible and innovative to adjust with available resources both in terms of space and funds.

i) **Patient Waiting Area:** According to western datas approximately 80-85% patients are ambulatory and 15-20 are either on wheel chair or on stretcher, It has been estimated that 5-10% are paediatric group of patient. It is, therefore, experienced that large number of personnel i.e. patient and along with them not only attendant but relation and friend will nlso nccompnny, hence expected human load on this service will be enormous. Therefore, waiting area should be planned with utmost core. It is proposed to have a main waiting area with reception and registration counter and other facilities like lavatories (Rest Room) easily accessible to the patients and sub waiting area with each activity to accommodate changing cubicle, recovery room, contrast preparation room etc. As per western literature again space requirement is 1.3 sq. m per patient visit, if relative and friends are allowed to accompany as practice in our country the space requirement will also increase. The sitting arrangement should be adequate and appropriate, e.g. there is constant increase in number of elderly patient and they find very inconvenient to sit on low soft chair and hence they should be avoided.

ii) **Circulation Area;** The movement of patient, attendant, staff should be properly planned to avoid unnecessary criss cross movement and over crowding at any point or activity area, There should be parking area for stretchers nnd wheel chair. The corridors must be 2.8 m wide to avoid crowding.

iii) Technical Area: This is the prime area of the service and should be designed and planned with utmost care keeping technology advancement in mind. Activity wise space requirement is discussed below, however space utilization/allotment will primarily depend upon total available space and the layout plan of the department should also be considered along with overall plan of hospital.

iv) X-ray **Rooms:** The size of X-ray rooms will depend upon the capacity and type of equipment to be installed (Whether 500 MA or 200 MA, What are the fitments along with?). However general guidelines are:

v) Space: An X-ray room should approximately be 40 sq. m, with its long axis minimum of 6.7 m, depth not less than 5.8 m and height 3.3 m approximately. Door opening should be atleast 1.3 m wide and there should preferably be mazes between staff corridor and X-ray rooms to prevent radiation exposure. A lead glass window or screen is essential between X-ray machine and control panel to protect staff from radiation. In a 500 bedded hospital X-ray department distribution of radiology work with activity wise and accessories requirement are given as below as per western literature:

• General Radiography (47%) (Including Skeleton and Skull)	Bucky Table, Ceiling Mounted Tube, Vertical Bucky
• Chest Examination (31%)	Specialized Chest Unit or Vertical Bucky
• Radiology with Fluoroscopy (13%)	Tilting Fluoroscope with Image Intensifier and Bucky Ceiling Mounted X-ray Tube
• Urography, Tomography and Spine Exnmination (6%)	Bucky Table, Ceiling Mounted Tube, Pendulous Tube Stand, Tomography
• Angiography and Other Special Procedures (2%)	Bucky Table, Image Intensifier Film Changer etc.

These are recommendations, which help in development of plan and can/should be modified to match resources.

vi) Related Areas for X-ray Department: The film processing is an essential post exposure activity. Still at large number of centres the processing is done by conventional method that is in dark room by processing films through fixer, developer and than rinsing and drying manually. The approximate space requirement for dark room is 2 sq. m with single entry and of course black paint, with dim red light source. The auto processors are now made available, where exposed film is loaded and comes out dried after fully processed. With the introduction of auto processor units, the developing processes have become easy and space requirement has also decreased considerably.

vii) Ultrasound Unit: The central sonography unit should be located within the main radio diagnosis department and it should have direct access to patient without interfering with other work areas. The space requirement for single ultrasound unit room is approximately 25 sq m. Planning for supportive area like department reception, patient waiting, change room, toilets, radiologist office and record room should be done in coordination with main activity, to maintain smooth and effective work flow.

viii) C.T. Area: The CT room has to accommodate the CT Scanner, an anaesthesia Machine, Ventilator and other routine monitoring equipments and a patient bed. The CT room should have attached toilet facilities preferably. Beside main scan room the department should have reception, waiting area, change room, toilets, record room, and a recovery room which can be utilised for induction and should have piped gases with monitoring facilities. A complete CT unit will require approximately 110-120 sq m. of space.

ix) MRI **Centre**: The MRI Unit has to accommodate an MRI Room, where magnet is installed, the Gantry which has roof level scaffolding carrying all connecting wires (Electricity and Computer Connections), pipes for cooling the magnet and other necessary fitments. Besides main MR room other supportive area as Reception, Sub Waiting area, Change Room with locker facilities, Toilets, Radiologist Room, Departmental Conference room, Hileum storage and other supportive areas. The approximate space requirement is 125-130 sq m.

x) Mammography: Preferably located near CT or MR Unit so the support services can be common to save on space. The approximate space requirement for Mammography Unit is 15-20 sq m.

xi) Nuclear Imaging: This department is highly sensitive, as it has to accommodate *hot* lab, which houses active radio-nuclides which are potentially hazardous and needs extra care in receiving, storing and also in disposing. Beside common areas as in other activity i.e. reception, registration, waiting area—sub waiting, hot room, cold room, store, the main space is required for GAMMA CAMERA or SPECT and its accessories. Approximate recommended area is 110-120 sq m.

d) Supportive Areas

The department will need supportive areas beside technical area as mentioned above. These supportive areas are essential to maintain activities effectively, these are:

1) Consultant Rooms: Each consultant should be given separate chamber of approximately 10 sq m with basic fitments and furniture including a wash basin.

2) Conference Room: There should be a Departmental Conference Room, where adequate accommodation to be planned to hold not only Departmental Conferences but also Inter Departmental Academic activities at periodic intervals.

3) Library: The same can be accommodated in conference room depending upon physical layout. However the department must have a properly planned and maintained Library.

4) Store Room: An appropriate store should be planned for keeping all essential expandable items including equipment spares and unexposed x-ray films. There should also be place for store keeper.

5) Staff Room: Staff rest room with facilities for changing and lockers.

6) Record Room: A department record room must be planned, with present day trend, a central Computer with LAN facilities should be made available for easy entry and access.

e) Lay Out and Flow of Activity

There are many ways departmental activities can be organised depending upon availability of space and over hospital plan. Many Radiology departments have been designed around the concept of the Diminishing Rectangle. This approach positions Imaging activities (rooms) on the outer boundary of rectangle and utilizes boundary for technical support and radiologist work areas. The major benefit of this layout is the minimum interference or disruption that can occur when widely different task occurs in close proximity. This configuration allows patients requiring simple procedures to be separated from those requiring complex studies. However one shortcoming of this layout is that the monitoring of patients become more difficult as they are maintained on outer edge of rectangle.

The strategic placement of imaging rooms is generally based on the concept of minimising the movement of patients in the department. For example the most commonly used x-ray is for chest and is located near the entry and imaging rooms which serve low volume and require longer duration are located more centrally in the department.

f) Communication

An effective communication network both intra departmental and inter departmental and also with parallel organisation should be provided. In present days we should also plan for on line Internet and Web site facilities for keeping staff members abreast with the latest.

g) Equipment Installation

While at pladning stage of physical facilities it is important to consider the type, make and other essential installation requirements e.g. construction. electricity connection, scaffoldings, tubings, water outlets etc.

h) Heating Ventilation and **Air** Conditioning System **(HVAC)**

The Radio Diagnosis and Imaging Department of the day is very sophisticated and primarily based on computer technology and there is increasing demand on maintenance of room temperature. As in operating of these equipment quite a bit of heat is generated which needs to be properly ventilated or neutralised and optimum temperature is to be maintained to obtain maximum efficiency from equipment and staff both. Hence there is a need to plan a proper and effective air-conditioning system for the department.

i) Electricity **Source** and Back-up System

An in-depth calculation of electricity load with future expansion plan should be estimated and preferably a separate line from the direct source should be taken. An approximate requirement for the proposed department is 140 KW. Back up supply should of course be planned, It is recommended that beside emergency connection from main Hospital there should be a separate back-up source of the department. All essential equipments particularly computers should have **UPS** system.

j) Future Expansion

An exercise should be done at this stage to keep future expansion in mind and adequate measures must be taken to accommodate those changes at later date without disturbing existing set up.

Check Your Progress 2

1) Enumerate points to be considered for planning and activity (Radio Diagnosis)?

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2) Give space requirement for:

X-ray room .....

US Unit .....

CT Unit .....

MRI Unit .....

Mammography .....

2.3.2 Equipment Planning, Procurement and Installation

This aspect is well covered in units on Materials and Equipment **Management in course 2.** However it is essential to have detailed knowledge and understanding of this issue at this juncture., Planning for establishing the department, an indepth evaluation of equipment requirement with its-detail specification has to be understood. As these equipment are technically very advanced, sensitive, expansive and critical to patient care. There is ever increasing competition with fast ohanging technology and increasing vendor pressure.

Hence it is recommended that a high level committee comprising of Head radio diagnosis department, unit/activity Head, minimum two expert in the field from out side the Hospital, Senior Store Officer/Purchase Officer, two Senior staff members from other specinlities who will go into all details of equipment in question. An approach to this exercise is enumerated as under:

- Identify the Activity
- Select the Equipment
- Develop Specification
- Locate the Vendor/Vendors
- Prepare the Tendor Enquiry (which should be very elaborate i.e. all detailed specification of equipment and its accessories)
- Receiving and opening of Tendor Document
- Preparation of Comparative Statement
- Selecting the Supplier
- Preparation of Supply Order: This document should be very comprehensive including all specification and terms and condition about equipment, financial effect with payment schedule and spares, its installation and after sale services.
- Reception, Inspection and Installation: Before releasing final payment the committee should certify effective functional status of the equipment.

It is observed that equipment commissioning which is comprising of identifying, procurement and installation is complex process and many hurdles are encountered in this exercise. It is, therefore, felt that an approach as suggested above if followed in the letter and spirit than problems can be minimised. It is also important to mention about financial resources, as most of the decision will depend upon availability of funds and their control.

2.3.3 Equipment Maintenance

For ensuring credible, economical and continuous equipment maintenance an effective maintenance programme is essential, all the more in radio diagnosis services as it is totally equipment oriented department. Therefore, a comprehensive maintenance plan is an inescapable requirement. The maintenance can be classified as:

1) Plan Preventive Maintenance
2) Concurrent Maintenance
3) Breakdown Maintenance

1) Plan Preventive Maintenahce

Preventive maintenance is essential to prevent breakdown and disruption in services from all equipment and particularly for expensive machines, Beside on job checks and control by operator the preventive maintenance is achieved through after sale warranty and Annual Maintenance Contracts (AMC). The AMCs are awarded to the supplier, invariably as all sophisticated machines have some or other peculiarity which can only be hnndled by them, however there are other agencies also to take on such contract.

Warranty: The warranty clause is very essential for all new installation. All equipment should be under warranty as long as agreeable by supplier, normally this period is one year only and during this period complete responsibility is with company, including spares at no cost. The cost normally included in the initial cost only and hence buyer should hold minimum 10%of pnyment till warranty period is over. During warranty period staff training for both operation and maintenance must be emphasised.

Annual Maintenance Contract: This is the contract generally awarded to supplier or any other agency competent to handle the equipment on pre-determined terms and conditions. These conditions should include:

- Duration of contract,
- Periodicity of visits and check points of preventive maintenance to be supervised by the user.
- Spares—adequate fast moving (frequently needed) should be made available in house and other should be provided without undue delay.

  Financial effect with details of payment schedules.
- Breakdown time should be spelt out that is the number of breaks during contract period and maximum duration of a breakdown and it should not be more than accepted.
- Penalty clause—in the service contract a mutually agreed penalty clause should be spelt out to keep check on agency and also on operator.

2) Concurrent Maintenance

The department should have well written plan for each and every equipment particularly for life saving and expensive ones (not on AMC) for their in house concurrent maintenance by operator and hospital maintenance cell. Here it is worth mentioning a little about Hospital Maintenance Cell. This is a small inhouse organisation which is equipped with trained men power e.g. bio medical engineers, technicians and necessary infrastructure of tools.

3) Breakdown Maintenanoe

Even after detailed precaution one cannot avoid unwanted and untimely breakdowns resulting into crisis situations. There should be a departmental plan to deal with such situations effectively. In the department each unit (equipment) incharge should have knowledge of agencies, who can be contacted during such eventuality both in house or outside the hospital.

An effective maintenance plan will achieve:

- Reduction in Down Time
- Safety of Equipment and Men
- Credible and Cost effective services
- Increased life of Equipment

Check Your Progress 3

1) Enlist the steps for equipment procurement.

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2) Enumerate types of equipment maintenance plan and its importance.

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2.3.4 Staffing

The staffing is most difficult but very essential component of the organisation infrastructure as no machine can be useful without an operator. Hence the basic exercise of recruitment is must i.e. **job analysis, job description** and **job specification** meaning by identify the appointment and then describe its QR (Qualitative Requirement) for selection and then specify his job. This department is highly cost intense and the personnel's accountability has to be of very high order. The category of staff required are:

1) Radiologists: HOD (1), Sr. Consultant normally heading each unit (4-5), Jr. Consultant (8-10), Residents depending upon status of hospital.

2) Technicians: Sr. Technician and Inchnrge (1), Sr. Technicians (8-10), Jr. Technician (10-12), Nursing Personnel (2).

3) Others: Receptionist, Store Keeper, Scribes (both for record keeping and billing), Helpers (a multipurpose worker useful in assisting staff and patient). These personnel can be pooled in from main hospital resources. However it is recommended that there should be continuity in their duties to maintain smoothness in functioning. As regard qualification and experiences central (hospital) recruitment rules should be observed. The appointment of staff should also be done in phases to start with, meaning by depending upon work load to minirnise recurrent expenditure. The most important aspect of human resources is there is continuous training both on job as well as through structured programmes specially planned for each technical staff member. Besides their high order technical skill they should have or develop good human skill i.e. attitude and behoviour with patient, patient's relation and also with staff members.

Check Your Progress 4

What are pre requisites for recruitment?

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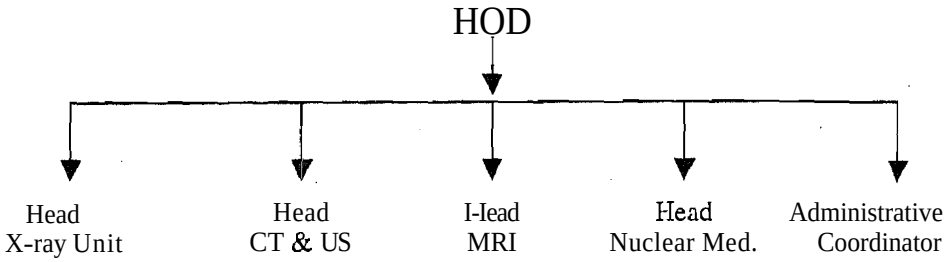
2.4 POLICIES AND PROCEDURES

In today's hightech world a top online computer system remains a show piece till a well developed software (programme) is developed and fed in, and hence it is very vital for systematic and effective functioning of a departmedt that detailed and workable policies and procedures are prepared. All major establishments have well documented SOPs (Standing Operational Procedures) e.g. Defence Services have such system which not only

facilitate smooth functioning, but ensure accountability of personnel responsible for various acts. It is, therefore, recommended to develop a detailed written programme of the department which should be periodically updated or reviewed and properly communicated to all concerned. An outline plan for department SOP is suggested as under:

1) **Organisation Structure:** giving details of chain of command i.e. distribution of staff with referance to their activity.

2)



The technical and supportive staff should be affiliated by name with the activities as mentioned above. Though continuity is helpful but in the interest of organisation a planned rotation of duties particularly among technical staff is advised. A detailed Job Specification of each member of staff should be written and communicated to them, periodically.

2) Working Hours: Working hours should be spelt out in coordination with other department.

3) Work Handling Capacity: Work handling capacity of each unit should be evaluated and documented. There should be policy where every unit's maximum functional capacity in terms of number of cases can be carried out in a day or shift is calculated on the basis of equipment capacity, staff availability and other variables. Once maximum handling capacity is known it is easy for management to plan patients appointment schedules and also assess the work output vis-a-vis resource input. It has been observed following a work study at few prestigious institutes that with application **of** concept of maximum handling capacity in any patient care area in general and ambulatory care including diagnostic services in particular has improved level of patient care and patient and staff satisfaction to a great extent.

4) Equipment Management Plan: The hospital should have a well spelt out plan for equipment planning, purchase, maintenance, and disposal. It has already been discussed in detail, however it is important to have detailed instructions written in department's SOP.

5) Staff Performance Appraisal Policy: No organisation can grow or prosper till its all members are satisfied to the desired level of satisfaction. Moreover it has been a known fact that morale of staff irrespective of his status directly effects organisation, environment and culture and in turn its output. Hence it is very essential that a well planned performance appraisal policy and system to implement same is written in SOP.

6) **Financial Management:** The crux of all issues are availability of finance and authority to spend it, There should be well prepared and communicated financial policies so there is no ambiguity about the authority and system to be followed. Head of Department should ensure timely and appropriate projection of funds requirement. Since the department is cost intense and huge amount (approximately 40%) out of total hospital budget will be required in procurement of new equipment, updating exhausting ones, maintenance and purchase of consumables beside staff salary, an effective financial control is inescapable.

7) **Radiation Safety Policy:** Safety measures against radiation should be taken with a lot of care and plan. The effects of radiation on human body can be classified as *somatic*, affecting irradiated person, or *genetic* affecting progeny. The safety of staff and patient while they are exposed to radiation during various diagnostic and therapeutic procedures depends upon safety measures taken while performing these activities and close monitoring by radiation dosimeters (Geiger Counter). Hence all staff members

who carry a risk of exposure to radiation should be provided with radiation monitoring dosimeter by name and should also be checked periodically for levels of exposure, to prevent any over exposure. The details of safety should be written and communicated. You will learn about this in detail in Unit 3 of this block.

8) Expansion **or/and** Upgradation Committee: To keep technology updated there is need to have a departmental committee to periodically review the needs of expanding the department in terms of Physical Facilities, Equipments, Staffing. The committee should submit their proposal with detailed justification for appraisal and approval of Hospital Management Board in which department representation will be there.

The basic objective to have a departmental SOP is to monitor the performance against pre determined guidelines and periodically assess the quality of services in terms of professional patient care and patient and staff satisfaction. It is also recommended to have an in house performance grading system with an objective of rectifying the shortfalls observed. This is a positive exercise and should be done with lot of care and commitment.

Check **Your Progress 5**

Enumerate importance of department policies.

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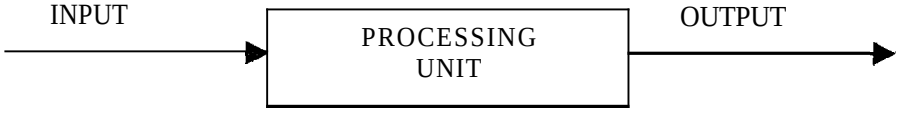
2.5 MANAGERIAL ISSUES

The management or managerial issues means application of management tools to ensure effective and efficient running or functioning of the department. To recapitulate and remember principles of management a commonly used letter is recommended i.e. POLICE, a concept of *guarding* to the manager. On expanding this letter a complete aspect of modern managerial tools is covered. Expansion of word 'police' is as under:

P : Planning
O : Organising
L : Leading
I : Integrating
C : Controlling
E : Evaluating.

Managerial issues of the radio diagnosis on day to day practices involves the common pathway of flow chart which are commonly seen in all diagnostic service:



Issues at Input

Registration: Reception.

i) Registration timing notification nnd exhibition in bilingual languages
ii) Any restriction in number of caseslday
iii) Selective directions for appointment cases.

Issues at Processing **Unit**

i) Personnel management issues
   - Lack of availability of qualified persons at equipment (machines)
   - Lack of desire to work in time/delayed function

ii) Lack of machineslnon-functioning unit informations

iii) Processing mistakes of numbering

iv) Mistakes of organ/part of exposures as desired.

Malpractices/Pilferages

i) X-ray films: at various levels—receipt/entry/disposals

ii) Developing solutions

iii) Cassettes etc.

Issues at Output

i) Reporting officer — misinterpretation of lesions

ii) Wrong reporting, mis-matched papers

The ultimate aim of any service is to achieve its desired objective with full satisfaction of consumer and provider. To arrive at this objective there is need to spell out all aims of the department in detail at very outset of department establishment and is to be reviewed periodically. Once we are aware of aims to achieve and resources available, than to match these the managerial approach through POLICE should be applied to get best out of situation. It is, therefore, felt that manager should be familiar with managerial approach and should not only use them but apply them very professionally.

26 LET US SUM UP

Changing trends and needs of health care delivery system has made medical practice more and more complex and demanding. The revolution in technology has not only brought improved and sophisticated diagnostic and therapeutic modalities in use, but has also made system mare transparent and accountable. The radio diagnosis and imaging is one of the most important branch of health care delivery system and plays very vitul role in urriving at correct and early diagnosis of disease profile. With introduction of newer modalities already and on going further advances in techniques and modalities, the planning and management of these services requires more and more emphasis, For establishing a department and/or single unit an in-depth study of all planning premises is an essential requirement, which means identifying servicelservices and knowing resources i.e. availability of physical facilities (land and/or building), human resources, equipment position nnd financial resource, Having planned and established a radio diagnostic and imaging centre. the functional plan should be developed and written as standing operative procedures (SOP), which should also be communicated to all concerned and updated periodically. A lot of emphasis should be given to equipment management, which not only deals with procurement but also with maintenance programme. The staff selection, positioning, satisfaction and their training is very important aspect to achieve desired results of the department or services. While dealing with humun resources, management should also plan for their professional growth and remunerations keeping pace with time and performance to avoid any staff dissatisfaction. It is desired that services should be dynamic, qualitative and cost effective and to achieve this objective an effective and aggressive management should be provided by applying principles of basic management.

2.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) These are diagnostic modalities, where body or part of body is exposed to an environment resulting in formation of images either on screen or on plate, which are

stored and studied by competent professional and who gives opinion on the status (normal or abnormal) of the part under study. The techniques involved are either transmission i.e. there is source which transmits rays in to body or emission i.e. rays are emitted from a body part after it has been activated. The most conventional example is X-ray examination, other modalities are: ultrasound, CT scan, MRI scan, Mammography, PET, nuclear medicine studies and others.

2) The nuclear medicine is based on the concept of studying the distribution of radiopharmaceutical in the body with a scintillation or gamma camera. To elucidate further a desired radiopharmaceutical is given in the body and its distribution is observed over a period of time by/under gamma camera, these studies are called study in vivo. Commonly performed studies are: thyroid scan, renal scan, liver scan, bone scan, thallium scan for studying myocardium perfusion (a popular non-invasive technique to study coronary arteries). In vitro studies nre performed in laboratory setting using radionuclides.

Check Your Progress 2

1) For planning any activity following aspects are to be remembered/considered:

a) Identify service and its scope i.e. radio diagnosis and imaging services with what all modalities are going to be installed.

b) Select location and prepare lay out plan in discussion with users.

C) Develop design for construction bf new physical facilities or renovation of existing structure keeping prospective functions in mind (prepare architect brief).

d) Plan for equipment establishment i.e. identification of equipment, selection of vendor, preparation of supply order and reception, inspection, installation and commissioning. Also to be incorporated equipment maintenance schedule;

e) Planning, recruitment and training of staff.

f) Prepare policies and procedures for functioning.

2) Though space is a very vital parameter in terms of functioning and finance and hence should be planned very meticulously. It is again very difficult to give rigid guidelines as regard space. however an approximate modality wise requirement is given ns under, these specifications are suggested for technical nrea only where as requirement for other essential supportive is to be considered separately:

X-ray Room (one machine with accessories)	40 sq. m
Ultrasound unit	25 sq. m
CT scan	110-120 sq. m
MRI unit	125-130 sq. m
Mammography	15-20 sq. m

Check Your Progress 3

I) It is very vital step in the process of department functioning. Following points are to be considered while procuring any equipment:

a) Identify the activity

b) Select the equipment

c) Prepare specification

d) Locate vendor/vendors

e) Prepare supply order

f) Instructions for reception and opening of tender inquiry

g) Preparation of comparative statement

h) Selection of vendor by hospital/department purchase committee

i) Preparation of supply order (this document should be very exhaustive)

j) Detailed instructions for reception of equipment, opening of packages, installation and commissioning of equipment

2) An effective equipment maintenance plan is an inescapable requirement of any hospital/department. There are following types of plan:

a) Plan preventive maintenance (including annual maintenance contracts)
b) Concurrent maintenance plan
c) Breakdown maintenance plan

Importance of effective maintenance plan are:

a) Reduction in down time
b) Safety of equipment and men
c) Credible and cost effective services
d) Increased life span of equipment

Check **Your** Progress 4

As said that human resource is most important and live input of any organisation and hence its planning is very vital for organisation credibility and growth. The basic components are:

a) Job analysis : We should know what category personnel are required for the organisation.
b) Job description : Give details about qualification and experiences required for a particular post.
c) Job specification : Specify detail about individual job specification i.e. person's duty schedule, responsibilities and accountability.

Check Your Progress 5

No organisation/department can achieve its objective without systemic functional policies, hence its importance cannot be undermined. With well prepared and periodically revised standing operative procedures (SOPs), the achievements are:

a) A qualitative performance in terms of patient care i.e. creditable and timely results
b) Optimum utilisation of resource i.e. capacity utilisation of equipment and man power
c) Cost effectiveness of services i.e. effective control of financial resources
d) Highest level of patient and staff satisfaction

2.8 FURTHER READINGS

Ervin Putsep, *Modern Hospital, International Planning Practices.*

Harold Laufman, Institute of Surgical Studies, Montefiore Hospital and Medical Centre, Albert Einstein College of Medicine, Bronx, New York, ***Hospital Special Care Facilities.***

Harrison, ***Principles*** of ***Internal Medicine.***

Jesus J. Pena, M.P.A., **J.D.** *St.* Michael's Medical Centre, New York, NJ., ***Health Care Administration, Principles and Practices.***

McGibony, J.R., *Principles of Hospital Administration.*

Naomi P. Alazraki, M.D., Chief, Nuclear Medicine Services, VA Medical Centre and Professor of Radiology, University of Utah Medical School, Salt Lake City, Utah; *Fundamentals of Nuclear Medicine.*

UNIT 3 RADIATION HAZARDS

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- enlist the biological effects of Radiation Hazards;

  describe the radiation protective and safety measures in designing of diagnostic x-ray, Magnetic Resonance Imaging, Nuclear Medicine Services;
- discuss various aspects requiring attention in planning of Radiation Therapy with particular reference to design and protection of personnel and materials; and
- describe the procedure for radio waste collection and disposal relating to Nuclear Medicine, Tele Therapy and Brachy Therapy.

3.1 INTRODUCTION

Radiation, as you know, is an energy emitted in the form of a beam of rays or waves, whereas hazards are risk involved to life, health or property due to poisonous nature or combustibility or other environmental causes of dangerous substance, here in mainly related to radiation.

This unit aims at making you aware of the problems associated with hospital diagnostic and therapeutic services involved in use of ionizing radiations, along with the problems in

planning of these services with particular emphasis on radiation hazards. It also highlights vital planning aspects and protective measures.

In this unit you will learn about the causes and safety measures for radiation hazards. You will also learn planning and designing aspects of various departments using radiation technology, though you may find too detailed description of these aspects but if due care is not taken during initial planning stage you cannot reduce the hazards later on.

3.2 BIOLOGICAL EFFECTS OF RADIATION HAZARDS

Radiation protection and safety in all imaging techniques are of great concern to safeguard radiation hazards. Radiation protection facilities and disposal of radioactive waste are of paramount importance in radio-therapy centres. Failure to observe the safeguard procedures invariably leads to harmful biological effects.

Radiation injuries can arise from various sources, viz. Gamma, Beta, Alpha and Neutrons. The effects of radiation depend on type of cells of body affected, dose and source of radiation to which individual is exposed. The effects can be acute and chromic.

Acute radiation effect is called as acute radiation syndrome (ARS). This is combination of syndromes occurring in stages during a period of hours to week after exposure, as injury to various organs is expressed. It occurs in three successive phases:

Prodromal		Appearing within a first few hours, lasting for a day or more.
Latent period	:	Lasting for days and weeks.
Manifest phase	:	Where recovery or death occurs within 6 weeks of exposure.

Chromic or Delayed Effects occur months to years after radiation exposure and include a variety of effects on almost all tissues and organs. Some of the possible delayed effects are:

a) Shortening of life span.

b) Cataract formation.

c) Chronic radio dermatitis.

d) Leukaemia.

e) Cancer.

f) Decreased fertility.

g) Genetic mutation.

h) Epilation (falling of hair).

3.3 DIAGNOSTIC IMAGING

In this section you will learn about diagnostic imaging which includes radiography, fluoroscopy, mammography, and other similar techniques. Radiography is a device of making pictorial records by means of x-ray on sensitised film, fluoroscopy is direct visualization through medium of x-ray, where as mammography is a screening technique for determining the presence of breast tumours. Most imaging requires radiation protection.

Diagnostic x-ray department usually consists of following sub-departments: inpatient, outpatient, emergency and special procedures departments as well as section for diagnostics in operation unit. The pattern of conducting of all x-ray examinations in one centralized department, although generally advocated, is by no means self evident at least in larger hospitals.

Diagnostic x-ray room should be multifunctional, the long axis of the room being not less than 6.7 m, the depth should not be less than 5.8 m and the working height of about 3.3 m could be recommended. In all x-ray rooms, astainless steel wash basin is needed because of microbial cross contamination and infection potential. Each x-ray room shall include a

shielded control alcove. This area shall be provided with a view window designed to provide full view of the examination table and the patient at all times, including full view of the patient when the table is in a tilt position or the chest x-ray is being utilized. For mammography machines with built in shielding for the operator. Mammography room should be designed to appeal to women.

X-ray room in which remote control is to be used, it is essential to have a lead glass window to protect the radiologist who is in line with x-ray table at floor level, so that the operator can see and communicate with the patient. The lower edge of the protective screen should be about 115 cm for use in the erect position.'The television monitor should be placed so that it can be easily seen through the lead glass window. Simultaneously the patient should be kept in view. The control panel should be close to the x-ray table so that the patient showing any signs of distress could be quickly reached. Door opening should be at least 130 cm wide. All artificial lighting in the screening room should be wall mounted. The ceiling has to be free from air ducts, pipes etc., and should be weight bearing in all directions for the installation of ceiling mounting equipments.

An examination room suites for general examinations including chest, abdomen, skull, extremities, spine and IVP; a suite for special procedures including cardiovascular, neurological and urological procedures, and suites for routine fluoroscopy, and for rapid chest examinations could be envisaged.

The x-ray film processing devices have until very recently been concentrated to dark rooms, which in a sense have been the central point of the department. The size of the darkroom depends on the number of staff working in it. Citrus fruit colour and pastel shades are suitable for the walls and ceiling of the dark room. Dark colour, above all black should be avoided. Ten air changes per hour are recommended.

Since automatic processors have largely taken over from manual systems, there have been changes in the dark room planning. Medical x-ray films can be cassette loaded, exposed, unloaded and processed entirely in daylight. About 90% of all x-ray examinations could be performed without access to a dark room. The automatic system reduces the physical workload of carrying the cassettes by the radiographer.

3.3.1 Radiation Protection and Safety

In general, the amount of radiation in a small basic radiological facility is so little that radiation protection is not a major problem. In larger set ups it assumes a greater proportion and requires urgent attention.

The recommendation for wall thickness for radiation protection which follow is based on a minimum x-ray room size. Calculate the desired thickness of material on the basis of total radiation exposure of 150 mA-minutes a week at 100 kv. The number of milli-Amperes used for each exposure multiplied by number of seconds provides the milli-Ampere-seconds (mA-s) for each exposure; the milli-Ampere-minutesper day can be calculated by multiplying the number of exposures per day by the average exposure used.

In basic radiology facility it is, therefore, permissible to utilize a wall thickness design figure of 1 mm of lead equivalent. This incorporates a sizeable safety factor and will be satisfactory until at least 30 patients are examined daily.

A standard poured concrete wall of about 8-12 cm thickness would be required to provide a lead equivalent of 1 mm. If cinder blocks or bricks are used, a thickness of about 12-15 cm will be required depending upon the density of the material actually used i.e., (thickness of concrete) x (2.35 gm/cm^3) = thickness x density (of similar material).

Within the x-ray room, there are two specific high-risk areas; the wall behind chest stand and the wall of the dark room. Provided the x-ray unit is properly positioned, the wall of the dark room will need no special protection if it is constructed of at least 10 cm of concrete. At no time should the main x-ray beam ever be pointed at the wall of the dark room, to prevent radiation fogging the stored films.

There are two ways to over come; increased protection as part of the chest x-ray cassette stand or increased protection on the wall itself behind the chest stand. For the farmer chest cassette holder must carry 2 mm of lead equivalent, whereas in the later way, an area, 2 m

in height and 1 m wide, centered immediately behind the chest stand must have the shielding of 2 mm of lead equivalent. This can be obtained by increasing the thickness of the concrete wall to 20 cm, It is worth remembering that simple plate glass of Icm thickness is equivalent to 1mm of lead and provides a very satisfactory radiation barrier.

It should be re-emphasised that these calculations provide for more of a margin of safety than is likely to be necessary in a basic radiological facility. However any change in room dimensions, a more powerful generator or a large increase in the number of patients will alter these requirements. Normal one brick wall thickness up to 250 mm is considered adequate.

The x-ray control (console) must be designed in such a way that the switch is an integral part of the unit and protection should be incorporated in the design of control panel. There should be a shield of 1 mm lead equivalent, at least 75 cm wide in front of the control panel and extending 50 cm on either side. It should be 2 m in height and should have a lead glass window with at least 1 mm lead equivalent (25 cm x 25 cm in size) situated in the central panel at eye level, so that operator can see clearly through it. Should there be a requirement for patient to be held then lead protective clothing must be worn.

Standard glass windows do not provide much radiation protection. However there is no radiation hazard provided people do not loiter within 1 m of the window of standard size of x-ray room. If patients wait outside the room, the window should be at least 1.5 m above the floor finish inside. Windows are desirable for both light and ventilation.

3.3.2 Radiation Safety Monitoring

It is internationally accepted practice that all personnel who work with ionizing radiation be continuously monitored to record the dosage received during their work. In diagnostic x-ray department, this is usually done by requiring each operator to wear while at work a small film badge of standard design. A written record must be kept for each wearer. Such a film badge service can only be organised and controlled on a central basis and report must be examined on monthly basis by a radiologist or radiation safety officer.

Other personal methods of protection include the routine use of radiation proof apron (lead equivalent 2.5 mm). These are usually double sided, and racks to support them should be provided in the x-ray room, preferably near the control panel. Protective gloves (lead equivalent 0.3 mm) must also be worn whenever a patient needs to be held by a nurse or aide who will be in the x-ray beam during the exposure.

3.3.3 Principles in the Layout of a Diagnostic X-ray Room

There are four basic principles in the layout of a diagnostic x-ray room:

i) The x-ray tube should never point towards the control unit.

ii) The x-ray tube should never point towards the dark room.

iii) The x-ray tube should never point towards any window or door, sometimes this is not avoidable, especially during a cross table control lateral view, but no one should be allowed to stand next to a door or window when these-films are being taken.

iv) The control should be as far away as possible from the x-ray table.

The main radiation danger in any x-ray room is scattered radiation, because with proper cones or collimators the primary beam will be controlled. Radiation decreases in proportion to the square of the distance, and distance is the most important single factor in radiation protection.

Radiation exposure to patients, staff and other personnel should be kept to the minimum required for performing the radiological procedure, metal cones and adjustable shutters (Collimators) are fastened to x-ray tubes to limit the size of the beam and to reduce scattered radiation. A further advantage of these devices is to increase the quality and confining them to the exact size and direction required, Collimators in major x-ray department incorporate multiple shutters and a light system coupled with mirrors which clearly defines the field size being used.

Check Your Progress 1

1) How radiation hazards can be avoided in an x-ray room?

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2) List the two specific high risk areas within an x-ray room.

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3) What are the radiation safety monitoring practices'?

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4) What ore chronic radiation effects'?

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3.4 VIDEO IMAGING MODALITIES

Video imaging modalities (diagnostic imaging) in radiology department are those which do not involve direct or indirect exposure of radiographic films. In this section you will lean about these video imaging modalities which include Digital Radiography, Digital Subtrnction Angiography, Computed Tomography, Sonography (Ultrasound Scanning), Echocardiography, Thermography, Cnrdiac Catheterizetion Laboratory, Magnetic Resonance Imaging and Nuclear Medicine Scanning. All these result in a video image viewed on a television monitor from which hard copy must be made. These hard copies are useful as research tools and legal supportive documents.

Digital Radiography

In digital radiography, an x-ray image produced by an image intensifier is recorded digitally and stored in a computer memory, replacing the conventional x-ray film. An image intensifier is a device for greatly enhancing the faint fluorescence of an input phosphor screen in response to radiation, by electron release and capture, causing much brighter fluorescence of an output phosphor screen viewed by a TV camera. The resulting image is viewed on a TV monitor. Careless handling of fluorescent devices may lead to unnoticed overexposure.

Digital Subtraction Angiography

Digital Subtraction Angiography (DSA), previously known as Digital Vascular Imaging (DVI), is similar to digital radiography, but may be included as an "add-on" to fluoroscopic

imaging equipment as well as being built into digital radiographic equipment. DSA is very sensitive and can satisfactorily image considerably diluted contrast medium. The subtraction images can be viewed dynamically on a TV monitor as a continuous real time image showing the gradual appearance and disappearance of contrast medium in the blood vessels being studied, or as regularly upgraded static images at short time intervals. The optional images can then be frozen for production of hard copy.

Computed Tomography

Computed tomography (CT or computer assisted tomography CAT scanning) uses measurements of x-ray attenuation recorded by an array of detectors from a thin fan-beam of x-rays. The x-ray source and detector array rotate circumferentially around the patient. It is possible to construct simulated 3-D images of bones and blood vessels opacified with radiographic contrast medium. The latest generation of CT scanner use helical or spiral scanning instead of planar scanning of individual axial slices, resulting in decreased scanning time and allowing better dynamic imaging of blood vessels following contrast medium injection.

The CT unit has to accommodate the CT scanner (a large machine with a "doughnut hole" in the centre), anaesthesia machine, a ventilator, and routine monitoring equipment. The CT room tend to be cold, with the temperature under 21°C and control of patient temperature may become difficult. Piped anaesthesia gases and vacuum with connectors for anaesthesia machines should be provided. An appropriate electrical power source and piped oxygen connection for ventilators are also required.

Sonography (Ultrasound Scanning)

Ultrasound scanning uses a robe operating by the piezo electric effect to emit ultrasound of frequency 33-10 MHz into the patient and receive returning echoes from internal structures, producing a real time, grey scale image displaying the echo intensity as a 2-D image on a TV monitor. Doppler Ultrasound allows flow within vessels to be displayed. In duplex doppler the2-D image and doppler wave form are displayed simultaneously, allowing accurate placement of the sampling gate over the region of interest. Colour Flow Doppler assigns different colours (usually red and blue) to flow in different directions, so that adjacent arteries and veins are displayed in different colours superimposed on the monochrome ultrasound image.

In the field of cardiology and obstetrics, ultrasound is indispensable source of diagnosis. Sonography provides answers to some clinical questions without discomfort or great expense that otherwise demands hazardous invasive and costly investigations. Hot and cold water as well as suction and oxygen supply should be available. Sonography is relatively safer technique and no significant harmful effects have been documented because of its widespread use.

Echocardiography

Pulsed ultrasonic doppler techniques afford opportunities for making transcutaneous measurements on the cardiovascular system and to provide information, which other approaches cannot make available. For echocardiography room the door width should be 130 cm. There should be commonly grounded electrical outlets, a dimmer switch to adjust room lights and a washbasin. There is no radiation protection requirement.

Thermography

Thermography is an infra red scanning system for measuring changes in distribution of surface temperature and presentation of the temperature distribution and development. Warm areas may represent inflammatory or cancerous processes. Cool areas may signify inadequate blood supply. The temperature information from the infra red camera (with or without use of colour filters) which is normally displayed as a picture or an oscilloscope screen is particularly suitable for computerization. Thermograms could be assessed using a computer without loss of accuracy and without the necessity to use expensive personnel for examination and interpretation.

Thermography room requires a size of about 18 m^2 and a height of 2.5 m. The room should not be smaller than 3.5 × 3.5 m. Room should be maintained at a temperature of 21± 1°C and humidity of 50 per cent. The thermal environment must be controlled with great

accuracy. There should be no heat sources or draughts. No sunlight should enter the room and it is best if not even daylight comes in. Light should be provided by fluorescent tubes. There should be no glass or polished metal surface near the subject. The walls of the room should not have glossy paints.

Cardiac Catheterization Laboratory

Cardiac Catheterization Laboratory is vital to the diagnosis and treatment of coronary diseases. Cardiac catheterization is the insertion of a catheter (a long, narrow, flexible tube) through a blood vessel into the heart. It allows examination of the heart and coronary arteries. The procedure may be either diagnostic or therapeutic. Coronary angiography (injection of contrast media) is a diagnostic procedure that causes arteries to become visible or x-rays. Therapeutic procedures include the installation of pace makers and angioplasty (balloon catheter) which can clear an occlusion in the artery.

The cardiac cath lab (cardiology) is normally a separate suite located near surgery, but may be a part of imaging provided that the appropriate sterile environment is provided. The amount of radiation protection to be installed has to be certified by the physicist. A viewing area in addition to control room should be provided with a space for processing, individual counter top projection and film boxes (3.05 m in length) with illumination to provide light of the same colour value and intensity for appropriate comparison of several adjacent films. Other facilities needed are scrub up, soiled holding and contamination holding, storage space for portable equipment such as defibrillators, catheters and other supplies for use during clinical emergencies.'

3.4.1 Contrast Media

All the video imaging modalities (diagnostic imaging) described above have created their own demands for contrast media. The use of contrast media in computed tomography improves the visibility of anatomic structures and also provides important information on organ function and pathological changes in organ function. In digital subtraction angiography and conventional angiography, the use of contrast agents are essential. Administration of the contrast medium via a catheter allows the visualisation of greater vessels as well as the entire vascular periphery.

3.4.2 Laser Imaging

The laser imaging is a much more sophisticated method of converting an analog or digital signal from an imaging modality into hard copy. The electronic data of an image is converted into a digital signal from which a laser beam of corresponding intensity scans across a photographic film exposing it in proportion to the brightness of the image line by line, in exactly the same manner as the electron beam scans the phosphor screen of a TV monitor. This results in true reproduction without loss of contrast or resolution, free from distortion. The image can be electronically smoothed so that TV lines are not visible. The photographic film is designed with sensitivity to match the wave length of light output of the laser.

A laser (light amplification by stimulated emission of radiation) is an intense, parallel, coherent beam of light with fixed frequency and phase. The laser beam can be shaped with collimator lenses or deflected by mirrors. Laser imagers in clinical radiology use a helium-neon (HeNe) laser or a laser diode,

The helium-neon laser is a thermo-emitting valve, with a warm-up period of 15-20 minutes, emitting a red light of wave length 633 n m. The solid state laser diode has the practical advantage of no warm-up time, and is, therefore, only " O N while printing (about 8 seconds per film), emitting radiation in the infrared range of wave length 780-820 n m. It has a life span of 80,000-10,0000 hours where as helium-neon laser has a life span of 15,000-20,000 hours.

3.5 MAGNETIC RESONANCE IMAGING

Magnetic Resonance Imaging (MRI) as you know is a relatively new and potentially significant imaging modality in medicine. MRI uses the principles of nuclear magnetic

resonance (NMR) to produce cross sectional images without the use of ionising radiation. MRI technology is a synthesis of several technologies—RF technology, Computer technology, super conductive magnetic technology. The use of magnetic technology poses a unique challenge to the hospital planner.

The installation planning for a superconducting MRI system requires extreme care to assure that the magnetic field is protected from the influences of the surrounding environment and conversely, that the surrounding environment is undisturbed by the effects of the magnetic field.

The static magnetic field of the MRI system is 3-dimensional and, therefore, extends to the space above on the same level. Magnetic field strength which is measured in Tesla (I Tesla = 10000 Gauss where the earth's magnetic field is 0.7 Gauss) decreases as one moves away from the magnet. Two problems arise: First, ferromagnetic materials in the environment can distort the magnetic field of the system degrading image quality, spectroscopic studies would be impossible. Second, the magnetic field can interfere with the function of certain electrical/mechanical devices such as instruments with cathode ray scopes, pace makers and so on.

Ferro magnetic material in the vicinity of the magnet could be stationary, such as structural beams or moving objects, such as elevators, passing vehicles. The former can be foreseen and compensated by symmetrical magnet placement and use of shims. Compensations of field distortions encountered from moving objects is generally more difficult and often impossible. It is necessary in such cases to make actual physical measurements on site to determine the compensation required.

Another aspect of planning involves shielding the examination area against rndio frequency waves emanating from external transmitters. The materials used for making the RF shield are one of the three: Copper, Aluminium and Stainless Steel. It is important to have good contacts between the panels used or else RF leakage can take place. Hence long term stability of the joined parts is essential. Parts which are bolted may become loose or oxidation may break down the conductivity of panels resulting in either case of RF going through.

A crucial aspect of planning MRI systems in India is the availability of cryogens. In super conducting magnets, liquid Helium and liquid Nitrogen are used to maintain the temperature of the magnet at the super conductive temperature (approx. 4 K). It is necessary first to fill the magnet with liquid helium and later on to refill the magnet after the permissible drop in level of liquid helium in the mngnet is reached. Liquid nitrogen is replenished more often than liquid helium. A minimum stock of both cryogens must be maintained at site to prevent magnet shut down in case of delay in cryogen supply.

Provision must be made to adequately vent the evaporated helium and nitrogen. Liquid helium can be vented to a recovery system and subsequently sent for liquidification. Oxygen monitors should be installed to ensure that the oxygen level in the examination room is not depleted due to leakage of the inert gases. Apart from the normal boil off, there must be a provision to vent off the helium in the event of a quench.

3.5.1 Planning Constraints

In terms of architectural planning constraints, the epicentre of all activity is the examination room (magnet room) which houses the magnet. The magnet is enclosed in an RF cage. The room is surrounded by satellite spnces viz. the control room, the computer room, the technique room, the cryogen storage, dark room etc. The computer room projects out of the central circle. This is done to avoid the field strength I mT where storage devices (magnetic disks) are sensitive. At the same time this projection has to be away from the expected I mT field of the proposed small magnet. The dark room is to be outside the magnetic field.

When spectroscopy is provided, caution should be exercised in locating it in relation to the magnetic fringe fields. Magnetic shielding may be required to restrict the magnetic field plot. Radio frequency shielding is required to attenuate stray rndio frequencies.

Facility shall be provided with uninterrupted power supply and central air conditioning to maintain temperature of 21°C. Noise generated by equipment can be frightening and

irritating to patients; accoustic treatment is recommended for a successful MRI procedure room.

3.5.2 Preventive Measures Against Magnetic Field Hazards

Metal detectors are placed at the entrance to screen any ferrous objects on patients and medical personnel. Besides warning notices are placed at strategic points warning visitors with pace makers, metallic implants etc. from entering the magnetic field. The magnet is in one piece and the floor must be reinforced to take the load of the magnet weighing approx. 10 ton in case of 1.5 Tesla while at the same time avoiding use of steel reinforcement. In the magnetic room and surrounding areas, air conditioning ducts, soil pipes, electrical conduits are to be of non-ferrous materials.

Check Your Progress 2

1) Which principles. the MRI uses to produce image?

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3) Magnetic field of 1.0 Tesla is equivalent to what measure'?

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3) What planning aspects are involved in shielding the examination area (magnet room) against the radio frequency waves emanating from external transmitters'?

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3.6 NUCLEAR MEDICINE DEPARTMENT

Nuclear Medicine as you know is concerned with diagnostic and therapeutic uses of artificially produced radioisotopes. Nuclear medicine procedures are of two types:

a) In-vivo procedures in which radioisotopes are administered to patients, and

b) In-vitro procedures where radioactivity is added to the samples collected from the patient.

Again, in-vivo tests are classified into imaging procedures, and non-imaging procedures. An imaging procedure, which is more popularly known as scintigraphy, provides an image of the distribution of administered radioactivity in the organ or tissue of interest at any given time. Non-imaging procedures are aimed at measurements of gross radioactivity in the organ of interest at any particular time. Serial measurements provide a time activity curve.

With the availability of many short lived radioisotopes, nuclear medicine has now become an important medical speciality with wide applications in various branches of medical science. Some of the important applications of nuclear medicine are:

- Imaging of various organs such as thyroid, liver, brain, bone and kidney etc.
- Thyroid function studies
- Investigations of central nervous system
- Absorption studies in gastroenterology
- Nuclear haematology e.g. blood volume studies, iron kinetics, etc.
- Renal function studies
- Nuclear cardiology e.g. stress thallium and MUGA studies
- In-vitro studies like radio immuno assay (RIA) of various hormones

With the help of an on-line computer, coupled to a gamma camera, a variety of dynamic function studies can also be performed using appropriate radio pharmaceuticals. Therapeutic uses of radio-nuclides are mainly limited to treatment of thyrotoxicosis and thyroid cancer with I-131, polycythemia vera with P-32, intracavitary installation of radiocolloides for malignant ascites and effusions and radio isotope synovectomy for painful joints.

A nuclear medicine department caters to the need of all clinical departments, because of radiation hazard associated with the use of radionuclides, planning of the department should be done in such a way that there is no radiation exposure to non-radiation workers and the genera1 public, and also that workers handling radioisotopes receive minimum exposure.

Nuclear **Medicine Imaging**

Nuclear medicine imaging, or gamma camera/rectilinear scanner produces images from gamma rays emitted by radionuclide injected into the patient. The commonest radionuclide used is technetium 99-m (Tc 99-m) which is tailored to image different structures or physiology by chelating it with compounds to target specified organs or physiological functions. The emitted gamma rays are detected by a gamma camera consisting a large lead shielded crystal that gamma camera scintillates when a gamma ray enters it. Groups of photo multiplier tubes behind the crystal detect and localise the scintillations and a computer analyses the resulting electrical signals and reconstructs an image.

Positron Emission Tomography

Nuclear medicine includes Positron Emission Tomography (PET) which is not common to most facilities. Positron emission tomography scanning is generally used in experimental settings and requires space for a scanner and for a cyclotron. For both a hot (radioactive) lab and a cold (non-radioactive) lab may be required. Significant radiation protection may be required since the cyclotron may generate high radiation. Special ventilation systems together with monitors, sensors and alarm systems may be required to vent gases and chemicals. The HVAC system will require particular attention, highest pressures should be in coldest (radiation) areas.

The cyclotron is water cooled with deionized water. A heat exchanger and connection to a compressor or connection to chilled water may be required. A redundant plumbing system connected to a holding tank may be required to prevent accidental leakage of contaminated water into the regular plumbing system.

Radio Pharmacy

If radio pharmaceutical preparation is performed on site, an area adequate to house a radio pharmacy shall be provided with appropriate shielding. This area should include adequate space for storage of radionuclides, chemicals for preparation, dose calibrators and record keeping. Even for use of pre-prepared material space adequate for dose calibration, quality assurance and record keeping shall be provided.

3.6.1 Facility Planning

Planning of a nuclear medicine facility be approached cautiously, as it is a facility with interrelated areas that require both a high degree of integration and a high degree of isolation. In order to understand these simultaneous need for integration and isolation,

awareness of the procedures to be performed within the nuclear medicine laboratory is required.

The value of nuclear medicine as diagnostic tool is based upon the ability of certain organs and system of the body to absorb radioactive isotopes of certain elements, measured with various types of radiation detection equipment. Unlike Radiology and Radiotherapy, nuclear medicine does not involve the use of radiation emitting equipment. The only radioactive materials used in diagnostic areas are those that are administered to the patient.

The Nuclear Medicine department is divided into:

i) Hot areas, those in which radiation levels potentially could approach a dangerous intensity,

ii) Diagnostic areas, those areas where the patient and staff are exposed to low levels of radiation, and

iii) Patient Support areas, those areas in which no one should be exposed to any radiation.

Hot' Areas

Activities performed in hot area include receiving, holding and stirring, diluting, counting and issuing of radioisotopes. Where work with liquid isotopes is performed in open laboratory areas, floor and work surfaces should be made of non-porous materials in case of spillage. All work with isotopes in solid should be performed in a glove box or under a hood, so that if spillage occurs the technician will not inhale or ingest the solid particles or fumes. The handling of isotopes before and during dilution is the hottest procedure performed in the nuclear medicine department.

After dilution for use in diagnosis, the radioisotopes require storage and their radioactivity level needs to be counted. These procedures are carried out in an area free of direct contamination from handling and diluting areas. From storage area, isotopes are sent to diagnostic area for administration to patients.

Hot areas facilities thus include a radio pharmacy cum Tc99m generator room, radio isotope storage, decontamination room, and dose administration room.

Diagnostic Areas

The focal point of the nuclear medicine department is the diagnostic areas, where actual isotope procedures are performed on patients. The mbst common procedure involves use of scanners, counting units, scintillation camera and counters. Diagnostic areas must be located immediately adjacent to patient support areas. Direct access between hot and diagnostic areas provides a high level of functional integration.

Support Areas

Such as waiting and reception areas, for the convenience of the staff as well the patient's. Waiting areas for patients should be located off the major circulation corridor and should be marked as to be easily seen and recognised. Staff support facilities, such as lockers and lounges, should be located as close as possible to the employees work areas. Important aspect to keep in mind for planning is to provide toilets separately for radioactive and non-radioactive patients.

The only area of the nuclear medicine department that must be isolated is the hot area. Such isolation is required, first because levels of radiation within the hot area potentially dangerous to personnel and secondly to prevent high levels of background radiation from distorting readings in the diagnostic area.

3.6.2 Radiation Protection Aspects

Radiation protection is an important aspect to be taken care of in nuclear medicine department. Adequate number of radiation monitoring instruments should be procured for routine monitoring and survey. A portable contamination monitor with aural alarm is an essential instrument. In addition, beta gamma survey meter with measurement ranges from a few in mR/hr to a few R/hr is also required where large activities are handled. Persons

handling radioisotopes should wear personnel monitoring badges while working in nuclear medicine department.

For effective implementation of radiation safety in nuclear medicine department, following points are to be ensured:

a) All walls and doors of the radioisotope laboratory are to be painted with a good quality washable paint.

b) Minimum furniture should be used.

c) Top surfaces of work tables should have a smooth laminated finish.

d) Adequate number of lead containers and interlocking lead bricks should be procured for providing adequate shielding in storage and handling rooms.

e) Remote handling devices for different operations in the radioisotope laboratory should be procured.

f) Ventilated fume hoods for handling large.doses of 1-131 and for carrying out extraction of Tc-99m should be installed.

g) The drainage pipes of the radioisotope laboratory i.e. of sinks, washbasins, toilet etc., should be connected directly to the sewage system.

h) Ordinary wall thickness is sufficient, in general, for the diagnostic nuclear medicine laboratory. However, extra wall thickness may be required for rooms where patients administered with I-131 therapy doses are to be hospitalized.

3.6.3 Radioactive Waste Collection and Disposal

The radioisotopes used in nuclear medicine are mostly short lived, the half-life being in the range from a few hours to a few days. In India, at present Tc-99 m and I-131 are the two major radioisotopes that are used for nuclear medicine procedures in large quantities. Because of the short half-lives, the disposal of radioactive waste is done by the simple method of decay and disposal. When the quantity of radioactive waste is large, specific advice on disposal may be obtained from the Radiological Physics and Advisory Division (RPAD) earlier known as Division of Radiological Protection (DRP), Bhabha Atomic Research Centre (BARC),Trombay, Mumbai-85.

3.6.4 Procedure for Obtaining Clearance

For obtaining the necessary license to handle radioisotopes, the user has to get the design of the department cleared by RPAD, BARC. Proposed layout of the department, indicating the locations of each operation with radioactivity such as storage and handling, dose administration, counting etc. to RPAD, BARC. Approval will be accorded for construction of the department with due modification as deemed necessary.

Simultaneously, information regarding the radioisotopes intended for use, their activity and purpose of use should be furnished to RPAD, The names of nuclear medicine staff, their qualifications and experience should be intimated in the prescribed form available with RPAD, The nuclear medicine specialist attached to the department has to get a clearance from Nuclear Medicine Committee for human administration of rndio pharmaceuticals, After these requirements are fulfilled, RPAD will issue the necessary authorization/no objection certificate for supply of radioisotopes by Board of Radiation and Isotope Technology (BRIT), a unit of Department of Atomic Energy.

Check Your Progress 3

1) List two types of Nuclear medicine procedures. Which of these involves radiation hazards?

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2) Describe in brief the functional divisions of Nuclear Medicine Department from radiation point of view.

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3) What must be observed in planning Nuclear Medicine Department to avoid radiation hazards?

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4) Elaborate the terms RPAD, BRIT and BARC.

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3.7 RADIATION THERAPY

Radiation therapy is a speciality in the field of oncology. Radio-therapy was started in India with the installation of first telecobalt unit in 1957. Recent reports of Bhaba Atomic Research Centre states that more than 60% of all cancer cases can be treated by radiation. The majority of the radio-therapy patients can be treated on out patient basis and also in limited radio-therapy facilities, Chemotherapy, which is exceptionally demanding in medical science both in the clinic and the laboratory, is given as an adjunct to radio-therapy or as a continuing treatment.

Radiation therapy can be divided into following categories:

Brachytherapy

Brachythernpy involving use of ionizing radiation is an important mode of treatment for cancers of specific sites. Isotopes like radium or the equivalent or radioactive cobalt cenium or iridium are used in the form of needles for implantation of tumours or in applicators to be placed against the tumour or inserted into a cavity containing a tumour. Because of the potential hazard involved in the use of ionizing radiations, it is essential that every brachytherapy facility complies with the various regulatory requirements as specified by the Radiation Protection Rules (1971) promulgated under the Atomic Energy Act (1962).

The medical institution while selecting and ordering a specific remote after loading brachytherapy unit must ensure from its supplier that the type approval/No objection certificate for the make and model of that unit has been issued by the competent authority i.e., Chairman, Atomic Energy Regulatory Board (AERB) from operational and radiation safety stand points. In case of sealed sources, it must be ensured from the supplier that the design of source encapsulation is also duly approved by AERB.

The radio isotope laboratory has for its solid sources a general service area where applicators and accessories are stored together with shielded containers and appliances for radioactive materials. A radio pharmaceutical room is needed to produce under aseptic conditions substances which are injected intravenously into the patient. Rooms for general in-vivo and in-vitro coupting are needed, where gamma cameras and rectilinear scanners are used. Additional rooms will be required for imaging equipment, A sub-waiting area will enable to separate patients who have received radio isotopes from other waiting patients. Where ever possible, rooms should have outside windows.

Mega Voltage Therapy (Teletherapy)

Teletherapy involving use of ionizing radiations of greater than one million volts. This includes cobalt 60 and a variety of accelerators using high energy x-rays. Most of the radiation therapy centres have more sophisticated accelerators which deliver radiation at 4 to 12 million volts. A few of the large centres have accelerators and betatrons which produce x-rays at 25 to 35 million volts.

In the linacs of linear accelerators, electrons are accelerated in a linear tube by high frequency power generators. Electrons are emitted from a gun, travel down the tube gaining energy all the way to hit a target and produce x-rays at the end of the tube or to be let out. The main advantages over the cobalt are the higher quantum energy of the radiation, better depth dose curves, better collimation and much higher radiation intensities of the x-rays. The maintenance of a linac is more complicated and costly than that of cobalt unit.

In the betatron, electrons are accelerated by induction and guided by magnetic fields. The betatron is basically a very simple and reliable, though expensive machine for producing very high-energy electrons. Unlike radiation from other common sources, the dose it delivers drops off very sharply after a certain depth and in general, a lower amount passes through the patient on the side away from the point at which the radiation enters. These advantages are countered to some extent by the fact that electron beam is not particularly well focused and radiation is scattered to tissues around the cancer.

According to Snelling a cobalt unit can treat 30 to 40 patients in a day of 7 hours and a linear accelerator treats 60 to 70 patients in the same duration. All machines should be replaced in 12 to 15 years.

Ortho Voltage Therapy

Ortho voltage therapy involving use of ionizing radiation with energies from 150 to 400 kilovolts. This equipment now stands replaced largely by megnvoltage units. It is used in the treatment of infiltrating surface malignnncies and often as a supplement to megavoltage therapy such as interoral and intervaginal treatment.

Superficial Therapy

Superficial therapy employing ionizing radiation with energies from 8 to 140 kilovolts. Relatively soft x-rays are used for non-infiltrating cancers such as skin cancers.

3.7.1 Facility Planning and Procedure

Functional facility planning of the department includes clinical examination section, treatment section and the radiation rooms.

The clinical examination section of radio therapeutic clinic includes a reception area including a registration room, examination and consultation rooms, medical staff and social workers rooms, waiting area including stretcher or trolleybays, storage, toilets and telephones.

The treatment section comprises the treatment planning room for time consuming dosimetric planning which requires access to a computer assisted tomography, simulator, mould room, medical officers and staff rooms, physicists, technicians, secretarial work rooms and record facilities, space for machinery including the power supply components and the control room.

A computer nssisted tomography coupled with computerized treatment planning and dosimetry offers a great potential for improving radiation therapy through accurate localization of tumour and critical normal structures within the host and by utilizing the tissue density and x-ray attenuation coefficients to increase the accuracy of close computations.

A simulator is an essential piece of equipment and mandatory for all teletherapy units. The accommodation will comprise the main simulator room and a control room, an x-ray

processing room and a clinical room for the preparation of the patient for minor surgical procedures.

A mould room suite is a key supporting facility. The prime function of this suite is to produce skills and applicators for tumour sites. Here patients impressions are taken, appliances constructed. A vacuum forming and injection-moulding bay is required as well as a store for materials. As the mould room uses inflammable materials, good ventilation is essential.

To reduce the hazard of transporting radioactive sources, the insertion of radioactive materials is undertaken in the operation room. A single operation room unit is needed. Extra space must be allowed for radiation protection equipment.

The treatment or radiation room needs about 45 cm^2 to 80 cm^2 depending upon the nature of teletherapy unit for its irradiation area. Various methods are used for providing access to the room. The most convenient is a door leading directly into the room. Such a door requires heavy shielding. A maze arrangement is generally the most economical, as shielding of the door can be greatly reduced, usually to less than 6 mm of lead, if it is exposed to multiple scattered radiation only. The required lead equivalence of the door will depend upon radiation energy, maze design, weekly work load and beam orientations.

The people outside the treatment room must be protected from accidental radiation. The walls of the treatment room likely to be hit by the direct radiation must be made of baryt concrete, the other walls may consist of normal concrete (refer to specifications at sub-section 2.6.4). In treatment room, there is a hazard due to high concentration of ozone and the oxide of Nitrogen. An air flow across the room to reduce rapidly the gas concentrations and about 12 air changes per hour should be provided. The machine control room or station needs not border on the treatment room. It should allow adequate space for the radiographers.

Govt. of India has designated Chairman, Atomic Energy Regulatory Board (AERB) as competent authority for implementation of radiation protection. Institutions intending to set up radiation therapy centre must seek clearance from RPSD. No construction work should be undertaken by the institution unless prior approval of RPSD of BARC for the specific layout of the installation has duly been obtained by the institution.

When the installation of the unit is completed as per specifications, the institution must immediately inform RPSD, so that pre commissioning radiological protection survey of the facilities could be carried out and necessary permission accorded for the commissioning of the installations.

For supply of source, the institution is required to place an order with the senior manager of technical sales operations, Board of Radiation and Isotope Technology (BRIT), Mumbai.

3.7.2 Radiation Protection Facilities

For storing Brachytherapy sources/applicators, the medical institution should ensure the availability of an appropriate lead protected storage safe. For movement of sources, an adequately shielded lead transport container must also be made available. To reduce the exposure to the personnel handling sealed sources, the institution should ensure the availability of an appropriate lead-bench which is essential for preparation of interstitial implants.

The institution concerned is responsible' for making necessary arrangements for the transportation of the decayed/damaged sources to Bhabha Atomic Research Centre for subsequent safe disposal. It is desirable to preserve the original packing and lead containers of the sources carefully so that they can be made use of for transporting the decayed sources, when necessary.

The decrease in output of a tele cobalt machine due to the decay of the cobalt source necessitates the replacement of the source once in 5-7 years. The source also requires replacement when the output of the machine falls below 50 rads per minute at treatment distance for meaning full radiation therapy. The institution is also responsible for the safe disposal of the decayed source in consultation with RPSD.

3.7.3 Radioactive Waste

Radioactive waste from tele-curie and brachy-curie treatment is in the kilocurie or 100 milli curie range with a half life of about five years. These preparations as well as cobalt-60 are regarded as no longer useable after a few years. These waste are not bulky but are highly active and need to be fully screened at all stages.

Waste from nuclear medicines and other applications are bulky but with a half-life of less than 14 days can be treated as inactive waste after 24 half life periods. Iodine 125, with a half-life of 60 days, need special storage. When providing facilities for storing of these wastes, the national regulations have to be observed.

3.7.4 Specifications for Tele Therapy and Brachy Therapy

Siting

The location of the Tele therapy and Brachy therapy installation should be so chosen that it is away from unconnected facilities and is close to the related facilities. These shall be planned at ground floor with requisite radiation protection shielding barrier walls and ceiling. Specific layout indicating appropriate wall and ceiling thickness should be worked out by the institution in consultation with Radiation Protection Services Division (RPSD) of Bhabha Atomic Research Centre (BARC) Trombay, Mumbai. The actual wall and ceiling thickness required will relate to the type and model of the Tele therapy unit, (telegamma unit relating maximum activity of the source and or an accelerator depending on maximum energy of the electron/photon beam) and will also depend on the nature of occupancies in the immediate surroundings and above the ceiling. Whereas in case of Brachy therapy, it will depend on the type and activity of sources, work load, nature of occupancies in the immediate surroundings and also above the ceiling and below the floor, if any. In the case of accelerators additional rooms for modulator, cooling etc. are required.

In case of Brachy therapy facility, it is desirable that the minor operation theatre is situated in close proximity to the treatment room/ward so as to facilitate easy transfer of patients. It is also to be noted that treatment room/ward should be exclusively used for brachy therapy patients only. U-traps or appropriate sieve arrangements should be provided in the toilet drain to ensure settling of any Brachy therapy source accidentally discharged into the toilet. Windows may be provided in the outerwalls of the wards facing open area above a height of at least 200 cm from the finished floor level inside.

Construction Material and Restraints

The construction material to be used for Tele therapy treatment room and for the treatment room/ward of Brachy therapy should be concrete of density 2.35 gm per cubic cm (gm/cc). However, where structural requirements so demand, RCC may be used. In case concrete of higher densities like haematite, baryt etc., are used the thickness may be reduced in inverse proportion to the ratio of their densities. Regarding feasibility of reduction in the physical thickness of some of the shielding barriers for getting more clearance to take the crates of Tele therapy unit into the room, reduction by a factor of 0.67 can be achieved by using haematite concrete of density 3.5 gm/cc instead of ordinary concrete of density 2.35 gm/cc. Alternatively steel in the form of sheets can be used as shielding material. Ten millimeter thick steel sheet will replace approximately 33 mm thick shielding barrier of ordinary concrete.

When two radiation installations are envisaged, they may preferably be located adjacent to each other so that one of the thick walls may be made common for both the installations. This will help in reduction of construction cost. In case there is no likelihood of occupancy above the Tele therapy room the primary barrier thickness for the ceiling may be provided from above. This will ensure that there will not be any construction above the ceiling in future and further the construction cost is also reduced.

It may be necessary for the installation of the Tele therapy unit that some portion of the wall or ceiling be constructed after bringing the crates carrying the unit into the treatment room. It may also be ensured from the supplier of the unit before, starting construction work that the maze planned for the treatment room is adequate for the movement of the various components of the unit with or without crates.

A ramp may be provided in close proximity to the tele therapy installation to facilitateeasy movement of the crates carrying the unit to tele therapy room. The ramp is also useful in future during source replacement operation, which is to be carried out once in every 5-7 years. The height and slope of the ramp should be so adjusted that the transport container can be unloaded with ease from the truck and transported into the Tele therapy room on a suitable trolley.

In certain instances, it is difficult to meet the shielding requirements of a Tele therapy installation due to structural and space constraints. This situation may arise when a:

- tele therapy unit is to be installed in an existing room,
  stationary telecobalt unit in an existing installation is to be replaced by a rotational telecobalt unit, or
- telecobalt unit is to be replaced by an accelerator.

This difficulty can be circumvened by installing a Tele therapy unit with a beam stopper. The beam stopper completely intercepts the primary beam and reduces its intensity approximately by a factor of 1000 and thereby decreases the shielding requirements for the primary barrier.

Viewing System

For observing the patient under treatment and the gantry movement from the control room, appropriate viewing system being an essential need must be provided. This can be achieved by providing either:

- Lead glass viewing window or
- Closed Circuit TV System (CCTV).

A viewing window of 4 cm lead equivalence should be installed. For this purpose an opening of 120 cm × 120 cm should be left untilled at the time of construction of wall in question at a height of atleast 135 cm from the finished floor level of the control room and a lateral distance of about 100 cm from the central line of the unit.

Alternative to lead glass viewing window, a CCTV system may be installed in the treatment room for observing patients under going treatment. The system should be supported by an additional camera and monitor should be available as standby or a back up mirror arrangement must'be available for viewing whenever CCTV system fails. In case of accelerator installations CCTV needs only be provided.

The mirror arrangement consists of installation of mirrors at appropriate locations inside the treatment room so that the image of the patient reflected in the mirrors is viewed through an observation panel fixed on the door of the treatment room. This observation panel may be of glass of size 20 X 20 cm located at a height of about 1.4 m from the floor.

Conduit

A conduit of 5 cm diameter should be provided in the wall to enable cables of radiation's measuring instruments to pass through from the control room to the treatment room. The conduit should be fixed in the specified wall at an angle between 20"-45" to the horizontal. The lower end of the conduit should be located in the treatment room at a height between 15-20 cm from the inside finished floor level.

Door Interlock

Door leading to the treatment room (Tele therapy/Brachy therapy) may be ordinary wooden door of width 150 cm for Tele therapy and 120 cm for Brachy therapy. This door should be so inter-linked to control panel by electrical interlocks that the unit cannot be operated upon when the door is open. A red warning light should be provided above the door and should be so inter-linked to the control panel that the light glows only when the unit is in operation,

Alr Conditioning

The treatment rooms (Tele therapy/Brachy therapy) should be air-conditioned. Central air conditioning or split type of air conditioning may be provided. In case of central air

conditioning, ducts should pass over the entrance door and along the ceiling over the maze for entry into treatment rooms. In case of split air conditioners, conduit of minimum diameters as required may be provided at a height of about 1.5 m from the floor of treatment room. Conduit for the passage of the air conditioning duct is to be provided in the specified wall at an angle to avoid direct scattered radiation passing through it. In the case of accelerator installations special ventillation arrangements are required for which RPSD should be consulted. It is desirable that control room should also be air-conditioned.

Electrical conduit requirement and any pit in the ground, load specification, conduit etc., particularly Tele therapy unit should be decided in consultation with the firm installing the unit, before commencement of the actual construction work.

Check Your Progress 4

1) Which of the radiation therapy units are in general use in radiation therapy centre?

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.....

2) Fill in the blanks:

Brachy therapy involving use of ionizing radiation is an important mode of treatment for ..... of specific sites such as .....

3) Name the regulating authority who is to approached for establishing of Radiation therapy centre comprising of Tele therapy units and Brachy therapy units.

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4) List the measures which can protect the personnel from radiation hazards of radiation therapy unit.

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3.8 LET US SUM UP

In this unit you have learnt about the Radiology Services involved in use of ionizing radiation requiring radiation protection and safety measures to safeguard occurrence of radiation hazards in health care institutions and hospitals.

Radiology department uses many different diagnostic-imaging modalities, radiograph to video imaging associated to use of contrast media. The process of Radiography, Fluoroscopy and Mammography involves mainly x-ray film exposures where in control of radiation is of prime importance. Other video imaging modalities of diagnostic imaging as radiology services not involving direct or indirect exposure of radiographic films include Digital radiography, Digital subtraction angiography, Computed tomography, Sonography, Echocardiography, Thermography, Magnetic resonance imaging and Nuclear medicine scanning.

Magnetic resonance imaging is considered by many to be the most revolutionary imaging technology of the 20th century. Advances in medical technology have reduced the area of magnetic field influence (the gauss field) surrounding the equipment to allow it to be more easily integrated.

Nuclear medicine department emitting radiation hazards associated with the use of radio nuclides require careful planning to ensure that there is no radiation exposure to non-

radiation workers and the public, staff handling radioisotopes are subjected to receive minimum exposure.

Cardiac catheterization laboratory employing ionizing radiation is vital to the diagnosis and treatment of coronary diseases. The procedure may be either diagnostic or therapeutic. Coronary angiography is a diagnostic procedure where as therapeutic procedure involves installation of pace makers and engioplasty.

Laser imaging is much more sophisticated technique of converting digital signals from an imaging modality into hard copy. It emits radiation in the infra red range requiring protective measure.

Radiation therapy is an important therapeutic technique for treatment of cancer. Brachy therapy and Tele therapy, which includes cobalt-60 and a variety of accelerators, are the vital units mainly involved in this therapeutic field.

Because of the potential hazard involved in the use of ionizing radiation, it is essential that every radio-therapy facility complies with various regulatory provisions as specified by the radiation services department, as envisaged under the Radiation Protection Rules (1971) promulgated under the Atomic Energy Act (1962). Government of India has designated Atomic Energy Regulatory Board as the competent authority for the implementation of radiation protection.

3.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress **1**

I) Radiation hazard in an x-ray room can be avoided through a provision of shielded control alcove with a view window designed to provide full view of patient and examination table.

2) • The wall behind chest stand

• The wall of dark room

are two specific high risk areas within an x-ray room.

3) All operators who work with ionizing radiation to wear small film badge to record the dosage received during their work, routine use of radiation proof apron (lead equivalent 2.5 mm) and protective gloves (lead equivalent 0.3 mm) are the radiation safety monitoring practices.

4) Some of the important effects are: a) Shortening of life span, b) cataract formation, c) chronic radio dermatitis, d) leukemia, e) cancer, f) decreased fertility, and g) genetic mutation.

Check Your Progress 2

1) MRI uses the principles of nuclear magnetic resonance (NMR) to produce images without use of ionizing radiation. Magnetic field of 1.0 Telsa is equivalent to 10000 Gauss whereas the earth's magnetic field is 0.7 Gauss.

2) Shielding of Radio frequency waves is achieved through an R F cage made of non-ferrous material such as copper, aluminium or stainless steel.

Check Your Progress **3**

1) The two types of nuclear medicine procedures are: In-vivo procedures in which radioisotopes are administered to patients, and In-vitro procedures where radioactivity is added to samples collected from the patient. Former involves radiation hazards.

2) There are three functional divisions of Nuclear Medicine Department. Hot areas, in which radiation levels potentially can reach dangerous intensity. Diagnostic areas,

3) Due to radiation hazard associated with the use of radio nuclides, medicine department should be in such a way that there is no radi non-radiation workers and general public, and also that radiation radio isotopes are subjected to minimum exposure.

4)
- DRP stands for Division of Radiological Protection.
- BRIT stands for Board of Radiation and Isotope Technology
- BARC stands for Bhabha Atomic Research Centre.

Check Your Progress 4

1) Mega voltage therapy or tele therapy units are in general use. Thi and variety of linear accelerators using high energy x-ray.

2) Cancers, Tumour

3) Radiation protection services division as envisaged under Radiati (1971) promulgated under the Atomic Energy Act (1962) is the re

4) Radiation hazards can be avoided through provision of radiation p barrier walls and ceiling, a maze, door interlock, viewing system a radiation measuring instruments.

3.10 FURTHER READINGS

Insadore Rosenfield, ***Hospital Integrated Design,*** Progressive Architecture Library, New York.

World Health Organisation, ***Approaches to Planning and Design of Health Care Facilities,*** Volume 3.

Ervin Putsep, ***Modern Hospital—International Planning Practices,*** Lloyd-Luke Ltd. 49 Newman Street, London.

Radiation Protection Services Division, ***a. Nuclear Medicine Laboratory, b. Planning of Tele Therapy Installation, c. Planning of Brachy Therapy Installation,*** Users Guidelines, Bhaba Atomic Research Centre (BARC), Trombay, Mumbai.

International Hospital Federation, ***Hospital Management International,*** 1995-1997, IHF 4 Abbots Place, London, UK.

Jain Malkin, ***Hospital Interior Architecture—Creating Healing Environment for Special Patient Populations,*** Van Nostland Reinhold, New York.

UNIT 4 BLOOD TRANSFUSION SERVICES

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- identify the major nim of blood transfusion;

  provide information about the planning considerations including physical facilities and layout, equipment and staffing;

  decide category of blood bank appropriate to a hospital depending on its bed strength, specialised services, teaching and training facilities available;

  identify managerial issues involved; and
- describe the quality assurance and control measures.

4.1 INTRODUCTION

Blood transfusion is a broadly based discipline that overlaps and intersects many other medical, scientific and managerial fields, including haemntology, immunology, genetics, histocompatibility, cellular function and metabolism protein structure and function, cryobiology, disposable equipment, bioengineering, statistics, data-processing, public relations, logistics, and standardisation. Coordinated long-range planning is needed for the development and integration of such diverse activities, together with careful consideration of priorities and optimal use of resources. This is particularly important in developing countries where financial and other resources are very limited.

Accumulated information has revealed that Blood Transfusion Specialists, especially in developing countries, often need training in various aspects of management, such as planning the development of n national blood transfusion service, or expanding and improving the efficiency of an existing one, calculating the present and projected needs for blood, determining priorities in developing production of essential blood derivatives, and preparing budgets for the development or expansion of such services. Guidance is needed for the planning of the premises and staff training, for estimating the number of personnel required, and for preparing instructions (including principles and practice of quality assurance), regulations and job descriptions.

4.2 HISTORICAL DEVELOPMENT

In this unit you will learn in detail about various aspects of planning and management of Blood Transfusion services.

Resolution WHA28.72, adopted by the Twenty-eighth World Health assembly in 1975, requested the Director-General of the World I-Iealth Organisation (WHO) Io increase assistance to Member States in the development of national blood transfusion services. The blood transfusion service is a vital hut very often neglected part of the National Health Service, although blood and blood products have become indispensable in medical treatment during the past thirty years.

William Harvey ⓒ of blo.

1400's: During the time of Christopher Columbus at the end of 1400, Pope Innocent VIII, when he was old and ill, was given the blood of three young courtiers, probably by mouth. The illustrious patient died as did the three youth, who probably had lost too much of blood.

1616: William Harvey described circulation of blood.

1667: Jean Baptiste Denis, Physician to Louis XIV, transfused 9 oz. blood from carotid artery of a lamb into the vein of a young man successfully. Subsequently the transfusions failed and transfusions were prohibited except with the sanction of Faculty of Medicine in Paris. In 1668 the dangers of transfusing animal blood into man were recognised.

1678: An edict of French Parliament declared transfusion unlawful and similar decision in other countries followed.

1818: James Blundell, English obstetrician, gave first man to man transfusion, in a case of post partum haemorrhage. The patient recovered.

1899: Shattock noted agglutination, which he interpreted to be result of rheumatic fever. The pioneers in transfusion therapy faced not only the problems of an unpredictable outcome of each transfusion but also the problem of blood clotting and sepsis.

Landsteiner. 3 BG
A B O

1900: Landsteiner described 3 blood groups, which he called 1, 2 and 3. Karl Landsteiner, the father of modern immunohaematology, discovered the importance of blood groups and agglutinins, the so-called natural antibodies, which are responsible for transfusion reaction due to major blood group incompatibility. He subsequently called these as blood groups A, B and O.

Decastello & Sturli AB

1902: Decastello and Sturli, his pupils, discovered group AB.

1914-1916: Hustin in 1914. demonstrated the use of a mixture of sodium citrate and glucose as a satisfactory anticoagulant and blood preservative doing away with the practice of direct transfusion from donor to the recipient. The outbreak of World War I saw the large scale of anticoagulant stored blood to treat war casualties.

1937: On March 15, 1937 first blood bank in U.S. was opened at Cook County Hospital through the efforts of Dr. Bernard Fantus who conceived the term " Blood Bank".

1939: Levine and Stetson discovered Rh system and its role in hemolytic reactions. On the basis of Rh typing the human population was divided into Rh positive (85%) and Rh negative (15%) individuals.

1945: Coombs Mourant and Race introduced antiglobulin test based on a method described by Moraschi 1908.

World War II saw major advances in the organisation of regional transfusion centres, organisation of voluntary blood donors services, collection and preservation of blood and production of plasma, on a scale unknown earlier to meet the needs of the war time casualties.

Other blood groups were discovered during 1946 and 1951.

1964: Blumberg discovered Australia antigen.

1981: First case of AIDS was detected. This resulted in a radical turnabout in the transfusion medicine to review many of the established approaches. There were primarily two reasons for this change—the discovery of AIDS and major advances in technology.

Developments over the last three decades in the field of renal dialysis, cancer therapy, cardio-vascular surgery, transplantation surgery, treatment of hemophilia and related

disorders have put enormous burden on the blood transfusion services, not just for whole blood, but for products not available earlier, namely, blood components or blood selectively depleted of specific cellular components.

As a consequence three major changes have taken place in the blood traasfusion services throughout the globe.

1) Blood Donors

There has been increasing change in donors being accepted from professional donors to the voluntary donors. It is due to the increased awareness of the risk of transfusion transmitted diseases especially through that of the professional donors. Another important factor is the awareness that the blood of professional donors is under-haemoglobinised and, therefore, does not serve the real purpose.

The trend for **Autologous** Transfusion has opened a much better arena both from safety as also disease transmission.

2) Blood Transmitted Diseases

Blood is a double-edged weapon. On one hand whereas it is life saving, on the other it is endowed with the dangers of transmitting deadly diseases. Fortunately more and more awareness is coming into the public regarding this danger. The infections that may be transmitted through transfusion are Hepatitis B, Hepatitis non-A and non-B, HIV, CMV, Syphilis, Malaria, E.B. virus and HTLV infection.

The discovery of post transfusion Hepatitis in 1968 led to mandatory testing of blood for Hepatitis B antigen (HbsAg). This resulted in lowering the incidence of post-transfusion hepatitis. But it was found that many other organisms like non-A non-B hepatitis virus (called as Hepatitis C and D viruses), Cytomegalovirus (CMV), EB virus, were also responsible for post transfusion hepatitis, In addition to these the transmission of HIV I and II through transfusions resulted in overall changes brought about in blood banking. The role of blood in transmitting Treponema causing Syphilis and Plasmodium resulting in malaria too were highlighted. Hence it has been made mandatory that every donor must be tested for these. HTLV implicated in endemic T-cell leukemia are other viruses transmitted in blood that can cause serious and fatal diseases.

3) Introduction of Disposable Plastic Bags

In 1960 the changeover from glass bottles to plastic bags revolutionised the working of the blood banks. This helped in the use of the components to a much greater extent and also helped in better safety procedures. The introduction of disposable too helped in much safer transfusion procedures. The added advantages of the disposable are:

a) convenience in storage and transportation
b) no breakage
c) ease to transfuse
d) less risk of transfusion reactions
e) facilitates various blood components separation

With the availability of Apheresis procedures the scene in the blood banks has changed tremendously as one can now procure what is really needed.

4.3 ROLE AND FUNCTIONS

Blood Transfusion Services play a vital role in daily functioning of a hospital. The major functions of blood transfusion service are:

a) Recruitment of donors and maintenance of donor records.
b) Collection, storage and preservation of blood and blood components
c) Laboratory procedures
d) Teaching, training and research
e) Clinical/therapeutic functions

4.4 TYPES/CATEGORIES OF BLOOD BANKS

Based on consumption of blood and bed strength, blood banks have been divided into three categories:

Category I : Hospitals consuming 3-7 units of blood/Bed/Year
Bed strength 100-400
It includes District Hospitals, Corporation Hospitals, No Superspecialities, and Non-teaching

Category II : Hospitals consuming 8-15 units of blood/Bed/Year
Bed strength 400-1000
It includes State Medical Colleges, Specialised Hospital, and Teaching Hospital.

Category III : Hospitals consuming more than 16 units of blood/Bed/Year
Bed strength > 1000
It includes Apex Institutes, Metropolitan Medical College, and All Superspecialisation Teaching Hospitals.

Check Your Progress 1

1) Fill in the blanks.

a) William Harvey described the circulation of blood.

b) Blood group AB was discovered by Decastello and Sturli in the year 1902.

c) Blumberg ... discovered Australia Antigen in the year 1964

d) In the year 1981 first case of AIDS was detected.

2) Give True or False:

a) Malaria may be transmitted through blood transfusion. (True/False)
b) Introduction of disposable transfusion sets helped in transmission of diseases. (True/False)
c) Based on blood consumption and bed strength; blood banks can be divided in to four categories.@ (True/False)
d) There is more risk of transfusion transmitted diseases among professional donors as compared to voluntary donors. (True/False)

3) List the advantages of using disposable plastic bags.

- no breakage in storage + transportation
- convenience & ease of transfusion
- & risk of transfusion reactions
- facilitates old component seperation

4) List the major functions of blood transfusion service.

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4.5 PLANNING CONSIDERATIONS

4.5.1 Physical Facilities and Layout

A blood transfusion centre can meet the demands made on it only if adequate premises are

available. It should preferably be located at the ground floor, close to the emergency and the operation theatres. The premises must be of suitable size, construction, and location to facilitate their proper operation, cleaning, and maintenance in accordance with accepted rules of hygiene. They must comply with the Requirements for Biological Substances No. 1 (Geneva Requirements for Manufacturing Establishments and Control Laboratories) and provide adequate space, lighting, and ventilation for the following activities:

- Medical examination of the individuals to determine their fitness as donors of blood and/or blood components
- Taking blood from donors with minimum risk of contamination or error
- Care of donors, including those who suffer adverse reactions
- Storage of whole blood and blood components pending completion of processing and testing
- Separate storage of whole blood and blood components after testing and before distribution
- Laboratory testing of blood and blood components; processing and distribution of whole blood and blood components in a manner that minimizes the risk of error
- Performance of all steps in apheresis procedures where applicable
- Labeling, packing and other additional operations
- Storage of equipment, reagents and disposable material
- Documentation and recording of data of the donor, the donated blood and, the recipient

Further in planning a transfusion centre, due consideration should be given to the following;

- Total amount of blood to be taken; and
- The level at which the centre will operate (national, regional or district), which will determine the different tasks requiring different premises, working conditions, equipment and personnel.

The centre must make special provisions for space if it is to:

- Have an outpatient department for activities such as sampling for antenatal serology or treating patients with haematological diseases;
- Produce sterile containers (bags), blood taking and giving sets and other sterile equipment;
- Produce blood grouping reagents.

General Considerations

Location and Space

The blood transfusion centre should be located where it provides easy access for donors and staff, and allows quick and safe transportation of blood and components to hospitals. The areas of the blood bank should be contiguous. The blood bank should have the following areas:

- Donor Recruitment area
- Bleeding complex
- Therapeutic area
- Laboratories
- Administrative and clerical offices
- Teaching Facilities

Donor Recruitment **Area!** Donor recruitment is extremely important for success of a blood bank. Recruiting voluntary donors requires techniques of mass contact, therefore, the donor recruitment area should be provided with:

- Adequate space for interaction with the'donor, It should be air conditioned and comfortable, so that any apprehensions in the mind of a donor are removed.
- Adequate facilities for maintaining and retrieving donor data as and when required.

- Printing facilities to provide required information to the donor should be available.
- The bleeding complex should have adequate space and facilities for a comfortable bleeding of the donor.

Hygienic Conditions: The best hygienic conditions must be ensured throughout the premises of a transfusion centre since there is a continuous movement of donors, staff, materials, and blood and blood samples.

Blood and blood components taken from the centre are used in hospitals, and external contamination of containers should, therefore, be avoided. All rooms must be easy to clean, with washable floors and walls.

The collection and disposal of waste must take place separately from the distribution of clean material, to avoid the spread of infection; provision for the expedient disposal of potentially infective materials by autoclaving and/or incineration must be made, There must be compliance with local by-laws in the disposal of these materials. It is particularly important that special arrangements be made for the disposal of blood samples and occasionally, of outdated blood: they Should not be directly discharged into the public sewerage system.

Air-conditioning is desirable for the greater comfort of donors and staff.

Moreover special conditions, including a supply of filtered air, or low temperature and humidity. may be required for some types of equipment and procedures.

Infrastructure within the Transfusion Centre

Following facilities need to be considered and taken care of while planning a blood transfusion centre.

Water Supply: The water supply should never be contaminated with any material potentially dangerous to health; it must be suitable for production of pyrogen-free water. Installation of filters is often necessary.

Electricity Supply: A reliable electrical supply is essential for lighting and for operation of equipment. A power failure to refrigerators may damage stored blood and blood components, and a transfusion centre must, therefore, have its own stand-by generators. The cost of damage caused by a power cut will almost certainly exceed the cost of the generator. Special attention should be paid to the possible need for a nonstandard electrical supply and for voltage stabilization, especially when considering the suitability of particular equipment.

Sewage: Sewage disposal must comply with the sanitary requirements of the local health authority. It should be noted that highly nitrogenous sewage has a high biochemical oxygen demand rating and should, therefore, never be discharged in an untreated condition.

Storage: Whole blood and blood components must be stored separately in a refrigerator, refrigerated room, or freezer, as appropriate, which is used only for this purpose. Refrigerated rooms are more economical for larger transfusion centres, where large quantities of blood and components must be accommodated,

Steam: If large-scale production of solutions is undertaken, there should be an adequate supply of steam for cleaning of equipment and operation of sterilizers. The steam itself should not cause or leave a contaminating deposit on the equipment or containers to be cleaned or sterilised.

Distilled Water: A supply of freshly distilled (and usually deionized) water should be available in every blood transfusion centre.

Gas, High-pressure Air Vacuum: Depending on the task undertaken by the transfusion centre, there may be a need for a gas supply, for high-pressure air and for vacuum facilities.

Communications: The transfusion centre requires telephones and/or telex facilities to maintain communications with hospitals and other transfusion centres, and to call in donors in special circumstances.

Factors Determining Adequate Floor Space

If a transfusion centre is not located within a hospital, the following supporting facilities must be provided:

- Sterilizing room
- Laundry
- Garage
- Store rooms
- Changing rooms, toilet facilities and canteen for staff of the centre
- Workshop for maintenance of the building and equipment

In the case of multistory buildings, the floors should have large loading capacity; where floor space is limited; weight distribution must be carefully considered.

The provision of a basement depends on the climatic conditions and the type of ground, and may prove impossible in tropical areas.

Standards for Space for Blood Bank

Depending upon the type of the Blood Bank the standards for space are as follows:

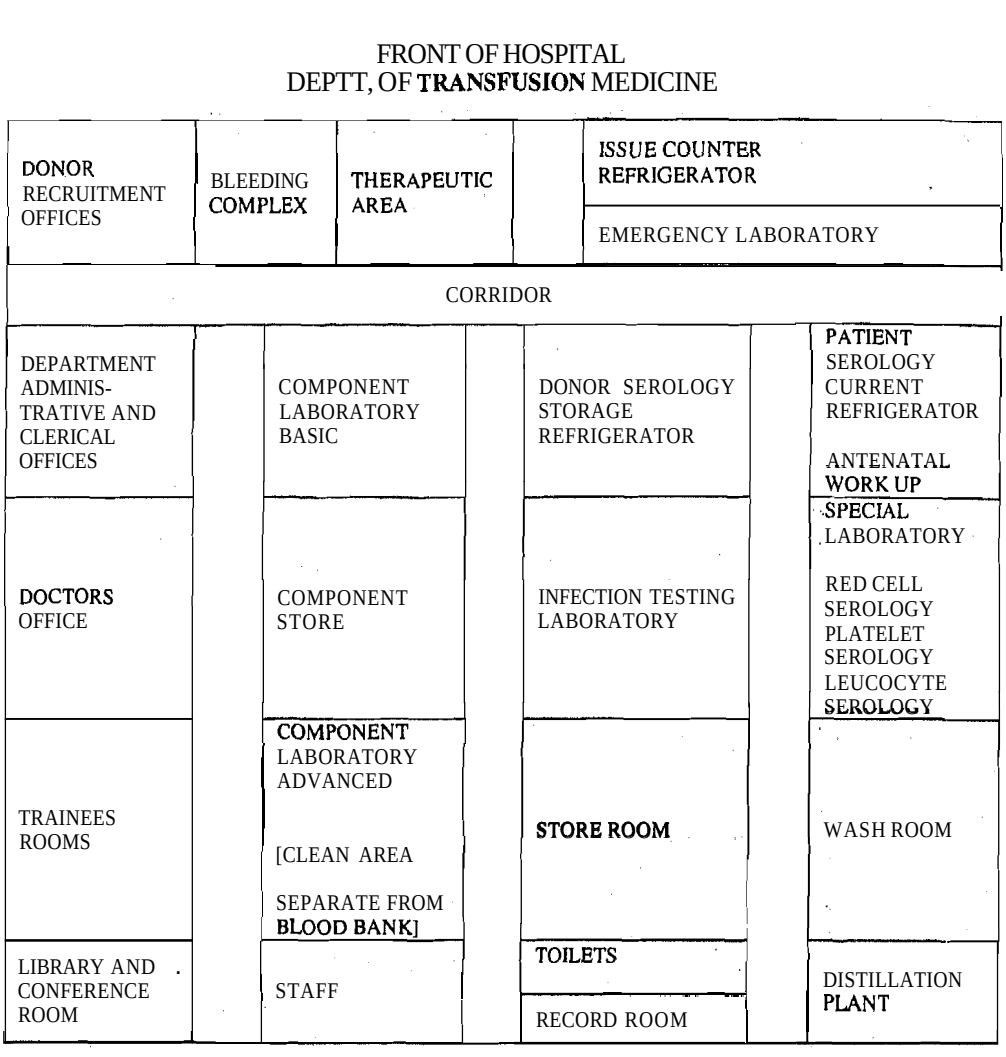
	Blood Rank Category		
	I	II	III
Bleeding Complex			
1. Reception Room	25	25	40
2. Medical Examination Rooms		15	25
3. Bleeding Room	40	55	100
4. Refreshment Room	15	25	30
5. Kitchen/Pantry	5	5	10
6. Aphcresis area			40
7. Day Care/Therapeutic area		30	50
Laboratory Area			
1. Laboratory for routine Donor work		25	50
2. Laboratory for routine patient and antenatal work		25	50
3. Laboratory for specialized work: Platelets HLA granulocyte serology			50
4, Issue Counter			20
5. Emergency Laboratory	18	20	20
6. Hepatitis, HIV, VDRL, Malaria	20	25	30
7. Wash room, distillation plant ctc.	20	25	30
8. Component basic and coagulation work		25	30
9. Component advanced freeze-drying			50
General Areas			
1. Doctor's office	15	15	20
2. Donor, Recruiter, Social Worker, clerical staff	25	30	50
3. Blood *Bank* Office	15	20	25
4. Stores	20	25	35
5. Technician's common room	15	20	25
6. Toilets	5x2	5x2	5x3
7. Trainee doctor's room			25
8. Library/Conference room			30
Total	**248**	**460**	**895**

Note: It is imperative to have bleeding room, refreshment room, donor waiting area and laboratories air-conditioned.

Minimum Area Requirements for different categories of blood bank are:

For category I : 100 Sq.M
For category II : 300Sq.M
For category 111 : 895 Sq.M

General Layout of **a** Blood **Bank**



4.5.2 Equipment

In a blood bank equipment are required for routing work, blood component work and for screening purpose of blood. In this **section** you will learn about requirement of these equipment.

A) ***For Routine Work***

1) Refrigerator: The refrigerators should maintain a temperature of 1-4° C, have audio-visual alarm system, temperature display, and recording, air circulation and **24** hours power supply. The inside should be of stainless steel and removable or pull out shelves.

   Although the number of refrigerators will depend upon the size and work load of the blood bank, yet a minimum of 3 are required, **1** for storing uniested blood, **1** for tested blood and **1** for cross-matched blood.

2) Table Top Centrifuge: Capable of 3500Xg with accurate timer in 1 min. increment up to 30 minutes' Accurate Tachometer. Acceleration to desired speed in **approximately 30 sec.,** rapid deceleration Rotor for swing head capable of taking minimum of **16-20, 12x100** mm tubes and microplate carrier. Number depends on size of blood bank but approximately equal to the number of daytime technicians.

3) Water bath 37°C with temperature control of + 10°C, of fiber glass
4) Incubator 37°C with temperature control of ± 10°C
5) Hot Air oven for drying glass ware
6) Microscope binocular
7) 1 kg balance for weighing blood bags during collection
8) Tube stripper cutter and aluminium clips to seal blood bags
9) B.P. Apparatus
10) Domestic Refrigerator for storing anti-sera, kits etc.
11) pH meter
12) VDRL Agitator
13) Blood bag stand (stainless) for keeping bag upright
14) Test tube racks/test tubes and glass slides, marker pencils etc,
15) Flexible table lamps with concave mirror
16) Blood bags—single (350 ml. and 450 ml.) and multiple (double, triple and multiple)
17) Sera for grouping and other reagents
18) Distillation nnd double distillation plant

Additional equipment for blood bank collecting more than 10,000 units:

1) Dielectric tube sealer
2) Vortex mixer.
3) Magnetic Stirrer
4) Analytical Balance
5) Laminar Air Flow
6) If using microplate technique—Microplate agitator

B) ***For Blood Component Work***

1) **Blood bank refrigerated centrifuge** for 450 ml blood bags. Swing head 5000Xg with windshield. Temperature of 0-25°C. Timer at I min. interval up to 60 min. Accurate tachometer.
2) **Freezer:** 70°C with alarm system, temperatures display, and recording device. 24 hours power supply and standby power.
3) **Freezer:** 20°C to 40°C with alarm system, temperatures display and recording device. 24 hours power supply and standby power.
4) Dielectric Tube Sealer
5) Plasma Separation Stand
6) Tube Stripper, cutter and aluminium rings
7) Platelet Agitator cum incubator for platelet storage
8) Cryoprecipitate Thawing Bnth
9) Laminar air flow
10) Weighing scale of 2 kg with sensitivity of 100 mg.
11) 1 kg, balance in 5 mg increments for weighing plasma bags
12) Computers, Printer etc.

C) ***For Screening of the Blood***

1) Elisa System with washer, incubator and Reader
2) Kits for HIV, HbsAg, HCV, VDRL

D) ***Apheresis System:*** If apheresis procedures are carried out.

4.5.3 Staffing

	Blood bank Category		
	I	II	III
Bleeding Complex			
1. Jr. Doctor	1	1-2	2
2. Nurses	2	3	4
3. Social Workers	1	2	3
4. Lab. Attendant	1	1	2
Laboratory			
1. Technical Supervisor		1-2	4
2. Technical Assistant	2	4	8
3. Lab. Technician	4	11	13
4. Lab. Assistant	1	2	4
5. Lab. Attendant	2	4	5
Donor Organiser			
1. Associated/Clerical Staff	Part time	1	2
2. Social Worker	2	5	10
(For mobile teams)			
3. Vehicle + Driver	Part Time	1	3
Service Staff/Clerical Staff			
1. Clerk Typist	Part Time	1	2
2. Store Keeper	-do-	1	1
3. Cleaner Sweeper	-do-	1	2
Medical Doctor—MD (Transfusion), MD (Pathology)			
1. Professor			1
2. Asst. Professor/Reader		1	1
3. Lecturer		2	3

Check Your Progress 2

1) List the areas which a blood bank should have.

Donor recruitment area.
Bleeding Complex
Therapeutic area
Laboratories
Admin + clerical offices
Teaching facilities

2) List the facilities to be provided within the transfusion centre.

Water supply ; Steam ; Distilled H_2O
Electricity
Sewage
Storage
Gas : high pr. air vacuum.
Communication

3) Minimum area requirement for different categories of blood bank:

I 100 sq m.

II 300 sq m.

III 895 sq m.

4) Equipment for blood component work:

4.6 POLICY AND PROCEDURES

Every blood bank should maintain document carrying Policy and Procedures being followed in the form of **Standard Operating Procedures**. Each person working should strictly follow the laid down protocol for every procedure. It is beyond the scope of this section to describe in details regarding each procedure. However, some important aspects regarding Donor Selection, proceeding with bleeding of donor and processing the donor's blood is being highlighted. Similarly how the patient's blood is to be processed is being mentioned.

Selection of Donor and Bleeding Donor

In order to protect the donor as well as the recipient, each blood donor must be screened prior to each blood donation by medical history and limited physical examination on the day of donation. Whenever a decision is made regarding acceptance or rejection of a blood donor, these two goals should be kept in mind, i.e., safety of donor and safety of recipient.

The donor should have:

1) Age: Between 18 to 65 years.
2) Body weight: 110 lbs. or more for 450 (± 45) ml of blood collected in 63 ml of CPD anticoagulant plus up to 30 ml for additional tubes.
3) Temperature: Less than 37.5° C or 99.5° F.
4) Pulse: Between 50-100 beats per minute.
5) Blood pressure: systolic between 90-180 mm Hg; diastolic between 50-100 mm Hg.
6) Haemoglobin: 13.5 g/dl (male) and 12.5 g/dl (female); or minimum haematocrit: 41% (male), 38% (female). (Copper sulfate is often used as rapid haemoglobin screen.)
7) Specific gravity: > 1.055 (male) and > 1.053 (female)

Deferral

1) Permanent: History of viral hepatitis, history of jaundice of unknown cause, malignant tumours, leukaemia, convulsion after infancy, fainting spells, abnormal bleeding tendency, known positive HbsAg test, serious cardiopulmonary disease, high risk behaviour, drug addicts.
2) Temporary: Conditions requiring rest or medication—cold, flu, diabetes, tuberculosis, syphilis and other infections, and diseases of the heart, lungs, kidney, stomach, or liver.
3) The period of deferral may vary for many other conditions like various vaccinations, major surgery, termination of pregnancy or delivery, dental or minor surgery, and symptomatic bronchial asthma.
4) A minimum of 72 hours deferral is made for a donor who has consumed aspirin.

5) It is very important to permanently defer a donor with an answer in affirmation regarding **high risk behaviour**.

Under the directive of Honorable Supreme Court of India it is illegal to take blood from any professional donor. Best is to take blood from non-remunerative voluntary donors.

Other Important Considerations

1) Identification: Full name, address, telephone number, age. and sex, race (helpful for special typing).
2) Consent: A written consent of the prospective donor is required.
3) Preparation before donation: Eat a regular meal, avoid fatty food, and no alcohol within 12 hours prior to donation.
4) Exceptions: A physician can make exceptions, especially for therapeutic bleeding, auto transfusions, immunization and especially rare blood donors.

Phlebotomy

1) Bleeding of the donor should be smooth and painless.
2) Strict aseptic procedures must be followed and all disposables used.
3) The venipuncture site should be free of skin lesions of an infectious nature. Arms should also be examined for needle marks (a sign of drug addiction)
4) The donor blood bag, sample tube, and donor record should be properly identified and labeled before drawing blood.
5) Plastic blood bags with additional satellite bags should be selected according to need. For instance, a single bag may be used for whole blood, double bags for red blood cell concentrates, triple bags for platelets or cryoprecipitate, and quadruple bags for both platelets and cryoprecipitate from the same donation.
6) Each bag should be examined for defects and anticoagulant inside inspected.
7) Thorough mixing of blood in the bag and tubing is essential. Stripping the tubing several times before sealing is important.
8) After phlebotomy, establish that there is no leaking from the puncture site and that the donor is in satisfactory condition before leaving the room. A compress or adhesive bandage should be applied to the phlebotomy site.
9) Donor should be made to rest for 15-20 minutes before being asked to get up. He should be then taken to the refreshment room for light refreshment which may include fluids like tea/coffee/milk/juice/cold drink etc. and some snacks.
10) Ensure that donor is in a fit condition to leave. In case the donor complains of giddiness or faints, immediately make him lie down with foot-end raised. Check his vitals and reassure him.
11) Give necessary post donation advice to the donor.
12) Every donor must be thanked before he leaves the blood bank.

Labeling and Storage of Donor Blood

a) Donor Blood should be stored at 1-4°C in proper blood bank refrigerator.
b) Untested, tested and cross-matched blood should be stored in separate refrigerators.
c) Standard coloured labels should be used for labeling the donor units.
d) The donor bag number, date of collection, date of expiry, blood group and other relevant information should be properly and boldly incorporated on each bag.
e) Ensure suitable information to be made available on the cross matched label, so that the blood goes to the **correct patient**.

Tests on Donor Blood

1) ABO and Rh Typing: Confirmation of donor's blood group and antibody screening (for irregular antibodies) should be carried out in the donor laboratory. Every 'Rh-negative' donor must be tested for Du.

2) Every donor's blood must be tested in Infectious diseases laboratory for HIV I and II, Hepatitis B, VDRL and Malaria. Though it is not yet mandatory but it is desirable to screen the donor's blood for Hepatitis C also. The blood bank must have separate facilities for carrying out these tests in its own premises. Strict confidentiality should be maintained about any positive results. It is imperative that written documentary proof should be maintained of the results.

All the relevant procedures must be maintained in the Standard Operating Procedure Manual, which should be accessible to the staff doing these tests. Technicians who perform these tests should record the results in appropriate registers with due date and initials. Second technician who will also sign results should counter check all results. Every patient's blood should be tested for confirmation of the blood group.

Pretransfusion Testing of the Recipient's Blood

1) His/her first and last name, age and sex, bed number plus hospital number and other relevant available record must positively identify the recipient.
2) Specimens must be labeled at the bedside with the full name of the patient, date, identification number, and the initials of the person drawing blood. The particulars must match with those given on the requisition form.
3) If the blood sample has to be drawn from the intravenous (I/V) tubing, it should be flushed with saline and the first 5 ml of blood discarded.
4) When additional transfusions are requested, a new specimen should be obtained at each 48 hour interval to identify an incompatibility from an antibody developed by an anamnestic response.
5) Hemolyzed blood samples should be avoided as they may mask hemolysis of donor erythrocytes in the cross-match.
6) It is good practice to wash red blood cells routinely before testing.
7) ABO and Rh typing should be done on every recipient before blood is issued.
8) Antibody screening is much more important in a patient than in the donor. Therefore, it must be carried out in each patient. The antiglobulin test should be included routinely for antibody screening.
9) Compatibility testing or crossmatching should be done on every unit of blood to be transfused to the patient.

Issue of Blood

Only a hospital employee (Doctor, Nurse or Nursing orderly) should receive the blood on behalf of the patient. Person receiving blood and technician issuing the blood should sign in the issue register. Blood should be transfused without delay. All empty bags should be returned to the blood bank within 24 hours.

Movement of Donor Blood

Donor blood after collection is moved into either the untested refrigerator for storage till screening tests are over, or moved to the component preparation room, if components are to be prepared.

The pilot tubes collected along with the blood bags are sent to the routine laboratory for grouping and serological work up, and to the infectious disease laboratory for tests for hepatitis, syphilis, AIDS etc.

Once the components are prepared and the tests on the pilot tubes are completed, the donor blood is moved to the labeling area, where each unit is appropriately labeled with blood group and other relevant information.

The labeled and tested blood is stored in the stock refrigerator. Each morning sufficient number of donor units is shifted from the stock refrigerator to the refrigerator, which stores the blood to be cross-matched.

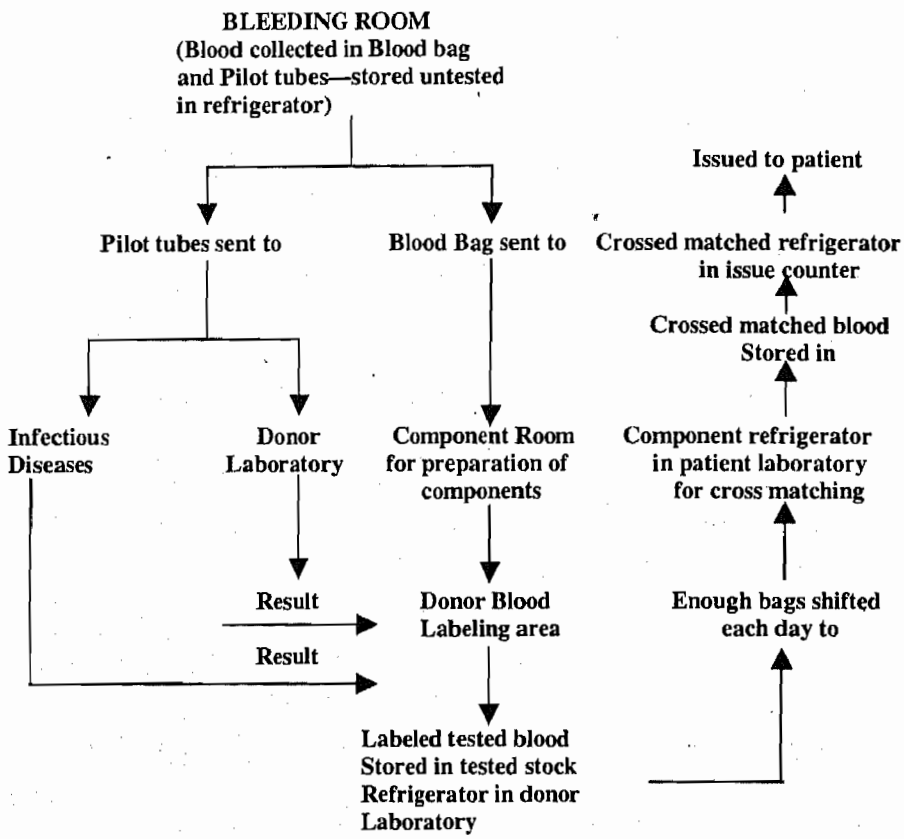
Once the blood is cross-matched the blood unit is moved to the refrigerator enmarked for this purpose and kept in the issue room for issue to the patient.

Movement of Patient Blood

The person on duty there receives patient samples in the counter room. Emergency requests are separated and proceeded on priority for immediate grouping, crossmatching and issuing of the blood.

Routine requests are serially numbered and sent to the patient laboratory for serological workup.

MOVEMENT OF EACH UNIT OF DONOR BLOOD



Cross-matched bag is labeled with cross-match sticker that carries all the relevant information about the patient and is sent to the crossmatched refrigerator till the time it is issued to the patient.

4.7 MANAGERIAL ISSUES

The last two decades have witnessed an increased awareness in the field of blood transfusion. Advances in basic sciences such as immunology, biotechnology, genetics, cryobiology, physiology as well as technical progresses in instrumentation have together created a significant impact on transfusion medicine. **A greater stress has been laid on voluntary (non-remunerated) blood donation since the hazards of commercial blood has resulted in endangering the life of the recipient from dreadful diseases like hepatitis and AIDS.**

The major aim of blood transfusion has been to make the transfusion safe and beneficial. The other aims of improvement in blood have been in prolongation of the shelf life of blood, its optimum utilization and development of synthetic substances to supplement the human source. Through better understanding of red cell metabolism, the red cell preservatives now improvised, can preserve the red cells for transfusion up to 49 days as against 21 days earlier.

The development of **cryobiology** has enabled the preservation of cells and plasma for prolonged storage for years, in frozen state. The emphasis is now rightly put on the use of various components of blood based on the requirement of the patients, since this helps to utilise one unit of donated blood for more than one patient.

With the use of the **cell separators, the pheresis procedures** help separate and collect platelets, granulocytes and plasma in enough quantity from a single donor. Therapeutic applications of these cell separators have also enabled clinicians to reduce morbidity and mortality from many diseases.

Improved serological techniques have reduced the incidence of transfusion reactions. Introduction of new and more sensitive methods for screening of donors has helped in prevention of transmission of diseases such as hepatitis and AIDS. Methods of HLA (leucocyte antigens) typing have been useful for transplant surgeries.

Efforts are now on the way for use of artificial substitutes for specific components of blood. Perfluorochemical emulsion Fllusol-DA and polymerized stroma free haemoglobin solutions have been tried as red cell substitutes. Genetic engineering techniques have isolated recombinant-DNA clones for adequate and safe production of plasma proteins especially factor VIII. The dependence of human source for the reagent will also be reduced if the hybridoma technology is applied for preparation of reagents.

Recent advances in the **field of instrumentation** have even invaded blood banks. Several autoanalysers for blood grouping, antibody detection and quantification, and for various ELISA procedures are now available. These equipment would be cost effective in large centres, where the blood collection is very high and manual processing is difficult.

The factors, which influence the progress in transfusion medicine, can be viewed broadly under three major groups, which are the issues of great managerial importance.

1) Technically the progress is hindered due to non-recognition of this faculty as a medical speciality and inadequate training facilities for medical officers as well as technicians.

   There is tremendous growth in the reagent and instrumentation area but there appears a lack of quality control. It is certainly essential that some regulatory agencies monitor the products to ensure their validity and performance. For the smooth functioning of transfusion services apart from other voluntary and philanthropic agencies, individuals and institutions can be of immense help.

2) Socially the inadequate awareness amongst general population regarding blood donation is responsible in making this commodity very scarce.

3) Due to paucity of funds, adequate amounts of educative programmes for promoting voluntary blood donations are not available. Thus one is unable to reach the masses in making them come forward to donate blood.

Recent advances in medical knowledge have significantly increased the volume and complexity of the work of the hospital blood bank. Surgical techniques are becoming increasingly sophisticated and complex procedures more numerous. Cancer surgery, reconstructive operations, open-heart procedures, and organ transplantation all make special demands upon the blood bank.

Greater clinical appreciation of haematological physiology is reflected in requests for specific blood components, and the modern blood bank dispenses a wide variety of blood products tailored to specific patient needs. An array of techniques unknown to blood bank workers even a few years ago has come into routine use, ranging from radioimmunoassay to cytotoxicity testing. Simultaneously with advances in clinical medicine has come an explosive increase in our knowledge of immunohaematology.

Whereas the ABO system and 'Rh factor' were almost the only considerations of clinical significance a generation ago, we now recognize more than a dozen major blood group systems, each many times more complex than originally conceived, with some 400 group antigens defined as of this writing. Powerful new investigative techniques have been devised to extend our knowledge, some of which have been adapted to use in the blood bank.

Immunoglobulin structure and the role of complement in red blood cell sensitization are now understood with considerable insight, and this knowledge has led to increased appreciation of the mechanisms of antibody-mediated red blood cell destruction. Increased understanding of the mechanisms of blood coagulation and clot lysis has resulted in major changes in approach to the patient with a bleeding disorder.

This sophistication, however, has not been without its drawbacks. Burgeoning demands for blood products have posed problems in obtaining sufficient supplies. Transfusions of 20 pints of blood to a single patient are now common place and 100 pints or more have been given in 24 hours to save a life. Awareness of the increased hazard of hepatitis transmission by blood obtained from paid donors has resulted in regulations requiring blood collection from a purely volunteer population, thus causing increased difficulty in procuring blood supplies in some areas. Widespread transfusion has caused widespread blood group sensitization, with resultant problems in antibody identification and procurement of blood of special types.

The amount of responsibility assumed by the blood bank technologist and its director has no parallel elsewhere in the clinical laboratory. There is no way for an attending physician to confirm through his own observation or judgement the adequacy of the testing performed in the blood bank until disaster occurs in form of an untoward reaction. If the clinical chemistry laboratory reports a serum potassium level of 10 mEq/dl or the haematology laboratory says the hematocrit value is 5% and the patient is jogging about the solarium, his doctor may reasonably suspect a laboratory error. But there is no way that a physician can say, "I think you are 'O', not an 'A' " as the lab says, simply by examining his patient.

In a blood bank as in no other area of the clinical laboratory the patient's life may hinge upon a mistake, be it clerical, technical, or judgmental. Errors in other areas may be irritating, confusing or embarrassing, but rarely are they immediately life-threatening. If someone errs in a blood bank, a patient may die.

The most important step in the organisation of a blood transfusion service is to appoint a person qualified and experienced in transfusion medicine to head it.

Blood banks at apex institutions or large metropolitan medical colleges having undergraduate and postgraduate teaching programmes and superspecialities should have separate departments of transfusion medicine headed by a professor.

Institutions and hospitals at other levels should have a separate Blood Transfusion Officer for whom a minimum experience of one year in a licensed blood bank with a MBBS degree from a recognised college is essential.

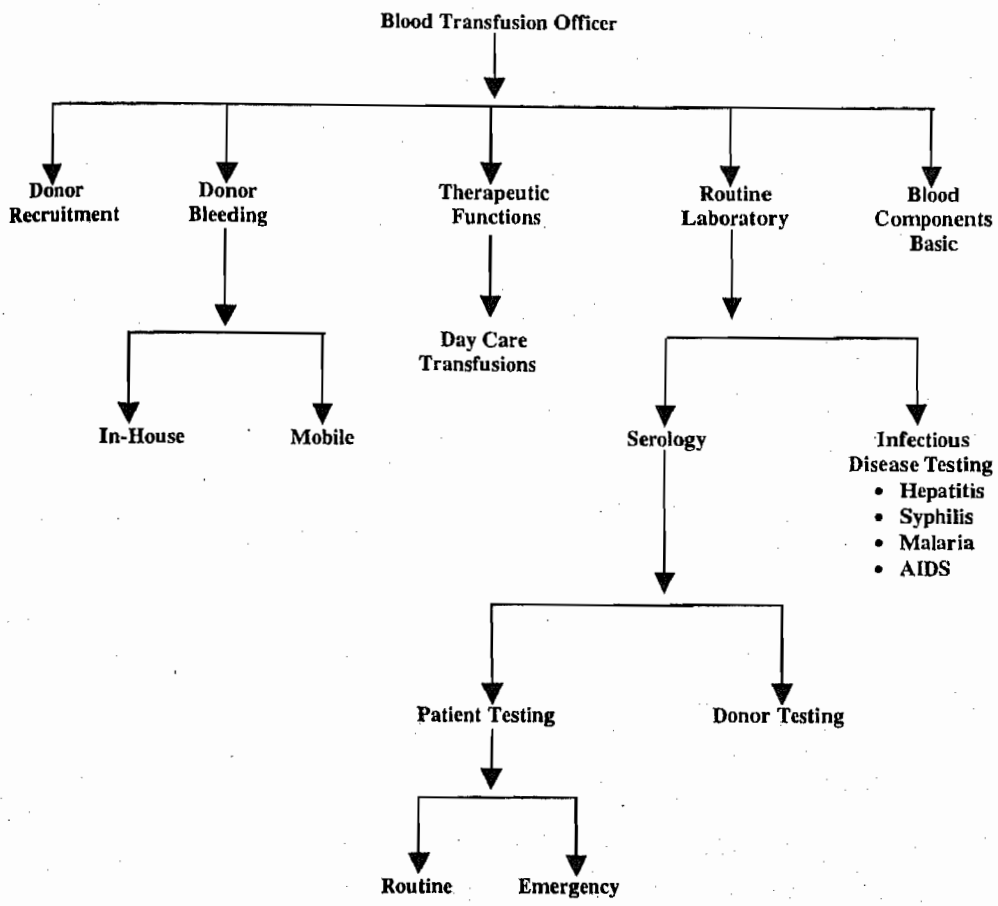
Organisation of a successful blood transfusion service is not possible without an assured supply of voluntary blood 365 days of the year. Thus a most important managerial issue of a blood bank is donor recruitment and bleeding donors.

Success in donor recruitment and maintaining donor records requires an intensive and sustained publicity and educational compaign by means of mass media i.e. television programmes, publicity pamphlets, letters and telephone calls to schools, colleges, service oriented organisations like Rotary, Lions etc. Such work requires trained staff headed by a donor organiser and including, social workers, nurses, clerical staff, good telephone facilities, vehicles and drivers.

Organisation and Structure

In recent years two fundamental changes in donor recruitment have taken place: a shift from individual responsibility to community responsibility for blood replacement and from paid donors to voluntary donors.

For many years, motivation for blood donation has focused on individual responsibility to ensure that present and future blood needs of the donor and/or his family are met. This approach may create a hardship for those who are not qualified for blood donation or for those who have no one else to donate for them. Hence blood replacement, as a community responsibility has become more acceptable. Motivation based on group or community responsibility has been successful in many countries. A pluralistic approach to donor recruitment embracing individual and community responsibility is favoured by many, since it utilizes both forms of motivation that have been demonstrated to be effective. Indeed, there appears to be a need for both individual and/or community responsibility to provide an adequate blood supply in response to the demand.



Based on present usage, if about 1% of the population donate 1 unit of blood each per year the nation's required blood needs would be met. Organised institutions or groups are rich sources of qualified blood donors.

Inventory Control

Ideally, no blood or blood components should be allowed to outdate. Although it is impractical or even impossible in small hospitals, every effort should be made to reduce such waste. Effective inventory control and an efficient system of transportation system can be of great help to improve the shelf life. Although accurate figures are not available, outdating of blood probably approaches 10%.

With computerisation of blood transfusion services and advances in telecommunication systems, there is no doubt that effective inventory control can be achieved. Regionalisation of Blood Transfusion Services can play a vital role towards this aim.

Blood Transfusion Committee

To ensure appropriate use of blood and minimise wastage, it is essential for a transfusion committee to meet periodically as part of medical audit.
Members of the committee would consist of the Medical Director/Administrator of the Hospital, Blood Bank Chief, representatives from each clinical department specially those, which consume large quantities of blood, representatives of the nursing staff and the blood bank technical staff.

The functions of the Transfusion Committee are to ensure safe transfusion practice for the hospital. This involves two main divisions i.e. systems audit and clinical practice audit.

Systems audit consists of blood bank procedures i.e.

1) No. of units transfused of whole blood and blood components.
2) Patients transfused and units transfused per patient.
3) Proportion of whole blood to red blood cell, transfused.

4) Crossmatch to transfusion reaction.

5) Out date rate.

6) Transfusion reactions.

7) Number uncrossmatched and fresh unit requests.

8) Turn around time from receipt of sample and issue of blood.

9) Emergency requests.

10) Units returned unused.

11) Surgical cancellation due to unavailability of blood.

12) Late requests for preoperative crossmatch.

13) Distribution of requests.

Clinical Practice audit would consist of criteria and justification for transfusion of whole blood, red cells, and various components into audit and paediatric patients.

4.8 SUPREME COURT JUDGEMENT AND DIRECTIONS (1996)

4.8.1 Supreme Court Judgement

- Establishing national and state councils of blood transfusion
- Activities of national and state councils to cover entire range of services related to blood transfusion
- Developing good quality technical manpower for transfusion services
  - — training of technical personnel
  - — post graduate course
  - — drug inspectors training
- Institution for conducting research on various areas of transfusion medicine
- Banning unlicensed blood banks within one year
- Banning professional donors within two years
- Income tax exemptions for donations to councils
- NACO/Co-ordinating the development of developing a national blood transfusion network in India
- Hindustan Latex Ltd. engaged to assist NACO in preparation of a comprehensive plan for setting up of a national and state councils.

4.8.2 Supreme Court Directions

1) The union government shall take steps to establish forthwith a National Council of Blood Transfusion as a society registered under the Societies Registration Act. It would be a representative body having in it representation from Directorate General of Health Services of the Government of India, the Drug Controller of India, Ministry of Finance in the Government of India, Indian Red Cross Society, private blood banks including the Indian Association of the Blook Banks, major medical and health institutions of the country and on-government organisations active in the field of securing voluntary blood donations. In order to ensure coordination with the activities of National AIDS Control Organisation, the Additional Secretary in the Ministry of Health who is in-charge of the programme of National AIDS Control Organisation for strengthening the blood banking system could be President of the National Council.

2) The National Council has a secretariate at Delhi under the charge of a Director.

3) The basic requirements of the funds for the functioning of the National Council shall be provided by the Government of India but the National Council shall be empowered

to raise funds from various other sources including contributions from trade, industry and individuals.

4) In consultation with the National Council, the State Government/Union Territory Administration shall establish a state council in each State/Union Territory which shall be registered as society under the Societies Registration Act. The State Council should be a representative body having in it representation from Directorate of Health Services in the State, State Drug Controller, Department of Finance of the State Government/Union Territory, Indian Red Cross Society, Private Blood Banks, non-Governmental Organisation active in the field of securing voluntary blood donations. The Secretary to the Government in-charge of the Department of Health could be President of the State Council.

5) The State Council should have its headquarters at the premises of the premier medical institution or hospital in the State/Union Territory and should function under the charge of a Director.

6) The funds for the State Council shall be provided by the Union of India as well as the State Government/Union Territory Administration. The State Council shall also be empowered to collect funds in shape of contributions from trade, industry and individuals.

7) The programmes and activities of the National Council and the State Councils shall cover the entire range of services related to operation and requirements of blood banks including the launching of effective motivation campaigns through utilisation of all media for stimulating voluntary blood donation in educational institutions, among the labour, industry and trade, establishments and organisations of various services including civic bodies, training of personnel in relation to all operations of blood collection, storage and utilisation, separation of blood groups, proper labelling, proper storage and transport, quality control and achieving system, cross matching of blood between donors and recipients, separation and storage of components of blood and all basic essentials of the operations of blood banking.

8) The National Council shall undertake training programmes for training of technical personnel in various fields connected with the operation of blood banks.

9) The National Council shall establish an institution for conducting research in collection, processing, storage, distribution and transfusion of whole human blood and human blood components, manufacturer of blood products and other allied fields.

10) The National Council shall take steps for starting special post graduate courses in blood collection, processing, storage and transfusion and allied fields in various medical colleges and institutions in the country.

11) In order to facilitate the collection of funds for the national council and the State Councils, the Government of India (Ministry of Finance) should find out ways and means to secure grant of 100% exemption from Income Tax to the donor in respect of donations made to the National Council and the State Councils.

12) The Union Government and the Government of States and Union Territories should ensure that within a period of not more than one year all blood banks operating in the country are duly licensed and if a blood bank is found ill-equipped for being licensed, and remains unlicensed after expiry of the period of one year, its operation should be rendered impossible through suitable legal action.

13) The Union Government and the Government of the States and Union Territories shall take steps to discourage the prevalent system of professional donors so that the system of professional donors is completely eliminated within a period of not more than two years.

14) The existing machinery for the enforcement of the provisions of the Act and the Rules should be strengthened and suitable action be taken in that regard on the basis of the Scheme submitted by the Drugs Controller (India) to the Union Government for upgradation of the Drugs Control Organisation in the Centre and the States.

15) Necessary steps be taken to ensure that Drugs Inspectors duly trained in Blood

Banking operations are posted in adequate numbers as to ensure periodical checking operations of the blood banks throughout the country.

16) The Union Government should consider the advisability of enacting a separate legislation for regulating the collection, processing, storage, distribution and transportation of blood and the operation of the blood banks in the country.

17) The Director General of Health Services, Government of India, Ministry of Health shall submit a report by July 15, 1996 about the action taken in pursuance of these directions.

18) It will be open to the Director General of Health Services, Government of India as well as the National Council to seek clarification/modification of these directions or further directions in this matter.

4.9 CONTROL AND EVALUATION

The aim of blood transfusion services is to supply good quality of blood and components to the patient and avoid any risk to the donor. Hence it is extremely essential to institute strict quality control measures.

The Standard Operating Procedures Manual should be maintained in every blood bank and should carry a chapter on Quality Control measures being undertaken in the blood bank. However, for a brief information, to the readers a few of them are being mentioned as follows:

1) Blood only from voluntary donors should be accepted which minimizes the chances of transfusion transmitted diseases.

2) Proper donor history and examination and strict selection ensures good quality of blood being collected from a healthy donor and fit donor.

3) Use of disposable and Universal Precautions should be followed.

4) Strict aseptic conditions should be maintained. The collection of blood and the component formation should be done in close system to prevent any possibility of infection.

5) All the employees must follow the Universal Protection Instructions.

6) All the employees working should be protected against HbsAg.

7) Proper donor care after donation should be strictly adhered to and donor should be released only when he/she is perfectly fit.

8) The blood and components should be stored at proper temperatures continuously.

9) All the seras and other reagents should be standardized daily.

10) Cross-matching should be strictly done by Coomb's method.

11) Daily/weekly/monthly/yearly maintenance of the equipment should be undertaken as required from time to time. All the technicians should be well trained in Preventive Maintenance of the equipment.

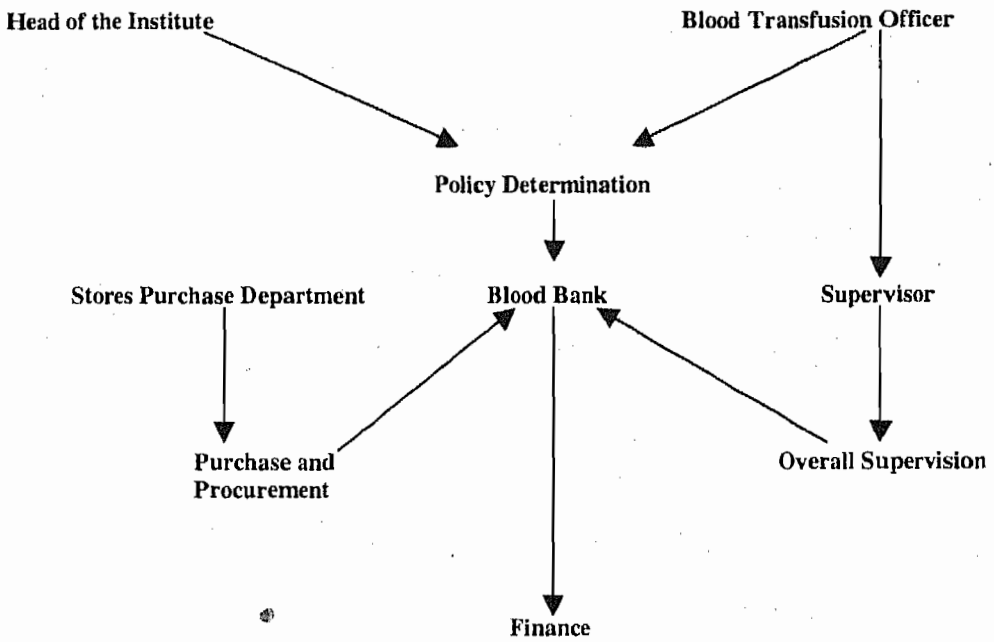
12) Proper records should be maintained involving various activities.

13) Strict inventory control and supervision as per policies laid down should be undertaken.

14) Daily stock checking of the whole blood and periodic checking of the components should be undertaken.

Coordination and Control

The line diagram on page 81 depicts the co-ordination and control mechanisms in a blood transfusion unit.



Blood Components

Cohn and associates during Second World War were the pioneers in the fractionation of plasma into its components. In some centres, the demand for these components is even more than the whole blood.

Various components prepared in modern blood banks are:

1) Packed Cells
2) Fresh frozen plasma
3) Platelet rich plasma
4) Platelet concentrate
5) Single Donor Plasma
6) Cryo-precipitates
7) Factor VIII concentrate
8) Factor IX concentrate
9) Haemoglobin

Indications

Packed Cells: Severe anaemia and edema, Chronic leukemia, Chronic hypoplastic and Aplastic anaemias, Hemolytic anaemias.

Fresh Frozen Plasma: Inborn deficiency of coagulation factors. DIC, Thrombocytopenic purpura, Neutralization of the effects of oral anticoagulants.

Cryoprecipitates: Von Willebrands disease, Chronic renal failure, Congenital platelet disorders, Haemophilia, Christmas disease.

Specific Immunoglobulins: Used for passive immunization for—Varicella, Tetanus, Hepatitis B, Cytomealovirus infections.

Hyperimmune Gammaglobulins: Primary Rh-immunization in case of Haemolytic disease of the newborns.

Fresh Blood: Massive Transfusion, Bleeding disorders, DIC, HDN, Exchange transfusion.

Fresh blood is specially ordered as certain components of the blood deteriorate rapidly on storage and these are: Platelets, Factor VIII, Factor V, Granulocytes.

Blood Transfusion Reactions

About 2-4 % transfusions lead to minor or major reactions. Though it is beyond the scope of this write up to detail them out, but the learner must have the knowledge how to handle such a case.

Causes of Transfusion Reaction

Clerical mistakes

—Up to 80% cases are due to incorrect labeling of samples

—Errors in writing the correct particulars on requisition

—Confusion in identity of the patient

Technical errors

—Wrong grouping and crossmatching

—Rare blood group

—Minor crossmatch errors, e.g. O group blood to A, B or AB group without seeing the titer which should be less than 1 : 100.

Investigations in a Case of Transfusion Reaction

The occurrence of a transfusion reaction should be immediately reported to the blood bank. The reporting authority should send: (1) A post transfusion blood sample, (2) A post transfusion urine sample, (3) A pretransfusion blood sample, if available, (4) Blood bag along with tubing.

To overcome transfusion reactions the blood bank should have:

- The patient's original crossmatch specimen, which is normally preserved for atleast 48 hours after despatching the blood or its products.
- The donor's pilot tubing/bottle, which should also be preserved for 48 hours.
- The entire laboratory and blood bank records.
- The blood bank should take immediate steps to establish the cause of the transfusion reaction. Proper records must be maintained and the results should be communicated to the concerned department.

Check Your Progress 3

1) What are the criteria for acceptance or rejection of a blood donor?

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2) List the three factors which are the issues of great management importance.

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3) What is the composition and functions of Blood Transfusion Committee?

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4) Describe in brief the causes of transfusion reaction.

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5) What are the four things which reporting authority should send in case of a blood transfusion reaction?

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4.10 LET US SUM UP

In this unit you have learnt that the duty of a blood bank does not end only on issuing of blood, but also includes the follow up of the course of transfusion to see that the transfusion is safe and uneventful and to investigate a case of blood transfusion reaction.

You have also learnt that on one hand while it is important for transfusion medicine to reach out to the clinical sector it is equally important for the latter to become involved with the transfusion laboratories in order to ensure quality assurance and proper handling of the blood resources.

You have also learnt that the clinical sector must keep up-to-date information on processing and automation and get ready to adopt new technologies. In near future, molecular biology techniques will definitely replace some of our current serology and become standard feature in transfusion technology. The challenge facing the transfusion medicine at the end of the third millennium is truly inspiring.

Challenge and responsibility are the daily substance of blood bank work; stimulation and gratification are the reward.

4.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a) William Harvey
   b) 1902
   c) Blumbery; 1964
   d) 1981

2) a) True
   b) False
   e) False
   f) True

3) a) convenience in storage and transportation
   b) no breakage
   c) ease to transfuse
   d) less risk of transfusion reactions
   e) facilitates various blood components separation

4) a) Recruitment of donors and maintenance of donor records
   b) Collection, storage and preservation of blood and blood components
   c) Laboratory procedures
   d) Teaching, training and research
   e) Clinical/therapeutic functions

Check Your Progress 2

1)
- Donor Recruitment area
- Bleeding complex
- Therapeutic area
- Laboratories
- Administrative and clerical offices
- Teaching Facilities

2) Water supply, electricity supply, sewage, storage, steam, distilled water, gas, high-pressure air, vacuum and communications.

3) Minimum Area Requirements for different categories of blood bank are:
   For category I : 100 Sq.M
   For category II : 300 Sq.M
   For category III : 895 Sq.M

4) a) **Blood bank refrigerated centrifuge** for 450 ml blood bags. Swing head 5000Xg with windshield. Temperature of 0-25°C. Timer at 1 min. interval up to 60 min. Accurate tachometer.
   b) **Freezer:** 70°C with alarm system, temperatures display, and recording device. 24 hours power supply and standby power.
   c) **Freezer:** 20°C to 40°C with alarm system, temperatures display and recording device. 24 hours power supply and standby power.
   d) Dielectric Tube Sealer
   e) Plasma Separation Stand
   f) Tube Stripper, cutter and aluminium rings
   g) Platelet Agitator cum incubator for platelet storage
   h) Cryoprecipitate Thawing Bath
   i) Laminar air flow
   j) Weighing scale of 2 kg with sensitivity of 100 mg.
   k) 1 kg. balance in 5 mg increments for weighing plasma bags
   l) Computers, Printer etc.

1) a) Age: Between 18 to 65 years.

b) Body weight: 110 lbs. or more for 450 (± 45) ml of blood collected in 63 ml of CPD anticoagulant plus up to 30 ml for additional tubes.

c) Temperature: Less than 37.5° C or 99.5° F.

d) Pulse: Between 50-100 beats per minute.

e) Blood pressure: systolic between 90-180 mm Hg; diastolic between 50-100 mm Hg.

f) Haemoglobin: 13.5 g/dl (male) and 12.5 g/dl (female); or minimum haematocrit: 41% (male), 38% (female). (Copper sulfate is often used as rapid haemoglobin screen.)

g) Specific gravity: > 1.055 (male) and > 1.053 (female)

2) a) Non-recognition of blood bank faculty as a medical speciality and inadequate training facilities for medical officers as well as technicians.

b) Inadequate awareness amongst general population regarding blood donation.

c) Paucity of funds

3) Members of the Blood Transfusion Committee consist of the Medical Director/Administrator of Hospital, Blood Bank Chief, representatives from each clinical department specially those, which consume large quantities of blood, representatives of the nursing staff and the blood bank technical staff.

Functions of the transfusion committee are to ensure safe transfusion practice for the hospital. This involves two main divisions, i.e. systems audit and clinical practice audit.

4) *Clerical mistakes*

—Up to 80% cases are due to incorrect labeling of samples

—Errors in writing the correct particulars on requisition

—Confusion in identity of the patient

Technical errors

—Wrong grouping and crossmatching

—Rare blood group

—Minor crossmatch errors, e.g. O group blood to A, B or AB group without seeing the titer which should be less than 1 : 100.

5)
- The patient's original crossmatch specimen, which is normally preserved for atleast 48 hours after despatching the blood or its products.
- The donor's pilot tubing/bottle, which should also be preserved for 48 hours.
- The entire laboratory and blood bank records.
- The blood bank should take immediate steps to establish the cause of the transfusion reaction. Proper records must be maintained and the results should be communicated to the concerned department.

4.12 FURTHER READINGS

"ABC of Transfusion", BMJJ,Vol. 299: December 1989.

AABB series of publications on various aspects of Blood Banking.

AABB Technical Manual 11, edition 1998.

Blood Transfusion: A Conceptual Approach, Churchill Livingstone.

Dacie and Lewis, *Practical Haematology,* seventh edition, DLBS, Churchill Livingstone.

De-Gruchy's Haematology, fifth edition (Indian edition), 1993, Oxford University Press, New Delhi, Reprint Blackwell Scientific Publications.

Diploma in Hospital and Health Management Course, ninth revised edition, 1998, Paper II, Part C & D, Academy of Hospital Administration, New Delhi.

Henry, Clinical Diagnosis and Management by Laboratory Methods, 17th edition, AITBS, First Indian Edition.

Hospital Acquired Infections: Guidelines to Laboratory Methods, W.H.O. Regional Publications, 1973, Experiences series No. 4, 10-16 and 43-49.

Modern Blood Banking and Transfusion Practices, 3rd edition, Denise M. & Harmening, published by F.A. Avis Company, Philadelphia.

Mollison, P.L., *Blood Transfusion in Clinical Medicine*, 9th edition, Blackwell Scientific Publications, Oxford, U.K. (1993).

Penpol Review series no. 1-15 on Blood Management Systems by W.H.O.

Safe Blood and Components, Distant Learning Techniques by W.H.O.

UNIT 5 PHARMACY SERVICES

Structure

5.0 OBJECTIVES

After going through this unit, you should be able to:

- define various types of hospital pharmacy services and their drug distribution systems;
- describe the various planning considerations for hospital pharmacies;
- discuss the policies and procedures involved and the associated managerial issues; and
- discuss the role of computers in a hospital pharmacy.

5.1 INTRODUCTION

In this unit you will learn about organisation and management of pharmacy services of a hospital. To begin with you will learn about the definition, role and functions of pharmacy services. Thereafter you will learn about the planning considerations including computerization of pharmacy services. Towards the end you will learn about policies, procedures and managerial issues including control and evaluation mechanisms.

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5.2 PHARMACY SERVICES

The pharmacy services was earlier viewed as solely compounding and dispensing drug products for patient use but these services have changed dramatically since the early 1960s and today the pharmacy is viewed as a clinical department that can serve as a bridge between the clinical and financial aspects of drug therapy. In this unit you are going to learn about definition, scope and functions of pharmacy services. You will also learn about planning considerations, physical facilities and layout. You will also be introduced to various types of pharmacy services and staff requirement. You will be sensitized to various managerial issues involved in this service, control and evaluation techniques, role of computers in pharmacy service.

5.2.1 Definition

The pharmacy services in a hospital'can be defined as "Premises licensed for the retail sale or supply to the hospital out patients deptt. and/or inpatient areas of drugs which have qualified licensed person(s) and indulge in compounding of drugs."

5.2.2 Brief History

Prior to 1947, hospital pharmacies and dispensaries in India were manned by dispensors and compounders, Their academic background was poor, many of them being not even matriculates. The Chopra Committee (1921) and Bhore Committee (1946) focussed attention of government and thus in 1949 the Pharmacy Council of India was founded, which had recommended that the Diploma in Pharmacy to be the minimum requisite for entering the profession.

The Pharmacy Act, 1948 was passed and is the most important event towards rationalisation of pharmacy services. It was amended in 1959 and on 1st September, 1976 respectively. The objectives of the Act are;

1) To regulate the minimum education required to become a Pharmacist as a Central responsibility.

2) To regulate the practice of pharmacy as State responsibility.

Its functioning is bringing uniformity in pharmacy education and practice. Few other events are also important, such as the Drug and Cosmetic Act and Rules, 1940. Publication of National Formulary of India in 1960, formation of Indian Hospital Pharmacists Association in 1964 and the report of Committee on Drug Pharmaceutical Industry known as "Hathi Committee" (1975), who submitted its report to the Ministry of Petroleum and Chemicals and also further stressed as to how to streamline the hospital pharmacies. It had clearly given guidelines about division of pharmacies, desirable educational background and pay scales of staff and had given due importance on quality control, methods to achieve it, proper control, supervision and recommendation that, if drugs are manufactured in hospital pharmacies, the conditions of manufacture should be stringently controlled in the same manner as private manufacture of similar items are controlled.

Check Your Progress 1

1) Define Hospital Pharmacy Services.

Premises licensed for the retail sale or supply to the Hospital - OPD, Inpatient areas of drugs which have qualified licensed person(s) and indulge in compounding of drugs.

2) What is the Pharmacy Council of India? (1949)

3) State the objectives of Pharmacy Act. (1948)

1) To regulate the minimum education required to become a Pharmacist as a Central responsibility

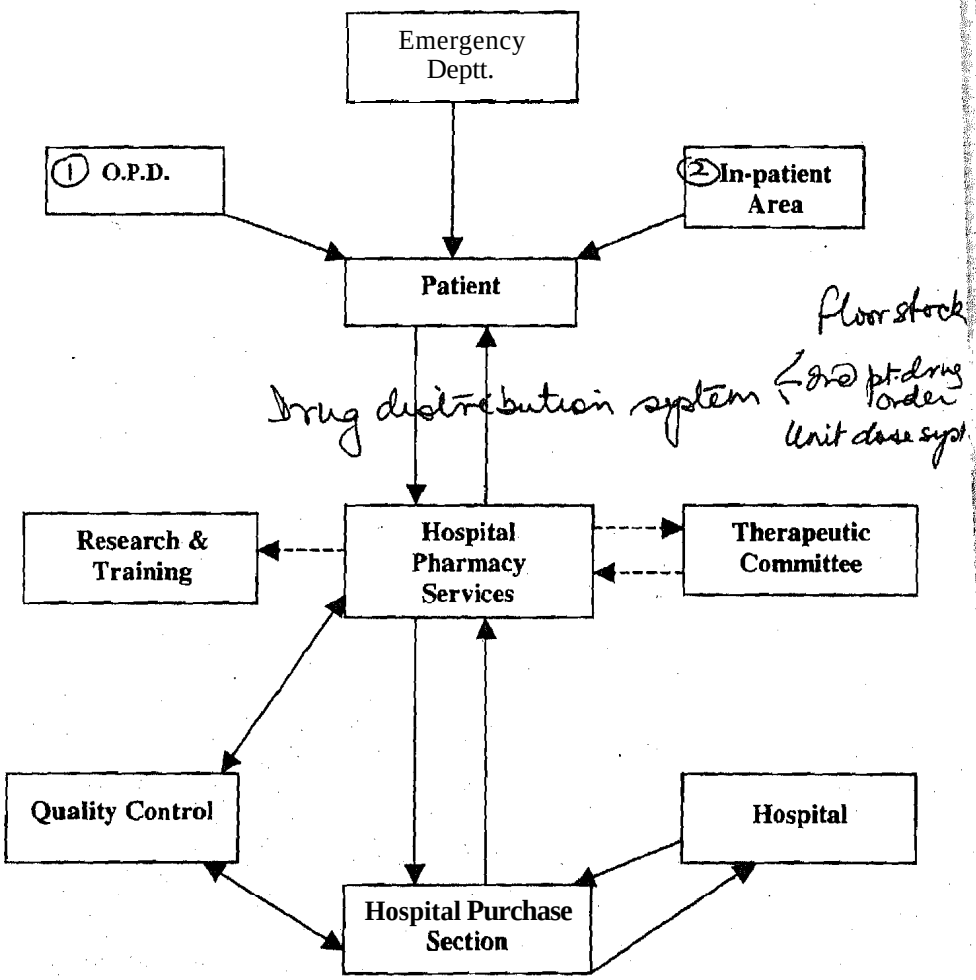
2) To regulate the practice of pharmacy a State responsibility

5.3 ROLE, FUNCTIONS AND TYPES

5.3.1 Roles and Functions

Drugs as you know are the most widely used therapeutic agents in the treatment of various diseases and this further emphasizes the important role of hospital pharmacy services in patient care. Pharmaceutical functions rendered by the hospital pharmacy services can be categorized as under:

1) Demand estimation according to formulary, In the absence of formulary, establishment of specification for drug procurement.
2) Compounding and manufacturing of sterile and non-sterile products.
3) Quality control of drugs purchased and those compounded, and manufactured in the Pharmacy.
4) Supply of drugs to inpatients, wards, various sensitive patient care units like ICU, ICCU, OT's and Emergency.
5) Dispensing for out-patients.
6) Maintenance of formulary system and implementation of the decisions of the Pharmacy and Therapeutic Committee.
7) Furnishing drug information to physicians and other professional staff.
8) In-service training, teaching and research and clinical trials.
9) Patient education
10) Drug use review.



counter
1,2,4.

Floor stock
pt-drug order
Unit dose syst

5.3.2 Types of Pharmacies

Quality of patient care should be the same in all hospitals, regardless of size or type of services. However, many hospitals, particularly those with less than 100 beds, have not yet developed satisfactory solutions to the problem of efficient and effective pharmaceutical services. Further, methods of distributing and charging for drugs differ among hospitals, with several methods in general use, e.g. no charges on all preparations in the Hospital Formulary or all or certain drugs are to be charged for. The hospital should have a clearly laid down policy regarding the extent and type of drugs and other items to be dealt with by its pharmacy services and the written policies should specifically cover the schedule for quality of drugs, therapeutic usage, rates and charges.

Depending upon the organisational policies of the hospital the pharmacy services can be of following types:

- Pharmacy for out-patients Department
- **Pharmacy** for in-patients services

  A combination of both
- A retail sale counter in the hospital
- A combination of above type

5.3.3 Drug Distribution System

The drug distribution system is the keystone of pharmacy services. Without an effective, efficient, safe and responsive system, it is impossible to implement the concept of drug use control. In addition to providing medications to patients the drug distribution system must also ensure that drugs are provided to other areas of the hospital, such as the emergency room, the operating rooms. In this era of cost control, these areas should receive increased pharmacy attention.

Drug distribution system are complex and involve the interaction of many individuals and departments, in addition to pharmacy. Over the years, a number of drug distribution methods have been explored—the unit-dose method in the mid-1960s, the floor stock and the individual patient order systems were the predominant methods of distributing drugs.

1) **Floor** Stock **System:** Many pharmaceuticals in bulk bottles were housed in the patient care division. When **a** drug order was written for a patient, the nurse would remove the appropriate drug from its bulk container and administer it to the patient. The nurse would also be responsible for reordering bulk supplies.

The floor stock system was labour intensive for nursing and lacked effective controls and was space occupying. Errors were frequent, and often the exact drug the physician ordered was not available in the floor stock supply. This resulted in the need to special order supplies, which created a delay between the time the drug was ordered and its administration to the patient. The system, by its design was not set up to respond quickly to the patient's medication needs. The floor stock system also resulted in large uncontrolled inventories on the nursing divisions.

2) **The Individual** Patient **Drug Order** System: The individual patient drug order system was introduced. In this system, most of the floor stock items, except controlled substances and such common patient items as mouthwash, antiseptics, and the like, were removed, and the nurse was required to write out a special request for each drug that the patient was to receive. Upon receipt of the drug request, which was usually sent to the pharmacy on a form similar to a physician's prescription, the pharmacist would fill the order with a multiple-day supply—usually a 3 to 7 day supply—and dispense it to the patient care area. The nurse was still responsible for removing the drug from a multiple dose container, preparing a patient label or identification card, placing the drug(s) in a small paper cup (for tablets and capsules), and administering it to the patient. Again, medication errors occurred, and the delay between ordering the drugs and having them dispensed to the patient care areas could be between 1 and 5 hours. Although an improvement over the floor stock system in reducing inventories on the nursing unit, the individual patient drug order system was still labour intensive for nursing and did not result in good drug use control and reduce precious nursing time.

Neither system used personnel resources optimally—nurses, trained in patient care, were ordering and dispensing medications, and pharmacists, trained in therapeutics, were filling orders with little or no opportunity to apply their expertise in drug use to the patient care process. Medication errors at times exceeded 10 per cent, and inventory was poorly controlled. Improvements in the distribution of drugs was clearly needed.

The introduction of the unit-dose method of drug distribution brought these improvements.

3) Unit-dose Method: In this system, pharmacists receive a direct copy of the physician's order. Medications are packaged in single-use containers and dispensed in as ready-to-administer form as possible. For most medications, not more than a 24-hour supply is dispensed.

The unit-dose system was developed to provide safe and effective drug distribution and control. Numerous studies have established that this concept is safer for the patient, more efficient and economical for the institution, and allows efficient use of professional resources.

There are following advantages of the unit-dose system over other alternatives:

- reduction in the incidence of medication errors
- decrease in the total cost of medication-related activities

  more efficient use of pharmacy and nursing personnel, allowing for more direct patient care involvement by pharmacists and nurses
- improved overall drug control and drug use monitoring
- greater control by the pharmacist over pharmacy work toad patterns and staff scheduling

- reduction in the size of drug inventories located in in-patient care areas
- greater adaptability to computerized and automated procedures.

Most hospitals do not have a pure unit-dose drug distribution system. Hospitals, however should strive to have unit dose as an essential element in their drug distribution and control programmes.

Check Your Progress 2

1) Enumerate the functional components of hospital pharmacy.

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2) Enumerate various types of pharmacy services.

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3) Describe drug distribution system.

Floor stock system

Individual patient drug order system

Unit dose method

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5.4 PLANNING CONSIDERATIONS

For proper services and efficiency, the pharmacy services should be established within the scope of status, responsibilities, relationships and limitations as per any other major department, with a qualified and experienced pharmacist as its in-charge. Planning for the depnrtment is guided by the establishment of administrative and professional policies of the hospital. How many items and for how many days the drug(s) is to be given to patients, again depends on the individual hospital policies. While planning for hospital pharmacy services forecasting techniques have to be used to obtain data regarding number of O.P.D. attendance, number of patients in various in-patient areas, disease pattern, comprehensiveness of drug formulary, items to be served, etc. and with such available data planning can be done for physical facilities, equipment and staffing.

5.4.1 Physical Facilities and Layout

Adequate provision of physical facilities and its correct location enhances the efficiency and productivity of hospital pharmacy. While designing, care should be taken for quick and easy flow of patients and material and user departments.

Location

Location where feasible, the pharmacy should be located preferably on the first floor of the hospital in-patient area and should be readily accessible to the elevators to ensure adequate and efficient service to various nursing stations and other departments.

The pharmacy for out-patients should be located in the O.P.D. area and as pharmacy in the O.P.D. is generally the last place to be visited by the patients coming to the out-patients department it should be conveniently located near the main exit of the O.P.D.

Floor Area

Floor Area will depend upon the size of the hospital and the services provided by the department. There are no laid down norms or criterion. However, recommended floor area is:

- 10 sq. ft. per bed in a 100 bedded hospital
- 6 sq. ft. per bed in a 200 bedded hospital
- 4 to 5 sq. ft. per bed in a larger hospital

Finishes and Lighting

The floors of the pharmacy should be resilient, smooth, easily cleaned and acid resistant. Rubber or asphalt tile and heavy linoleum are considered satisfactory. Walls should have a smooth surface with painted or equally washable finish in light colour. The finish of the cabinets and similar items should be light coloured wood or white enameled. Good lighting and ventilation are imperative. Venetian window blinds are favoured. In addition to general illumination, fluorescent lamps should be placed immediately above the prescription counter where necessary to assure adequate light; ample electrical outlets should be provided for both the pharmacy and sterile solution room. A dispensing window is needed through which prescriptions are dispensed to nurses and out-patients. Adequate number of windows to be provided as per the expected load of the hospital with provision of comfortable and adjustable high sitting arrangement. The windows construction to be in such a manner to act as mechanical barrier for infection prevention. The drug cabinet position to be within the reach of distribution personnel. A separate solution room for the preparation of parenteral solution in larger hospitals should be equipped with a water still, workbench, cabinets, resistant glass storage tank, burettes, fitted glass filters, conductivity meters, bottles, large acid-proof double sink with drainboard and graduate racks and a rectangular pressure sterilizer. The solution sterilization may be done in the central sterilization and supply section, but preferably in the solution room.

5.4.2 Furniture and Equipment

Equipment includes a prescription case and drug stock cabinets with proper shelving and drawers for a large assortment of drugs. Sectional drawer cabinets with cupboard bases are manufactured specifically for pharmacies and to fit any area. Cabinets should be such that they are readily adopted to future expansion.

Worktables or counters are required for manufacturing solutions, batches of powder, ointment and for filteration of solution. Work tables are also required for the loading of drug baskets and ward baskets. The standard counter height is 36 inches, depth of 30 inches, with minimum length of 74 inches desired.

Also necessary are an acid-proof sink with swivel faucet and with a drainboard approximately 5 feet in over-all length; a cabinet below to provide space for heavy mortars and pestles, and a cabinet with adjustable shelves above the sink for glass utensils, large graduates, flasks, funnels and beakers.

Space is required for a refrigerator of at least 8 cubic feet in the 50 bed hospital, 16 cubic feet in the 100 bed hospital and 32 cubic feet in the 200 bed hospital. A narcotic safe is necessary with proper double locking arrangement. A desk and other office equipment should be provided, including a telephone, a bulletin board and file cabinet for records and relevant literature.

5.4.3 Staffing

Considering the work load that is number of items to be served.per prescription and hours

of service to be given, requirement of pharmacist can be calculated. If the number of items to be served is between one to three, then in 8 hours duty a pharmacist can serve 150 prescriptions with half an hour break. If the items are 3 to 5 then limit to serve will be reduced to 120 prescriptions per pharmacist, although in Western countries only 100 prescriptions are served by one in one shift. Hospital having more than 200 beds need to have a Head Pharmacist and more than 200 beds should employ Chief Pharmacist and Assistant Pharmacist.

The study group on hospitals (1968) has laid down the guidelines for the staffing pattern of the Pharmacy Service, based on the number of beds in a hospital. It is as follows:

Bed Complement	*Number of Pharmacist*
Up to 50	3
Up to 100	5
Up to 200	8
Up to 300	10
Up to 400	15

It is the job of personnel department to create among different service and departments, scope of promotion to keep the workers motivated.

Recommended staff for pharmacy service in 750 bedded teaching hospital:

1)	Chief Hospital Pharmacist	
2)	Manufacturing Pharmacist	1
3)	Assistant Chief Hospital Pharmacist	1
4)	Technical Assistant (Pharmacy)	3
5)	Head Pharmacists	2
6)	Pharmacists	10
		18

Check Your Progress 3

1) Give the importance of location of hospital pharmacy.

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2) Name the physical facilities to be considered for a hospital pharmacy.

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3) Enumerate the equipment required in a pharmacy.

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4) Enumerate the factors affecting staffing requirements of a 750 bedded superspeciality teaching hospital.

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5.5 POLICIES AND PROCEDURES

The head of the pharmacy services will develop rules and regulations pertaining to the 'administrative policies of the department' and this will be done under the guidance and with the approval of the head of the hospital organisation. He will initiate and develop rules and regulations pertaining to the 'professional policies of the department' and interdepartmental with the approval and cooperation of the Pharmacy and Therapeutics Committee of the Hospital, and get that finally approved by the head of the hospital organisation.

The policies and procedures will clearly state:

- Extent (x) to which the department will prepare and sterilize certain injectable medications (including I/V fluids).
- Approved system for the possession and control of narcotics and barbiturates.
- Selection of Pharmaceuticals to be stocked in the various treatment and other areas.
- Restricted use of certain preparations, if any.
- Extent (x) to which a pharmacist will manufacture or compound pharmaceuticals.
- Dispensing of drugs, chemicals and pharmaceuticals.
- Procurement, storage and use of tax-exempt alcohol.
- Purchase procedures.
- System of record keeping.
- Role of pharmacist in education of medical and nursing staff.
- Charging procedures for drugs, etc.
- Research and clinical trials.
- Disposal of drugs.

5.5.1 Therapeutic Committee

The quality of patient care can be influenced by hospital patient care committee decisions regarding the role of drug usage process. The therapeutic committee is an advisory group that recommends policies related to drug therapy to the medical board. Every hospital, especially a teaching hospital must have a Therapeutic Committee. This committee usually consists of Physician, Surgeon, Nursing Supdtt., Pharmacist and the Medical Supdtt. as the Chairman. The committee should meet regularly, at least 3 times in a year. The functions and scope of the committee are:

- To serve in an advisory capacity to the clinicians and the hospital administrntion in all matters pertaining to drug usage.
- To develop a formulary of drugs, for use in the hospital and provide for its regular revision. Every hospital must have its own approved formulary and then it is the duty

of the administration to see that the drugs listed in the formulary are made available. Clinicians should be advised to restrict within its limits except in extra-ordinary cases.

- The committee should lay down procedures that help ensure cost-containment in drug therapy.
- To review adverse drug reactions, if any, occurring in the hospital.
- To assure quality standards in drug procurement and distribution systems.

Check Your Progress 4

1) What should be the various policies and procedures for a hospital pharmacy.

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2) Enumerate structure and functions of "Therapeutic Committee".

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3) What are the essential documents to be maintained in the hospital pharmacy?

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5.6 MANAGERIAL ISSUES

The pharmacy department should be organised in such a manner so as to ensure an integrated approach to its services in compliance with the aims and objectives of the hospitals as a whole. It should also be organised in a manner that it is consistent with the Central and State laws and regulations. Since drug therapy is a key component in patient care, the impact of ineffective or inefficient drug use will have consequences far beyond economic and clinical considerations. Important managerial issues are related to:

- Control of drug costs
- Effective staff utilization
- Human relations and consumer satisfaction
- Drug pilferage

5.6.1 Control of Drug Costs

Control of drug costs can be achieved to some extent by administrative strategies like reducing drug procurement cost, inventory management, value analysis, use of appropriate

drug distribution system, computerisation and use of therapeutic equivalents in the hospital formulary.

5.6.2 Effective Staff Utilisation

Effective staff utilisntion depends on an appropriate mix of pharmacists, pharmacy technicinns nnd other support staff. Pharmacists should not be used for functions that can be performed by other support staff.

5.6.3 Human Relations

Human relations in pharmacy services are as important as in any other hospital services. Right person for right job in an appropriate slogan but to achieve it is difficult. Work load of the department should be worked out so that appropriate staff can be deployed.

5.6.4 Consumer Satisfaction

Consumer satisfaction is an important issue of this service. Especially in the O.P.D. Pharmacy which is generally the last place to bc visited by the patients coming to the out-patient department and when they reach there, they arc in a tired state and thus, it is natural for them to expect quick and courteous service from the pharmacy.

5.6.5 Non-availability of Drugs

Non-availability of drugs is an important issue often causing embarrassment to the hospital. Availability of life-saving drugs should be ensured at all times based on appropriate inventory control techniques.

5.6.6 Supply of Sub-standard Drugs

Supply of sub-standard drugs is reported frequently in different places in the country. The hospital should follow standard purchase practices and routine and/or random qualitative analytical testing of drugs should be done. The hospital therapeutic committee should supervise this.

5.6.7 Drug Pilferage

Drug pilferage is nnother commonly dealt with managerial issue. As far as possible, drugs should be purchased by generic name. After the packages are received, they should be stumped with the hospital nume-stamp, The strips of tablets and/or cnpsules and bottles containing drugslchernicnlsshould also be stamped. The seal of bottles/containers should be opened at the time of issue of the item. The procurement section should be separate from the issue and distribution section.

5.6.8 Drug Distribution System

The drug distribution system is the keystone of pharmacy services. The head of this service should ensure safe and accurate distribution of drugs and other medications to patients nnd other service area. Proper labelling of drugs nnd dosage required should be ensured and errors should be minimized to zero, Time expired drugs should be weeded out systematically,

The pharmacy service will maintain following documents:

1) Non-expendable stores ledger
2) Expendable stores ledger
3) Indent File
4) Formula file for manufacturing medicaments
5) Costing Returns
6) Report File
7) Stock verification Returns file
8) Hospital Formulary

Check Your Progress 5

1) Enumerate various issues related to drugs in a hospital pharmacy.

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2) Evaluate the role of human relations and consumer satisfaction in a hospital pharmacy.

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3) What steps would you initiate to abolish drug pilferage in a hospital pharmacy?

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5.7 CONTROL AND EVALUATION

The complexity of the systems necessary to provide pharmacy services in a hospital would mandate a continuous and on-going control and evaluation system so as to develop a quality assurance programme for the service. Support from medical staff, nursing staff and pharmacy staff is essential for the hospital administration to develop such a programme. The Hospital Therapeutic Committee has a very important role in control and evaluation function of this service.

For effective control and evaluation of the pharmacy services criterion have to be developed on the basis of department's policies and procedures. There has to be an approved hospital formulary. The procurement and distribution should be clearly laid down. The entire pharmacy department should be reviewed periodically and annual verification of stock should be meticulously carried out by an independent authprity.

The Therapeutic Committee should evaluate the functioning of the service and should determine the correlation between what is actually occurring in all areas within the service and what is stated in established policies and procedures. Deviations, if any should be viewed very strictly and any changes required in the established practices should be duly implemented.

Check Your Progress 6

1) Discuss the role of in-built monitoring and evaluation system in a hospital pharmacy.

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2) Discuss the role of Therapeutic Committee in monitoring and evaluating a pharmacy.

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5.8 COMPUTERIZATION IN PHARMACY SERVICES

Computer utilisation in the pharmacy department is increasing, software applications have been developed for a wide range of pharmacy services, including drug distribution, clinical services, materials management, administration, ambulatory, and home care. Pressures to identify and contain costs while increasing productivity are part of the health care practice environment, and the effective use of computers is an important component in developing a contemporary pharmacy service.

Computerised pharmacy systems can generally be divided into two types—adjuncts to the hospital information system and dedicated department system:

1) Computerised pharmacy systems that are adjuncts to the hospital management information system typically use the hospital mainframe computer. In' its simplest form, datn regarding pharmacy services are entered into the mainframe, and reports are generated, usually monthly, for distribution and review by the pharmacy director. These data include financial management data, time reporting information, and reports of the number of batches by category, such as oral solid unit doses, injectables, I/V admixtures, and so forth. However, these data are of limited use becnuse they are usually presented in a standnrdised format that can be used by all departments, and there is limited ability to manipulate the datn for the purpose of answering specific questions or to run modeling or simulation analysis programmes, computer programmes that are specifically tnilored to pharmacy services and use the hospital mainframe computer. This form of computerisntion has some distinct advantages. Admission, discharge, and trnnsfer data can be obtained from the mainframe and integrated into the pharmacy system. Also, pharmacy can have access to data from other departments, such as laboratory medicine and medical records, that also use the hospital's mainframe computer. Although using the hospital mainframe computer may seem to be the "best of both worlds", caution must be taken nnd reason must temper enthusiasm. Standard computer programmes for pharmacy may be relatively inflexible in meeting the specific pharmacy's needs. Modification of these programmes may not be possible by the vendor; it is then important to know whether the data services department can make the necessary modifications. In either case there may be a cost to these modifications and its benefit must be assessed, as well as the practicality and time required to modify the system to meet pharmacy's needs.

2) Dedicated system that uses either microcomputers or minicomputers. This type of system enables the pharmacy to tailor its computer software to its needs, There is a

growing number of vendors with dedicated pharmacy systems available, and the increase in computer capabilities and cost decrease for micro and minicomputers make a dedicated pharmacy system practical.

Although there are a number of advantages to a dedicated pharmacy system, there are also disadvantages: Unless the pharmacy can have ready access to patient admission, discharge, and transfer data and data generated by other dcpartments, entry of this data for pharmacy use may be time consuming and prone to error. These disadvantages, however, have been some what reduced by the introduction of networking capabilities.

Current trends indicate that the ideal system may utilise a combination of both approaches with networking capability. Software is available to support most pharmacy applications and an increasing number of pharmacists have the ability to develop programmes to meet their specific departmental needs.

Some degree of computerisation is commonplace in most pharmacy dcpartments and ranges from simple billing procedures to marc sophisticated applications, such as pharmacokinetic monitoring. Computers were initially used to assist in financial and administrative activities. Computer programmes were then developed to support drug use systems that require a significant amount of documentation nnd record keeping.

Analysis of the economics of drug therapy will enable an institution to develop cffectivc strategies to control costs.

Computers can be used to support all aspects of the drug use process. Some examples of common computer applications in pharmacy are:

- drug data base development to support the formulary management programme
- patient identification/data
- maintaining patient profiles
- drug order entry, recall. and changes
- unit-dose fill lists
- I/V admixture work lists
- total parenteral nutrition solution calculations
- patient billing
- label generation
- floor stock control
- department cost accounting
- inventory management
- control drug documentation and recording
- drug information
- pharmacokinetic consultations
- financial reporting,

In addition to the computer applications identified, the pharmacy chief should develop a departmental management information system. The management information system should integrate key data for the purpose of enhancing decision making involved in the planning, managing, and controlling of departmental operations. A well-designed system incorporates operational, clinical and personnel information and provides periodic reports reflecting departmental operations that can be used to assist in the management decisions.

Further an effective pharmacy computer system integrates departmental data with hospital-generated data.

To develop an effective pharmacy computer system requires management and staff support. The information generated must foster accountability and responsibility throughout the department and must be focused on meeting the explicit needs of the department. It must also be collected and reported in a format that is both timely and accurate.

5.9 LET US SUM UP

In this unit you have learnt that pharmacy services in a hospital play a very important role in patient care. It is one of the most extensively used therapeutic service of the hospital. This service or department is under the supervision and control of a professionally competent and legally qualified pharmacist. It is from the pharmacy that all the medications are supplied to the nursing units and other services; pharmaceuticals and injectables are prepared; narcotics and other prescribed drugs are dispensed to the patients and professional supplies are stocked and dispensed. Thus the hospital pharmacy has the role of manufacturing, compounding and dispensing drugs and other therapeutic substances that may be used in a hospital. Smaller hospitals may not have a regular pharmacy department and may only maintain limited stocks. Hospital pharmacy services have changed dramatically in the recent past. These changes have paralleled the changes in the drug technology and in the health care system. The pharmacist who heads the pharmacy department must be licensed and be able to provide a full range of pharmacy activities, however whether the department manufactures certain solutions or drugs is a matter of hospital policy. The extent of activities in the department are to be governed by the laid down organisational policies of the hospital.

5.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) It is the premises licensed for the retail sale or supply of drugs to the hospital outpatient department and/or inpatient areas and it has qualified and licensed person(s) and indulges in compounding of drugs.

2) Prior to 1947, hospital pharmacy and dispensaries in our country were manned by dispensors and compounders. Their academic background was not adequate. In view of this the Chopra Committee (1921) and the Bhore Committee (1946) recommended reforms and thus in 1949 the Pharmacy Council of India was founded, which recommended Diploma in Pharmacy as the minimum academic qualification required for entering the profession.

3) The Pharmacy Act, 1948 is the landmark towards rationalisation of pharmacy services. It was amended in 1959 and again in 1976. The objectives of the Act are to:

   a) regulate the minimum educational qualification required to become a Pharmacist, as a Central responsibility.

   b) regulate the practice of Pharmacy as a State responsibility. This act has brought uniformity in this field.

Check Your Progress 2

1) Pharmaceutical functions rendered by a hospital Pharmacy are:
   - Demand estimation of various drugs in the formulary.
   - Compounding and manufacturing of sterile and non-sterile products.
   - Dispensing for outpatients/inpatients and other user areas in the hospital
   - Academic functions, like teaching and training.
   - Quality control of drugs purchased and those manufactured or compounded in the Pharmacy.

2) Various types of Pharmacy Services are:
   a) Pharmacy for out-patients department.
   b) Pharmacy for in-patients services.
   c) A combination of both above.
   d) A retail sale counter in the hospital.

3) The Drug Distribution System is the keystone of Pharmacy Services. It has to be a system which is effective, efficient, safe and responsive. It is a complex system and involves interaction of many individuals and departments with the Pharmacy. Various methods of drug distribution are:
   a) The floor stock system
   b) The individual patient drug order system
   c) Unit-dose method

Check Your Progress **3**

1) Location of a hospital Pharmacy is very important and a well-located Pharmacy can be more efficient and more effective. It can enhance the productivity of the department. Location should be such that the flow of patients and materials is quick and easy. The Pharmacy for out-patients should be located in the O.P.D. and as Pharmacy is the last place to be visited by the patients and/or their attendants, it should be conveniently located near the main exit of the O.P.D. The Pharmacy for wards, in-patients and other user areas should be located preferably on the first floor of the in-patient area in the hospital. It should be readily accessible to elevators to ensure efficient and adequate service to various user-areas.

2) The physical facilities to be considered for hospital pharmacy are:
   - location of the department
   - recommended floor area
   - considerations for finishings, lighting and ventilation
   - separate solution room

3) The equipment required is:
   - various types of shelves and cabinets
   - worktables/counters
   - refrigerator, its size and capacity
   - narcotic safe

4) The factors are:
   - staff requirement will depend on hospital policies and the work load of the department
   - the recommendations of the study group on hospitals, 1968

Check Your Progress 4

1) The Policies and Procedures should be:

- administrative policies and
- professional policies, as approved by the Head of the hospital organisation
- policies and procedures related to drug preparation, dispensing, procurement and storage

2) Structure of Therapeutic Cummittee is such that it consists of a Physician, a Surgeon, Nursing Superintendent, Pharmacist and the Medical Superintendent is the Chairman.

Functions of Therapeutic Committee are to:

a) serve in an advisory capacity to the clinicians and the hospital administration in all matters pertaining to drug usage.

b) develop a formulary of drugs, for use in the hospital and to keep it regularly up-dated.

c) laydown procedures to help ensure cost-containment in drug therapy.

d) review drug reactions, if any.

e) assure quality standards in the procurement and distribution of drugs.

3)
- Expendable store ledger
- Non expendable store ledger
- Indent File
- Formula File
- Costing Returns
- Report File
- Stock Verification File
- Hospital Formulary

Check Your Progress 5

1) The various issues are:
- control of drug costs
- appropriate drug distribution system
- availability of drugs
- inventory control
- quality control of drugs
- drug pilferage

2) Human relations and consumer satisfaction are two very important issues for a hospital pharmacy. There should be appropriate and adequate staff strength and its deployment should be such that staff utilization is most effective. The services provided to the consumers should be quick and courteous.

3) Following steps will be initiated in order to abolish drug pilferage:
- purchase drugs by generic name
- stamping of packages, strips and bottles
- seal to be opened at the time of issue of a bottle/container
- security checks
- motivation of staff

Check Your Progress 6

1) The Hospital Pharmacy should have an in-built monitoring and evaluation system for its proper functioning. Such a system can go a long way in providing better patient care and making the service more cost-efficient and more cost-effective. It will require support from Pharmacy Staff, Medical and Nursing Staff. Therapeutic Committee can play a very vital role in this field. There should be periodic review and verification of stocks and documents.

2) The Therapeutic Committee has a very important role in monitoring and evaluating a Pharmacy, as this Committee recommends policies related to drug therapy and it also develops a formulary for use in the hospital. It assures quality standards in the drug procurement and distribution system. This committee can recommend necessary changes in the department practice(s), if required. It correlates and analyses the actual performance of the Pharmacy with the laid down norms. Thus, the Therapeutic Committee has a very vital role in monitoring and evaluating a Pharmacy.

Check Your Progress 7

1) The various applications of computerisation in a pharmacy are in the areas of:
   - drug distribution
   - costing
   - materials management and inventory control
   - administrative

2) The various types of pharmacy computerisation are:
   - department system
   - as adjunct to hospital M.I.S.
   - a combination of the two

5.11 FURTHER READINGS

Accreditation Manual for Hospitals, Chicago, The Joint Commission on Accreditation of Hospitals, 1985.

Goodwin, H.N., "Institutional Patient Care" In A. Osol, et al., *Remington's Pharmaceutical Sciences*, 16th ed., Mack Publishing Co., 1980.

Charles E. Housley, *Hospital Material Management*, Rocknile, MD, Aspen Systems Corporation, 1978.

Wolper and Pena, *Health Care Administration*, Aspen Systems Corporation, 1987.

McGibony John R., *Principles of Hospital Administration*, G. P. Putnam's Sons, 1969.

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UNIT 1 PROBLEMS IN OPD

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- identify problems usually encountered in OPD by patients;
- enumerate problems in running a smooth OPD services;
- assess the quality of OPD services provided; and
- apply problem solving methods for quality improvement.

1 1 INTRODUCTION

You have already learnt about the importance, functions and need of OPD services, In this unit of practical manual you will learn about the problems faced by the patients and the hindrances to smooth functioning of the OPD. You will also learn how to inspect an OPD to study the problems, and also carry out a problem solving exercise in case of an actual problem situation.

1.2 REVIEW OF THE SITUATION

Out Patient Department (OPD) as you know is the part of hospital with physical, medical and other facilities to provide care to patients who are not registered as inpatients. It includes Emergency OPD, General OPD and Referral or Speciality OPD.

1.2.1 Significance of OPD

You have already learnt in Block 1 of this course about the significance of OPD in the unit on OPD.

To recapitulate your memory:

- it is the first point of contact with patient.
- it is window to any health care service provided to the community—"Shop window".
- it is an inseparable link in the hierarchical chain of progressive health care.

  a good OPD service reduces morbidity and mortality rates.
- it is stepping stone for health promotion and disease preventioq.
- it acts as a filter, reducing the number of admissions into the hospital.
- rising cost of hospitalisation has enhanced the need to keep hospitalisation to the minimum and thus enhances the importance of OPD services.

1.2.2 Functions of OPD

You have also learnt about the functions of OPD in the unit on OPD.

Rekindling your memory, you shall find that OPD:

- is ideal for early diagnosis of any disease with modern techniques and for prophylactic examination;
- provides Ambulatory and Domiciliary treatmenl to all cases which can be treated at clinic **or** at home;
- is a route for inpatient admission;
- provides after care and medical rehabilitation if necessary after discharge from hospital;
- carry our health promotion activities;
- trains medical, nursing and paramedical personnel;
- maintains records and collects data for epidemiological and social research; and
- participates in various preventive activities such as:
  - well baby clinic
  - ante-natal clinic
  - school health programme
  - health education and nutrition advice
  - immunisation
  - early reporting of communicable diseases.

1.2.3 Problems in OPD

You will appreciate that any disruption in the smooth functioning of OPD affects the patients directly **or** indirectly. There are numerous problems, one can think of. However, the most common problems in any OPD are:

i) Non-responsive rereption and apathetic staff.

ii) Wild search of speciality OPDs by patients.

iii) Appointment jumping.

iv) Long waiting hours at each point of contact.

v) Non-availability of reports of various investigations.

vi) Inadequate time given for each.

vii) Poor rapport **or** communication between doctors and patients.

viii) Non-availability of equipment and supplies.

1.2.4 Alternate Solutions

On analysis of various problems in OPD, you shall find that the following could be the alternate solutions. These are alternatives found by previous administrative researchers. However, you can come up with better solutions to your problems during the study. You have to choose the best course of action amongst these solutions to solve your practical problem.

The most common alternate solutions are:

- **Appointment system** in OPD to reduce the waiting time.
- 24 hrs. **registration system** to fix appointments for old cases and accommodating emergency cases as early as possible, again to reduce waiting time.
- Separate general and emergency OPD, to attend the serious cases on priority.
- **Selective attachment of services** e.g. having surgery and urology OPD close by because many of the surgical cases need urology assessment also. This will reduce the patient traffic in other OPD areas.

- Filter clinics: Clinics in the ground floor with junior doctors so that minor ailments like cough, cold can be treated and sent back so that they do not overcrowd the speciality OPD.
- Starting the OPD in time to reduce the waiting time and prolonging OPD time with another shift of doctors to provide services to maximum number of patients.
- Satellite Clinic: Community outreach clinics of the hospital will reduce the OPD load in the main hospital and the community will get special care at its door steps.
- Sufficient waiting area with adequate resources to cater the load.
- Sufficient space for future expansion.
- Efficient department of hospital administration for day to day redressal of problems.

1.3 MATERIALS AND METHODS

The various tools and techniques which can be used for assessment of OPD services of a hospital are:

i) Visit to OPD: The principles of direct observation of OPD is to check the accessibility, visibility, convenience and expandability of the OPD. These four principles will help you assess the general planning of OPD e.g. the size, site, assessment of funclional zones, etc. This would further help you to get a bird's eye view of the OPD process e.g. the waiting time, convenience, accessibility of services; the flow of patients.

ii) Operational Research Techniques: By using operational research techniques you can quantify the services required for the given OPD and derive the solutions to the problems mathematically. The various operational research techniques which can be used are:

- Queing theory
- Holding and lifting capacity
- SWOT analysis
- Activity study/Work study

iii) Review of the various policies and procedures: This will help you to qualify and quantify the lacunae in physical facilities, equipment and stores, and activities you have found by the above methods.

iv) Interview: Patients interview with the help of a questionnaire will go a long way in improving your public relations both internal and external because a hospital is for its patients and patient satisfaction is the key to the services you provide.

1.4 ACTION PLAN

After reviewing the various materials and methods to assess the quality of service provided you should concentrate on the exact plan of action. This means, how the study should progress, the various details to be observed, analysis of results of various operational research techniques applied, reporting the results of questionnaire and interview which you have developed.

These will help you in qualifying and quantifying the problems and design alternate solution and select the best course of aclion amongst them.

14.1 Direct Observation

By direct observation it is meant that you should basically observe the structural and process criteria in OPD.

i) See whether the location of OPD is easily visible to public, accessible and conveniently placed for the patient. This is a subjective observation.

ii) See the adequacy of the size of OPD in context to the patient load and the extent of other facilities provided. McGibony has estimated a OPD load of two patients1 bed/day.

iii) See the OPD site in relation to its need for;

- separate entrance without cris-crossing the inpatient services.
- sharing of investigation facilities with inpatients.
- unidirectional flow of patients.
- liberal parking space.
- space for future expansion.

iv) Assess whether the planning principle of "Design follows function" holds good or not, i.e. whether the OPD has been divided into various functional zones or not.

a) Public area should have:

- Reception and Enquiry
- 5% rise for ramp
- An area for record keeping. Ideal is 5-25 file draw per 10-50,000 cards of 5" x 7" size.
- An area for registration. McGibony recommended one registration desk for 12-30 patients per hour.
- Waiting area: The main waiting area of OPD should be 1 sq.ft/patient with a minimum of 400 sq.ft.
- 1 WC/100 patients and 1 toilet150 patients.

b) Clinical area should have:

- Subsidiary waiting area i.e. waiting area in front of doctor's consultation room. It is estimated to have 8 sq.ft/patient for 1/3rd attendance in subsidiary waiting area.
- Consultation room separate for each doctor with a screened area for examination which may be shared by two doctors. A consultation room should be at least 160 sq.ft.
- Treating and dressing room for each speciality of 120-160 sq.ft.
- Ancillary facility includes injection room and pharmacy.
- Injection clinic should accommodate 10-20 patients at one time with a space requirement of 6-8 sq.ft per patient.
- Auxiliary facility includes Laboratory, Radio-diagnosis, Blood Bank, Screening clinic and room for Medical Social Service Officer. Each of these area should constitute 150-200 sq.ft.

c) Administrative area includes: Business Office, Housekeeping Service, Storage area for materials. It should be approximately 150 sq.ft. McGibony has recommended that of the total area of OPD:

Public area should constitute	10-15% of area
Clinical area should constitute	40% of area
Administrative area should constitute	15% of area
Circulation area should constitute	25-30% of area
Wall and partition area should constitute	10% of area.

1.4.2 Evaluation of Process

The procedures and activities in the OPD can be evaluated by analysing the various utilisation pattern, flow of activity and use of operational research techniques.

i) **Flow Concept:** The flow concept defines the patient load in the various areas of OPD. This would help you to extend your services accordingly. It has been estimated that out of the patients coming for primary care in OPD:

- 20-40% attend injection room
- 5-15% attend the dressing room
- 5-10% attend the pharmacy/dispensary

- 5-10% go for the pathological investigations
- 2-5% attend the minor theatre.

ii) **Holding capacity:** Holding capacity is the adequacy of space to hold the patients in waiting areas. All OPDs with more than 2 floors should have lifts with adequate space.

iii) **Activity Sampling:** You have to assess the utilisation pattern of man and material in relation to workload by conducting an **Activity Sampling.** Activities of each category of personnel has to be defined and the time spent in each work has to be estimated. This is otherwise called as **work study.** This would also help you in assessing the cost effectiveness of labour in OPD.

Material utilisation has to be assessed vis-a-vis the workload, to analyse any wastage therein.

iv) **SWOT Analysis** : The analysis of the Strength, Weakness, Opportunities and Threats of a hospital is a must before analysing the services in its OPD. This would help you in reviewing the policies and procedures of the service provided and seek necessary solution.

v) **Queing Theory:** This is an operational research technique to quantify the waiting time of patients in each speciality and suggest alternate solution to reduce the queue and waiting time. The queueing theory has been developed in the attempt to answer the behaviour of queue, average waiting time and average time spent in the system. To study the queue you have to collect data of pattern of arrival of clientele, interval between the clients or we should know the arrival pattern and service time. The objective of knowing queueing theory is to determine:

- How many channels are required to provide, that average given length will not be unreasonable.
- How to schedule arrival so that queue length does not fluctuate too much.
- The cost of queue and cost of service should be beneficial.

vi) **Systems Analysis:** This is also an operational research technique in which you need to analyse the policies and procedures; qualify and quantify the service in relation to number of hospital beds; treatment of patients in relation to art of care and time spent with each patient and the development of good rapport between doctor and patient.

vii) **Diagnostic and Therapeutic Process:** You have to assess each procedure in relation to quality and quantity of test e.g. in an x-ray, you need to see the quality of x-ray, taken, the waiting time for a single x-ray, the type of x-ray, its adequacy in relation to the type of patient and his clinical need, the number of x-rays per day.

1.4.3 Evaluation of Outcome

You have to assess the outcome of OPD service in relation to patient satisfaction and cost benefit and cost effective analysis.

a) **Patient Satisfaction:** You can assess by developing a questionnaire about the quality and quantity of service provided. This can also be assessed by interviews of patients, number of complaints.

b) **Employee Satisfaction:** You need to assess the satisfaction of the staff working in OPD by questionnaire so as to improve the service and keep the employees motivated.

c) **Cost Benefit Analysis:** You have to assess the benefits (in term of aid provided for clinical diagnosis) out of any services in terms of cost incurred in providing such a service.

d) **Cost Effective Analysis:** You further need to assess each service provided in terms of its cost vis-a-vis its effectiveness to provide the required service e.g. Break Even Analysis can be adopted to study the cost-effectiveness of an equipment, say an x-ray machine.

At the end of this whole process you shall be able to qualify and quantify the **OPD** service provided in any hospital. The analysis of this action plan will help you in developing the alternate solutions and select the best course of action.

1.5 ACTIVITIES

Activity **1**

Now you have studied the problems in OPD in detail and the ways and means to analyse it and finding a solution to it. Therefore, now you are required to visit an OPD in your vicinity and analyse the problem therein as per the checklist given below. You are also required to study the problem given at Case Study, carry out the tasks specified therein, and prepare an action plan as required.

Checklist for a Visit to OPD

i) ***Evaluation of Structural Criteria***

a) Location vis-a-vis community and transport facility

b) Site and size of OPD in relation to workload

c) Type of OPD services provided vis-a-vis the needs of the community.

d) Adequacy of labour and facilities of space, equipment and stores vis-a-vis the workload in OPD.

e) Functional zones of OPD and its adequacy in relation to the OPD patient load.

ii) ***Evaluation of Process Criteria***

a) Evaluation of flow of patient traffic keeping in mind the flow concept, holding capacity and lifting capacity.

b) Assessment of waiting time by use of various operational resaarch techniques e.g. queuing theory.

c) Utilisation of man and material by doing a work study and activity sampling.

d) Evaluation of policies and procedures of the hospital for OPD with the help of SWOT analysis and system analysis and analysis of records.

e) Evaluation of quality and quantity of clinical care to patients in relation to art of care, cure provided, diagnostic accuracy and rapport between doctor and patient, and analysis of records.

f) Evaluation of diagnostic and therapeutic procedures both quality and quantity wise.

iii) ***Evaluation of Outcome Criteria***

a) Assessment of patient satisfaction by use of questionnaire and interviews, number of complaints and conflicts.

b) Assessment of employee satisfaction; grievance procedure for both patients and employees.

c) Assessment of outcome of service in terms of cost-benefit and cost-effectiveness.

Activity 2

In order lo practically orient you to live problems in OPD situation, a case study is given below simulating a problem in one of the OPDs. You are expected to study the case and complete the task given in it.

Medical Superintendent (MS) of more than 800 bedded hospital is receiving complaints for some time that the patients have to wait for long time for consultation at specialist OPDs. In Cardiology OPD after waiting for long hours hardly a minute is given for consultation. Even at times the ECG machine is not available for examination. In Surgical OPD sterile surgical dressing was not available for treatment of last few patients. MS on enquiry found that large number of cases were registered every day for specialists consultation out of which 30-40% cases could have been disposed of at lower level. Consultant Cardiology on enquiry stated that there was a long waiting list for ECG and Ultrasound examination. Sometimes the technicians are absent which adds to the problem.

Consultant surgeon stated that supply of sterile dressing may be inadequate, Officer incharge CSSD stated that there was no short supply of dressing and issues were made according 'to the demands. After a preliminary enquiry the MS formed a committee to investigate all aspects of functioning of OPD and related supportive services to make recommendations for remedial measures.

- Define the problem
- Critical analysis of the problem
- Possible reasons of the problem
- Collection of facts and figures
- Alternative solutions to the problem
- Selection of best alternative solution with reasons
- Action plan and remedial measures

On completion of both the activities, you should submit the reports to the academic counsellor of your Programme Study Centre.

1.6 LET US SUM UP

In this unit we have helped you in recapitulating the need and importance of OPD, the functions of OPD, the problems encountered by patients in OPD, the tools and techniques to evaluate the OPD service both qualitative and quantitalively, to analyse a given situation by a case study and to design alternate solutions.

UNIT 2 ORGANISATION OF EMERGENCY CARE

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- identify the problems in provision of emergency care in the hospital;
- plan a study of the problem;
- apply the problem solving method; and
- develop appropriate solutions to solve these problems.

2.1 INTRODUCTION

In this unit of practical manual you will learn to critically examine the provision of emergency care in the hospital. Emergency care should be of high quality, cost effective and compassionate. Administrative measures must be in place to ensure that this happens.

Emergency care in the hospital is primarily provided at the casualty or accident and emergency departments and in the intensive care units. These departments are important points of entry into the health care system and serve a clientele that demands modern efficient facilities, appropriately trained staff and state of the art health care. The emergency care is provided in an environment, which is stressful, demanding and uncertain both for the care providers and beneficiaries.

Hospital administrators (health care managers) in this scenario are constantly confronted with problems. Conditions encountered that initiate the need for problem solving are varied and multifaceted e.g. deficiency in service, mistakes and defects, breakdowns on delays and inefficiencies etc. **A** general problem solving method presenting an orderly process by which hospital administrators can approach this important task is described. An example of the case study is presented,

2.2 REVIEW OF SITUATION

The key issues which needs to be reviewed to ensure the operational success of emergency care services in the hospital are:

- Premises
- Personnel
- Plant (Equipment)
- Policies and Procedures

Premises

You have already studied the various aspects of planning and designing which need to be considered. A well-designed casualty or intensive care unit meets the needs of the medical staff as well as the patients. Facilities ensure provision of optimum medical care and increased customer satisfaction.

Personnel

The staffing norms of the emergency services have been enumerated earlier. The key issue

is the staff morale from the administrative point of view. It is directly linked to whether their needs and wants are being met. It is the responsibility of the hospital administration to satisfy the staff needs, allow for individual wants and balance these with overall hospital goals and resources. Well-trained and motivated personnel are vital to provide efficient emergency care in the hospital.

Plant (Equipment)

A wide variety of equipment is required for provision of emergency care. This equipment has to be dedicated, functional and provided with a back up. The equipment may be directly required for patient care e.g. monitors or ventilator or indirectly for various support services e.g. laboratory or radiological equipment. Appropriate communication and information management systems are these days critical to provision of high quality emergency care.

Policies and Procedures

Preparation of definite policies and procedures for emergency care is essential. These guidelines if well written and consistently applied, can raise the level of care and ensure consistency in the provision of that care. These are used by the staff to set their priorities and tasks without frequent reference to hospital administration. Written policies and procedures allow the emergency services to move from reactive to proactive mode with positive addition to quality of care being provided.

Problems

The problems in delivery of emergency care in the hospital have traditionally been identified through rctrospcctive reviews of written medical records, patient complaints and staff concerns.

There are basically five sources of problems:

- Failure to appreciate 'the importance of the task.
- Insufficient training of medical, nursing and paramedical staff.
- Inadequate support services or staffing,
- Failure to follow established policies, procedures and protocol.
- Lack of properly functioning equipment on supplies.

2.3 MATERIALS AND METHOD

Once a probable cause of the problem is evident you would require to collect relevant data on information about its various aspects. You will have to decide on the tools and techniques to use for the study of the problem.

Sources of Data

You may collect the relevant information through:

- Questionnaire
- Interview
- Document study
- Observation study
- Work study
- Operation Research Techniques

Method

The problem solving method involves:

- Problem identification
- Problem definition and/or goal statement
- Problem analysis

  Alternative solutions
- Recommended action
- Implementation and evaluation

UNIT2 ORGANISATION OF EMERGENCY CARE

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- identify the problems in provision of emergency care in the hospital;
- plan a study of the problem;
- apply the problem solving method; and
- develop appropriate solutions to solve these problems.

2.1 INTRODUCTION

In this unit of practical manual you will learn to critically examine the provision of emergency care in the hospital. Emergency care should be of high quality, cost effective and compassionate. Administrative measures must be in place to ensure that this happens.

Emergency care in the hospital is primarily provided at the casualty or accident and emergency departments and in the intensive care units, These departments are important points of entry into the health care system and serve a clientele that demands modern efficient facilities, appropriately trained staff and state of the art health care. The emergency care is provided in an environment, which is stressful, demanding and uncertain both for the care providers and beneficiaries.

Hospital administrators (health care managers) in this scenario are constantly confronted with problems. Conditions encountered that initiate the need for problem solving are varied and multifaceted e.g. deficiency in service, mistakes and defects, breakdowns on delays and inefficiencies etc. A general problem solving method presenting an orderly process by which hospital administrators can approach this important task is described. An example of the case study is presented,

2.2 REVIEW OF SITUATION

The key issues which needs to be reviewed to ensure the operational success of emergency care services in the hospital are:

- Premises
- Personnel
- Plant (Equipment)
- Policies and Procedures

Premises

You have already studied the various aspects of planning and designing which need to be considered. A well-designed casualty or intensive care unit meets the needs of the medical staff as well as the patients. Facilities ensure provision of optimum medical care and increased customer satisfaction.

Personnel

The staffing norms of the emergency services have been enumeraled earlier. The key issue

is the staff morale from the administrative point of view. It is directly linked to whether their needs and wants are being met. It is the responsibility of the hospital administration to satisfy the staff needs, allow for individual wants and balance these with overall hospital goals and resources. Well-trained and motivated personnel are vital to provide efficient emergency care in the hospital.

Plant (Equipment)

A wide variety of equipment is required for provision of emergency care. This equipment has to be dedicated, functional and provided with a back up. The equipment may be directly required for patient care e.g. monitors or ventilator or indirectly for various support services e.g. laboratory or radiological equipment. Appropriate communication and information management systems are these days critical to provision of high quality emergency care.

Policies and Procedures

Preparation of definite policies and procedures for emergency care is essential. These guidelines if well written and consistently applied, can raise the level of care and ensure consistency in the provision of that care. These are used by the staff to set their priorities and tasks without frequent reference to hospital administration. Written policies and procedures allow the emergency services to move from reactive to proactive mode with positive addition to quality of care being provided.

Problems

The problems in delivery of emergency care in the hospital have traditionally been identified through retrospective reviews of written medical records, patient complaints and staff concerns.

There are basically five sources of problems:

- Failure to appreciate 'the importance of the task,
- Insufficient training of medical, nursing and paramedical staff.
- Inadequate support services or staffing.
- Failure to follow established policies, procedures and protocol.
- Lack of propetly functioning equipment on supplies.

2.3 MATERIALS AND METHOD

Once a probable cause of the problem is evident you would require to collect relevant data on information about its various aspects. You will have to decide on the tools and techniques to use for the study of the problem.

Sources of Data

You may collect the relevant information through:

- Questionnaire
- Interview
- Document study
- Observation study
- Work study
- Operation Research Techniques

Method

The problem solving method involves:

- Problem identification
- Problem definition and/or goal statement
- Problem analysis
- Alternative solutions
- Recommended action
- Implementation and evaluation

Problem Identification

Problem is identified by the difference between what is actually happening (the actual) in a situation and what one wishes to have occur (the optimal). To determine a problem area it is necessary to gather, examine and interpret information from all sources available and to decide whether the problem area warrants attention.

Problem Definition

Problem is defined in clear and specific terms. A clearly stated problem structures the entire problem solving process as to what has to be done to solve the problem and evaluate its outcomes. Efforts are then focused towards providing a solution to the problem. Goals flow from the problem statement. A goal is then simply a restated problem.

Problem Analysis

After the problem is identified, it must be analysed. Analysis entails the following steps:

- To determine why the problem exists
- To identify the personnel, facility, equipment or guidelines which will solve the problem/achieve the goal
- To analyse the ability of personnel involved to accomplish the goal.

Alternative Solutions

Based on analysis, the next step is to develop various alternative solutions that have potential to solve the problem or achieve the goal. Relevant data/information collection is important at this stage. After the ideas are listed, then each solution should be studied for anticipated positive and negative results.

Recommended Action

Following analysis of alternative solutions, one line of action must be chosen. It is unlikely that any one solution will have no negative consequences. The recommended action, should, therefore, have the highest probability of reducing the gap between 'the actual' and 'the optimal' and lowest probability of negative consequences.

Implementation and Evaluation

After a recommended action has been specified it has to be implemented i.e. put into action. Evaluation is important till the action is completed.

2.4 ACTIONPLAN

How to proceed with study?

After deliberation on the problem you have decided to proceed with the study, then you would need to draw up an action plan.

This action plan will include:

- Programme of the study.
- Time schedule of the study.
- Day wise list of activities.
- Visit to the department/unit.
- Checklist of points to be checked,
- List of personnel for interview.
- Checklist of points to be clarified.
- Schedule of interviews.
- Development of Questionnaire.
- Administration of Questionnaire.
- Checklist for observation study.
- Checklist for document/record study.
- . Development of worksheets (if required).
- Record keeping.

- Analysis of data/information.
- Preparation of report.
- Presentation of report.
- Formulation of course of action.

2.5 ACTIVITIES

Activity 1

In your hospital review the following aspects in emergency services and intensive care units:

Premises		Location, Space, Waiting Area, Treatment Area, Facilities etc.
Personnel	:	Adequacy, Availability, Training Motivation etc.
Plant/Equipment	:	Availability, Maintenance, utilization etc.
Policies and Procedures	:	Admission and Discharge, Treatment, Scheduling of medical coverage, Equipment Maintenance, Drugs, Infection Control, Visitors, Medicolegal cases. Housekeeping etc.

Develop a manual containing various policies and procedures for your intensive care unit/ emergency medical services (EMS).

Activity 2

In order to practically orient you to the problem in emergency care, a case study is given below simulating a problem in one of the emergency procedures.

A 500 bedded hospital having a 12 bedded ICU for medical cases including four coronary care cases. A separatc ICU exists for surgicnl cases. Recently a case of severe heamatemesis was sent at night by the casualty department to the medical ICU but the case was not accepted firstly because a bed wns not available and secondly doubt existed whether the case should not go to surgical ICU. It was referred to surgical ICU again who refused to admit being a medical case. In this process one hour was lost and the patient died on the stretcher, without any medical attention. Reports were also received that acute cardiac cases needing constant observation and care are being treated in the general medical wards due to non-availability of beds in ICU. Medical Superintendent during his visit on different occasions found that retention of certain cases in ICU was unnecessary as their condition improved and they were fit to move to a general ward. He also noticed at times some of the cardiac monitors, and respirators were not in working order. Sometimes at night only interns and student nurses were managing ICU. Medical Superintendent ordered an enquiry to ascertain reasons of mismanagement, and to formulate detailed operating procedures for ICU.

- ☞ Identify the problems.
- ☞ Define the problcin.
- ☞ Critically analyse the problem.
- ☞ Alternative solutions to the problem.
- Selection of best alternative solution with reasons.
- ☞ Action plan and remedial measures.

2.6 LET US SUM UP

In this unit you learnt that as a hospital administrator the key issues to ensure operational success of emergency services in the hospital are premises (well planned facilities), personnel (well trained and motivated), plant (dedicated and functional equipment) and policies and procedures (well written and consistently applied). You came to know about the main sources of the problems in emergency care. The problem solving method was presented for developing appropriate solutions, An action plan to undertake a study of the problems was outlined.

UNIT 3 QUALITY ASSESSMENT IN CLINICAL LABORATORY SYSTEM

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the system of quality assessment in clinical laboratories;
- ensure parameters and procedures for performance of laboratory lest under quality assessment guidelines;
- establish the process of internal and external quality control in periodic monitoring performances of laboratories; and

identify the problems/bottlenecks in functioning of the system..

3.1 INTRODUCTION .

In this unit you will learn about definition, type of quality control and implementation of it in the laboratory system, You will be introduced to scenario of functioning of laboratories in this country with regard to quality control system; various factors involved in quality control, procedures of accreditation, status of'accreditation in the laboratories; authorities of accreditation; Registration and Licensing problems of laboratories. You will also learn about the need for training and research requirement. Towards the end you will learn about the steps to maintain minimum standards of laboratory quality assessment and various ongoing programmes in the country.

3.2 QUALITY CONTROL AND QUALITY ASSURANCE IN LABORATORY SYSTEM INCLUDING BLOOD BANK

It is imperative to provide referring physician with a quality diagnostic test report, Quality Control measures have been well established in Laboratory medicine for many years but its applications is inadequate. One needs to understand the difference between Quality Control (QC) and Quality Assurance (QA).

a) **Quality Control** is a surveillance process in which action of people and performance of equipment and materials are observed in a systematic and periodic way so that it provides a record of consistency of performance and actions taken when performance does not conform to standards established in the laboratory. In other words Quality Control focuses mainly on technical, procedural and process issues. Quality Confrol is a statistical system for measuring the reproducibility of degree of precision in laboratory procedures. It is an excellent means of improving lahoratory efficiency. The programme ensures the quality results for treating physician/surgeon and better progress for patients.

b) **Quality Assurance** is a continuous process of assuring that all laboratory services involved in the delivery of patient care have been accomplished in a manner

appropriate to maintain excellence in medical care. Quality Assurance (QA) is a broader concept and deals with outcome. It requires constant attention of chief of laboratories. Quality Assurance level is at three steps i.e. Pre-analytic, Analytic and Post-analytic which is depicted in Fig. 3.1.

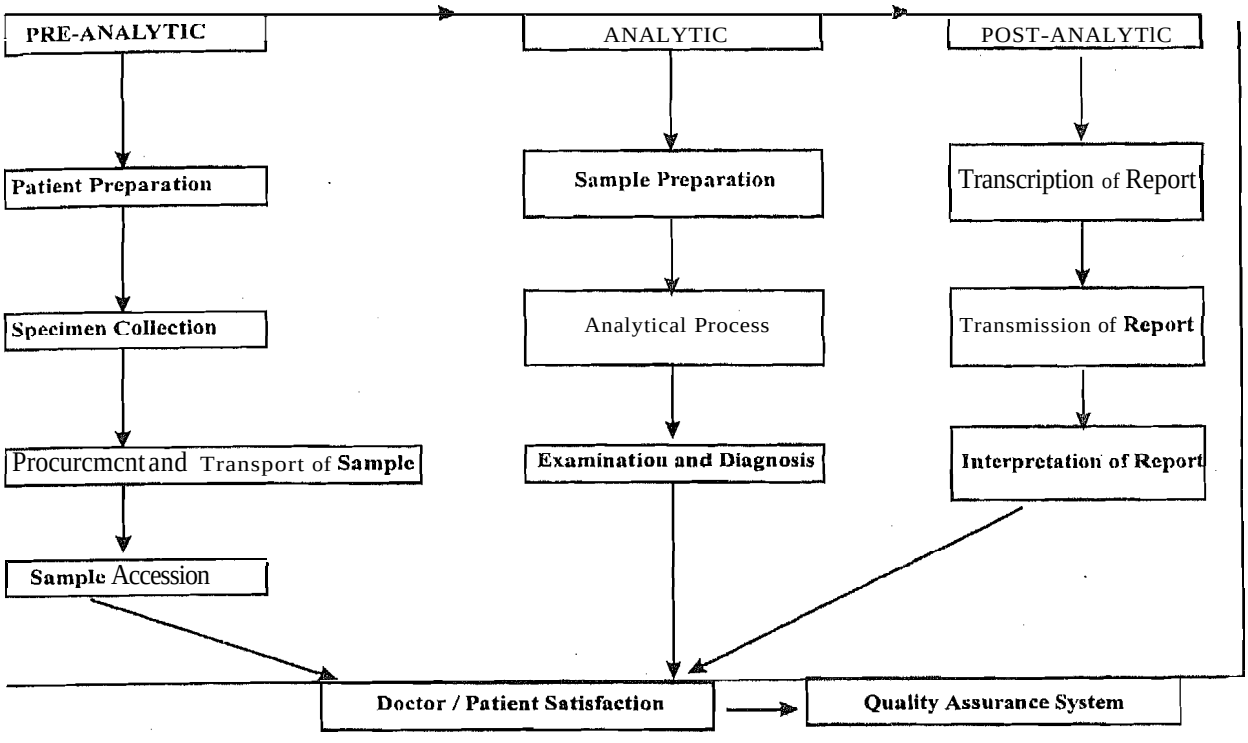

Fig 3.1 : Quality Assurance Level

Quality Assurance measures when appropriately implemented, will improve the quality and sensitivity of reports but it is not easy to design QA procedures. Major goal of QA should be in continued improvement and not in finding flaws and mistakes. Quality improvement is unlikely to occur in an atmosphere of fear. Quality Assurance measures when appropriately implemented, will improve the quality, sensitivity, specificity of diagnostic reports. It is also possible that QA measures improve purposes. Quality Assurance could be divided into:

i) Internal Quality Control (IQC)

ii) External Quality Assurance (EQA)

IQC programme aims at improving performance of single laboratory during day-to-day operation and provides immediate impact on the activities of the laboratory. EQA involves many institutions, provides information retrospectively, and has no direct influence on the output of the laboratory on the day of the test. EQA measures are necessary to ensure acceptable basis for inter-laboratory compatibility. It has to be remembered that both IQC and EQA are essential for ensuring high standards in diagnostic laboratories.

Components of QA in Diagnostic Laboratories

It is essential to assess the quality of work done in laboratory with reference to reliability of report considering precision and accuracy. The internal and external coinponents to be evaluated and checked for achievement are shown in Table 3.1.

Table 3.1 : Components of Quality Assurance in Diagnostic Laboratories

Internal Components	External Components
Personnel	• Procedures
— Qualifications	— Source and type of material
— Continuing education	— Standards for evaluation and diagnosis
• Specimens	Type of Programmes
— Acquisitions	— Education
— Handling	— Evaluation
— Preparation	
• Precision and Accuracy of test reports	
• Performance Evaluation	

3.3 ASSESSMENT, EVALUATION OF QUALITY SYSTEM

The following are basic requirements before any system of evaluation, accreditation procedures adopted for certification:

1) A laboratory to be evaluated should be legally identifiable and if the laboratory is a part of larger organisation, information on its relationship and ownership to be declared.

2) The laboratory should have managerial staff with authority and resources needed to discharge their duties. The working personnel should be qualified and experienced.

3) Authority of appointment to be notified and documented.

4) Standard operative procedures (SOP) for laboratory and working laboratory manual should be available and to be as per documented norms available in the country. Any change in system to be notified in the premises of accrediting or licensing authorities.

5) Each supervisory staff to be designated as technical/administrative with all responsibility notified to them. The quality manager should have a direct access to the highest level of management at which decisions are taken on laboratory policy or resources.

6) The Organisation Chart of the institute and the laboralory should be available as document support in evaluating system so as to create clear organisational charts indicating the key functions with recognisable lines of authority and responsibility.

7) Personnel involved in laboratory testing procedures, supervisors and managers have to maintain the confidentiality, impartiality and integrity of laboratory reports and system of working. The clear set of rules and guidelines to be notified at the time of appointment and periodically or at any amendments.

8) Documented procedures for audit and review as per policies of organisation should be available so as to ensure quality system is fully implemented and practiced.

9) Documents should be available indicating certified internal quality control system and external quality assessment for audit review and Quality Control Certification.

10) Laboratory should have an established programme for calibration and verification of its measuring and test equipment, National and International reference standards used to be notified.

11) Documented procedures should exist for the purchase, reception and storage of consumable materials used for technical operations of the laboralory.

12) The laboratory should have documented procedures for the receipt, retention or safe disposals of calibration or test items, including all provisions necessary to protect the integrity of the laboratory. All laboratory waste to be disposed as per guidelines issued From the government as per Notification Act.

3.4 LABORATORY MANAGEMENT

The efficient operation of a clinical laboratory and the effective delivery of medical laboratory services to the clinicians and their patients require a complex integration of expertise in medical, scientific, and technical areas; of resources in the form of personnel, laboratory and data processing equipment, supplies and facilities; and of skills in organisation, management and communication. Laboratory incharges, and supervisors must also be aware of the various accreditation standards and governmental regulations thal apply to laboratory practice and must ensure quality laboratory performance. The laboratory exists for the sole purpose of providing diagnostic and management information For the physician, to aid in the case of the patient. Automation of information processing with the use of laboratory computers, enabling productivity improvement and error reduction, now constitutes the standard of practice for diagnostic laboratories of almost every size. In the recent years, considerable emphasis has been placed on automated equipments.

Laboratory management is a complex task dealing with many aspects such as, laboratory planning and organisation, budgetary functions, realistic staffing, instrument selection and maintenance, inventory control and control of operations. Manager or a Director as the

laboratory head, who is the highest authority in technical matters and administration of the department, must have ability of leadership and supervision. The head of the laboratory should also be conversanl with various accreditation standards and governmental regulations. One should not just take up the job of managing a clinical laboratory attracted by monelary benefits but also one should realize the vast responsibility involved as the laboratory reports have a direct impact on the health care of the patient. The clinical laboralory management requires expertise in medical, scientific and technical areas. The person should have resources in the form of personnel, equipments, supplies facilities, skill organisalion, management and communication. A clinical laboratory should stand on firm goals and objectives. In order to achieve their objectives, the clinical laboratory should have adequate facilities, equipment and supplies and adequate number of qualified personnel. The objective of a clinical laboratory is to assist the medical professional, with reliable quality report which is a vital component of excellent health delivery system which is shown in Fig. **3.2.**

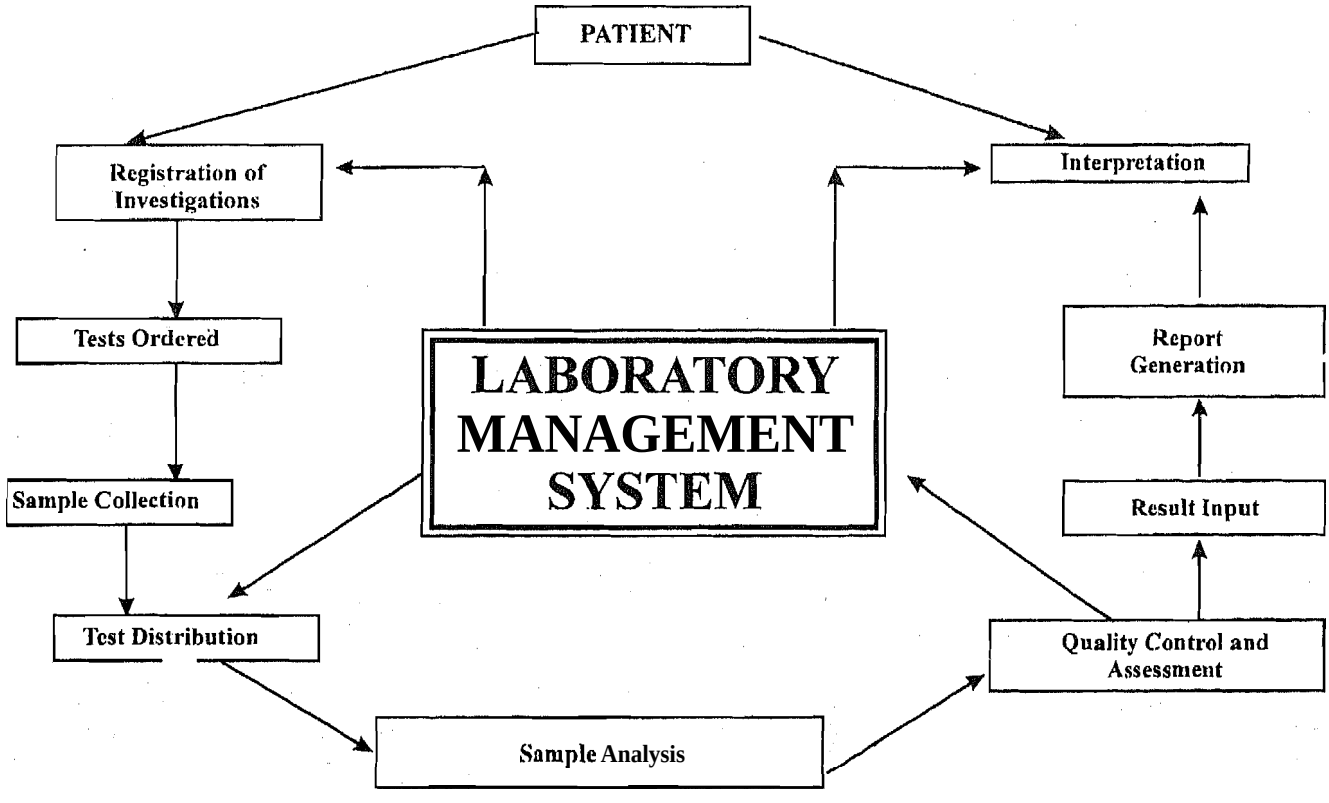

Fig. 3.2 : Laboratory management system

The following are considered Io be as essentials for organisation and planning of hospital laboratory management:

1) Concept of practice
2) Purchase, product specification function equipments, reagents etc.
3) Human resources
   i) Managerial duties and responsibilities
   ii) Leadership and motivation
   iii) Personnel management
   iv) Manuals procedures
   v) Job description and selection of staff
   vi) Inservice and CME programmes
   vii) Staff meetings
   viii) Personnel records
   ix) Performance appraisals
   x) Discipline and disniissals
4) Quality Control and Assessment
5) Information and Financial Management

3.5 PROBLEMS OF MANAGEMENT

The discipline of laboratory services can be viewed as a bridging endeavour linking the basic medical, biological and physical science with medical practice. Those working in clinical laboratories have the existing opportunity and challenge to apply advances in the science to assist their clinical colleagues in making diagnostic, therapeutic and prognostic decisions. In this role one has to serve as a clinical consultant to the clinician and the patient. To be a successful person in laboratory services one must be skilled in all these functions and be aware of all these external influences affecting the practice of laboratory medicine. Problems in management of laboratory services are mostly of general nature and specific problems of laboratory though not frequent but crucial in management. The most prominent problems are listed below:

1) Inability to maintain an adequate staff which may be due to an inefficient number of trained workers or inefficient use of the personnel available.

2) Lack of technical knowledge among working personnel.

3) Lack of work attitude, sincerity, devotion of work and indifferent personnel behaviour.

4) Lack of recognition of dignity of work and lack of job satisfaction.

5) Low morale in the laboratory.

6) Inability to perform one or more test when a key individual is absent.

7) Communication gap between officers and subordinate staff.

8) Recurring or persistent misunderstanding with the hospital administrator.

9) Frequent or recurrent confusion concerning requisition or reports of laboratory work. It makes little difference how accurately a pathologist perlorms a requisition test, if the report does not reach the doctor until 48 hours later, or if the result is reported on wrong patient.

10) Frequent 'rush' orders for reports.

11) Non-availability of updated modern technology.

12) Lack of quality control and standardization.

13) Paucity of inservice training programme (CME).

14) Lack of norms for technical staff.

15) Over loading of number of investigations as a whole and load work beyond capacity.

16) Management of irregularities, policy decisions with regard to screening committees, purchase committee etc.

17) Store receipts; purchase delays; substandard material/supply; increase lead time etc.

18) Lack of repairlmaintenance services equipments.

19) Malpractice of various kinds and nature.

20) Lack of promotional avenues and revision of cadre. Uniformity parity of scales, etc.

21) Lack of laboratory waste and disposals.

22) Lack of medical audit.

3.6 CONTROL, EVALUATIONAND CONSUMER SATISFACTION

Perfection in the management of laboratory issues is essential. Every problem has its own solulion and control. Quality control and assessment is integral part of management. Maintenance of services, supply of material, equipment maintenance, preventive and corrective measures, personnel management are components of evaluation in the procedures. **A** quality report and patient satisfaction is the final goal of evaluation programme of a laboratory.

For making a visit to laboratory for collection of relevant data a check list has been given at annexure in the end of this unit.

Patients are the foundation of medical practices, efforts should be focussed on satisfying needs of those who seek care. Quality service is a key for practical success. Opinions and

definitions of quality services and patient satisfaction are numerous. Patient satisfaction is determined by each individual according to his or her needs and experiences and recording to the actions and interactions of managerial laboratory services.

There was a time when patient satisfaction was fairly non-complicated whatever the result of investigation submitted to patient considered satisfactory both by the patient and treating physician. Today, the proliferation to technology and quality standards has changed expectations. The approach to consumer satisfaction is shown in Fig. 3.3.

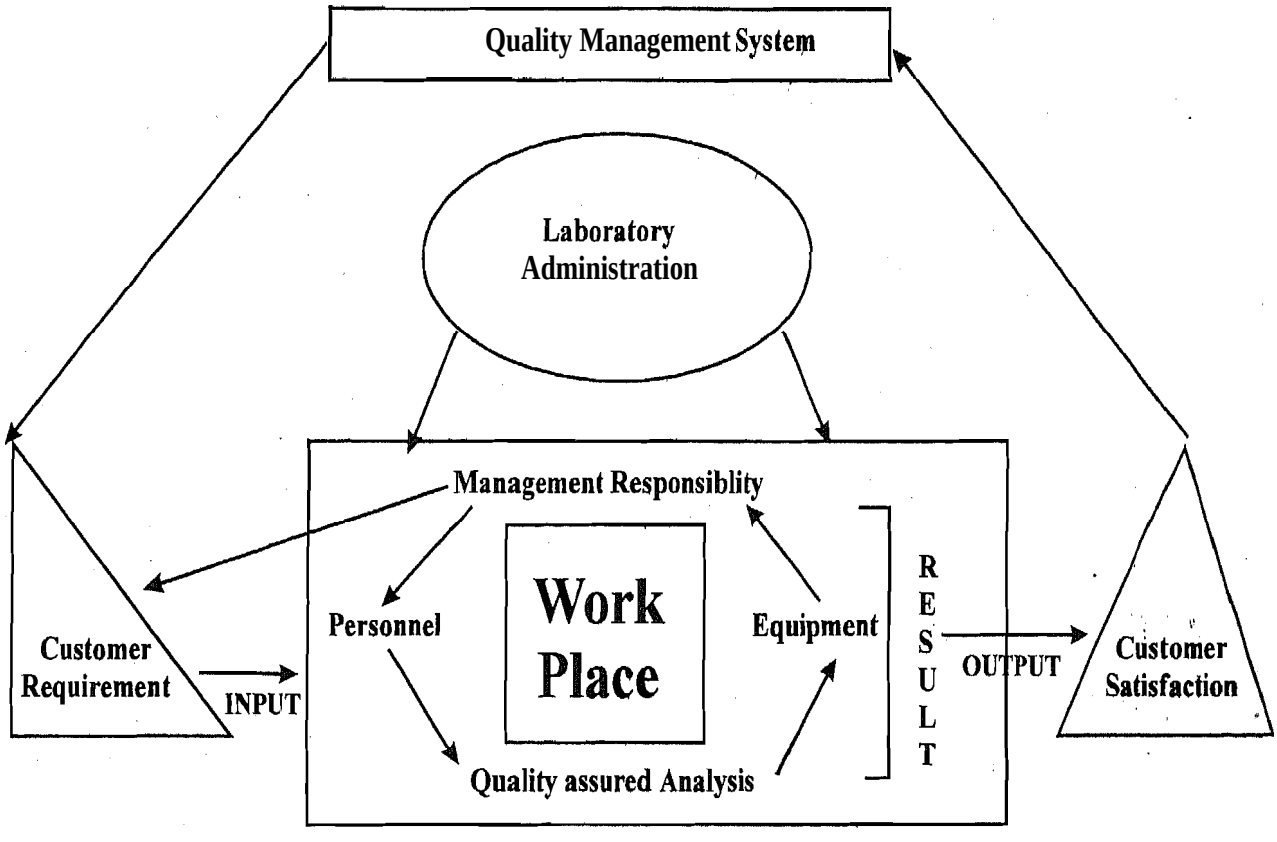

Fig. 3.3 : Approach to consumer satisfaction

The four critical elements of quality service (Quality Diamond) are:

- Customer
- Continuity
- Expectations
- Commitment

You should not ignore or minimize the importance of any of the elements of Quality diamond which are critical and shown in Fig. 3.4.

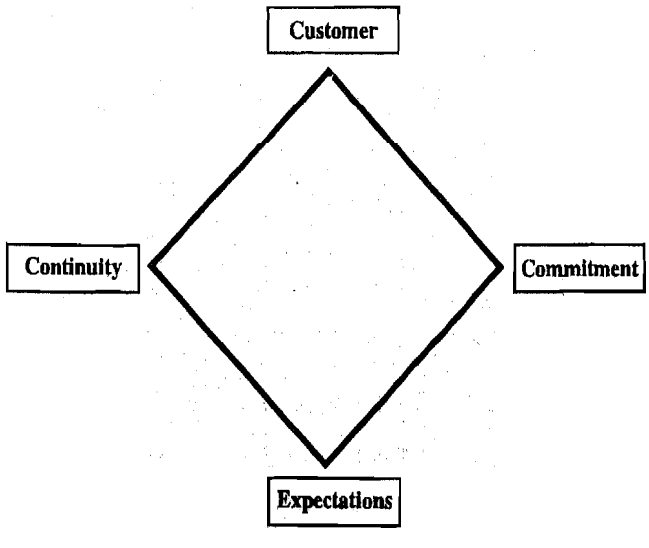

Fig. 3.4: The Quality Diamond

3.7 ACTIVITIES

In order to understand the operational aspects of functioning of laboratory, the pre-requisite; processing units; quality control; final reporting, the interpretive pathology; informative management and receipts of report to consumer and lastly the disposal of laboratory waste are few important aspects needed in evaluation proformas for preparing brief reports.

You are required to visit a Hospital Laboratory of more than 200 beds and evaluate the services, rendered. of this unit. The report should be submitted to the Counsellor in the Programme Study Centre.

3.8 LETUSSUMUP

You have learnt about laboratory and laboratory services play an important role in patient care services. You have also learnt about the important concepts in management, planning policy, Laboratory Quality Control and Assessment System, accreditation value of Total Quality Management (TQM). Further, problems of management control, evaluation and importance of consumer satisfaction have been emphasized.

Annexure 1

Proforma for Laboratory Services Visit

1) Name of the Hospital/Institution Visited

(500 Beds and above)

(Less than 500 beds)

2) Type of Laboratory Visited

a) Clinical Pathology

b) Haematology

c) Microbiology

c) Bio-chemistry

e) Histopathology

f) Any other lab.

3) Locations and Space Provision

a) Total area and other division

b) Location of Laboratory in relation to hospital and inter laboratory system

i) Site indications

ii) Area occupied of individual laboratories

iii) Basic amenities for staff/public

4) Staffing Pattern

a) Total number of staff and different categories

b) Number of Technical staff.

i) Lab Attendant

ii) Lab. Assistant

iii) Technician

iv) Sr. Technician

v) Technical Supervisors

vi) Jr. Technical Officer

c) Number of Officers

i) Resident Staff

ii) Jr. Residents

iii) Sr. Residents

iv) Medical Officers

v) Specialists

vi) HOD

d) Organisation pattern relationship

i) Workload/Staff ratio

ii) Methods of recruitment and pay scales

iii) Promotion avenues

iv) Inservice training facilities

v) CME Programmes opportunities

e) Inter personal relationship system

i) Within department

ii) Outside department

5) Type of Services
   a) OPD
   b) WARD
   c) Emergency
6) System of Registration of patient/Samples
   a) Manual
   b) Computerised
7) Type of Requisition of Samples/Forms availability details thereof
8) Receipt of Samples from
   a) Ward
   b) OPD collection system
   c) Existence Central Collection System for both
9) Laboratory Emergency Services
   a) 24 hours
   b) Restricted
10) Work Load

Ward	Sample Nos.	Investigations Nos.
OPD	Sample Nos.	Investigations Nos.
Emergency	Sample Nos.	Investigations Nos.

11) Standard Operative Procedures Availability (SOP)
    Details thereof
12) Quality Control Procedures
    a) Internal (details)
    b) External (details)
    c) Non-availability, if so, reasons, thereof
    Equipment Details
    a) Important Laboratory Equipment availability
       i) Name, Type, Manufacturer
       ii) Catalogue availability (details thereof)
    c) Annual maintenance Contract
    d) Repair/Maintenance Records
    e) Methods of Condemnation/Disposal
14) Reagents, Kits, Chemicals, Glasswares
    a) Methods of Procurement
    b) Receipt and Issue of Laboratory items
    c) Maintenance of Records
15) Investigation Reports
    a) Report entry system
    b) Despatch of Reports
       i) Wards
       ii) OPD
       iii) Emergency

c) Manual/Computer despatch Network System

d) Report Retrieval Methods

e) Indexing Investigation

16) Glass Wares

a) Quantity and Quality Availability (details thereof)

b) Washing and Cleaning Procedures

c) Breakage and. Records

17) Statistical Analysis of Investigations Performance

a) Day to day

b) Monthly

c) Annual

18) Patient's Satisfaction Survey Report/Any other feed back system (attach report)

19) Group discussion on above parameters report thereof (attach) (Not more than 200 words)

20) Individual comments, specific observations of management issues (not more than 200 words) including remedial measures.

Proforma for Blood Bank and Transfusion Services

i) Total space provision area distribution diagram (attach report)

ii) Specific Registration of donor system

iii) Donor Record System
- Voluntary
- Replacement
- Professional

iv) Recipients Record Methods
- Registration Records

v) Blood issue system record
- Reception
- Bleeding procedures
- Rest Room Facilities

(Post Transfusion)

vi) Laboratory facilities
- Cross Match system blood grouping
- Reagent, Maintenance Record Register
- Specific comments on Blood Bank Refrigerators
- Walk-in-coolers
- Component Separation Unit
- Deep Freezers
- Any other

vii) Blood requisition system and dispalch of blood to Wards/OT

viii) Donor card system and validity

ix) Stock position declaration system

x) Maintenance of Stock position of Blood and Components
- Routine

Emergencies
- Special disaster situation

xi) Safe Blood Investigation Procedures Source
- HIV
- Hbs Ag
- VDRL
- Malaria

xii) NACO Help and Communications

xiii) Red Cross Facilities

xiv) Donation Reports and Statistics

xv) Motivation Programme, details thereof

xvi) Statistic Records Maintenance

xvii) Post Transfusion Record Maintenance

xviii) Blood License Renewal Records

BLOCK INTRODUCTION

Hospitals are a multidisciplinary set up. All tlie disciplines and expertise is pooled for the care of the inpatient in particular and community at large. The support and utility services are being covered in this and in tlie next block of this course.

In this block you will learn in particular about the services meant for the care of inpatient.

Unit 1 of this block deals with organisation of sterile supply meant for the suffering patients. The utility of sterile supplies in the control of nosocomial infection is well known. This helps reduce the cost of treatment and also helps to cut down the duration of indoor stay of patient. This in effect leads to a lower average length of stay, and better utilisation of bed capacily.

Unit 2 deals with the maintenance of patient records. The need of adequate records has been one of the important recommendations of the various committees during the last over five decades. With the recent evolution in Information Technology it has become much easier to maintain proper records of patients in the Hospital. Yoll will also learn about constituents of proper medical tecords and various administrative aspects. The maintenance of proper records has always been important in respect of medico legal cases. In view of the recently coming in of Consumer Protection Act in the field of health care the emphasis on proper medical records has to be heightened. In this unit you will learn about different statistical data which are essential for evaluation of the functioning of tlie hospital arid also serve as an administrative tool.

Unit 3 deals with linen and laundry services. In this unit you will learn about the need of proper linen to be made available in adequate quantity and at tlie right lime. For the up keep of linen the utility of laundry and associated processes (cleaning, calendering, processing etc.) have also been discussed in this unit.

Unit 4 deals with dietary services. Diet for tlie patient in a hospital is as important as supply of drugs. You will be learning about tlie planning, organisation and management of dietary services in this unit. The effect/utility of full caloric value, nutritious diet served aesthetically can not he untlerstaled. The dietary services have also to be economical and proper care taken to avoid wastage and pilferage, which has been discussed in this unit.

Unit 5 deals with the important aspects ofhousekeeping. You will learn in this unit the importance of good housekeeping. Apart from the aesthetic effect good housekeeping goes a long way in eliminating/reducing the chances of infection. You will also learn that good housekeeping is an important factor affecting the morale of the attendants and thus help the hospital improve its image in the clientele and the community. These aspects have been discussed in this unit.

UNIT 1 STERILE SUPPLY SERVICES IN HOSPITALS

Structure

1.0 OBJECTIVES

After going through this unit, you should be able lo:

- understand various terms used in relation lo the sterile supply services in the hospitals;
- the aims and objectives of sterile supply services in the hospitals;
- physical facility-required for such a service or planning and design considerations for a CSSD;
- various methods of sterilisation, its usages, advantages and disadvantages;
- equipment and manpower planning for such a services;
- operating policies and procedures; and
- methods of quality control or performance evaluation on the functioning of CSSD.

1.1 INTRODUCTION

In this unit, you will learn the process of sterile supply services to the wards and various departments such as operation theatre, out patients department and so on, Studies in USA have identified the nosocomial infection rate to be 3% in 1997 with a

cost of 1 billion dollars in the year to the country. Authentic statistical data regarding the magnitude of the problem in our country is not available. However, on a rough estimate the rate varies from 5% to 25% or more, prolonging the hospital stay of the patient and higher cost of care to both recipient and provider of the services.

The discovery of causation and transmission of disease by micro-organisms led to the development of aseptic techniques and sterilisation processes. In 1928 the American College of Surgeons initiated centralisation of all surgical supplies and dressings in one unit for supply to all departments of the hospital. Thus, the concept of Central Sterile Supply Department (CSSD) began in the hospitals and it become a major tool for the reduction of hospital acquired infections.

During the Second World War the British Army established a CSSD in Cairo for supply of sterile items to mobile units in forward areas. In USA the first CSSD was established in 1945. In UK a CSSD unit was introduced in Adden Brook's Hospital, Cambridge in 1957. In India Safdarjung Hospital, Delhi and Christian Medical College, Vellore established their CSSD during 1957-60.

Prior to 1928 the usual practice was that each ward unit had its own autoclave thus duplicating facilities. Centralising the functions of Sterile Supply Department provided the following advantages:

- Sterilisation processes are carried out by appropriately trained personnel.
- Uniform sterilisation processes for all hospital units.
- Facilitates quality control of sterility of supplies.

1.2 DEFINITION AND SCOPE OF SERVICE

Central Sterile Supply Department (CSSD)

It is a department within a health care facility in which medical or surgical supplies and equipment are cleaned, prepared, processed, stored and issued for patient's use.

The scope of service varies vastly from hospital to hospital. The items are either stocked at the CSSD or at the central stores from where these are issued to the users. The user department sends these to CSSD for sterilisation or further issue to the departments for reuse. With the use of more and more presterilised disposable items, the scope of CSSD is gradually reducing since the items are disposed off after using it once. Normally the following items are catered for by the department:

a) Needles and glass syringes

b) Rubber goods (Rubber gloves, catheters and tubings)

c) Treatment and diagnostic sets and trays (lumbar puncture, sternal puncture and paracentesis sets, to name a few)

d) Dressing

e) OT linen and instruments

f) Intravenous sets

g) Infusion fluids for renal dialysis

By custom diets, medicines including blood, crystalloid and laundry are not included in the functions of this department.

Theatre Sterile Supply Unit (TSSU)

Some hospitals have a sterile supply unit as an integral part of operation theatre. These are known as TSSU. These units may be in addition to CSSD to cater to the emergent requirement of operation theatre or when the requirement of sterile supply is so large that necessity is felt to provide additional unit as an integral part of

operation theatre. In small hospitals where major work pertains to operation theatre and requirement of sterile supply to the department is bare minimum, there may only be TSSU or CSSD itself is integral to operation theatre.

1.3 AIMS AND OBJECTIVES OF CSSD

Aim

To provide all departments with an adequate supply of reliably sterilised materials on-line, from a Central Sterile Supply Department where safe sterilisation is conducted under controlled conditions at minimum possible cost thus contributing to reduction in the incidence of hospital infection.

objectives

1) To provide on-line supplies of sterile instruments. linen packs and other sterile items required for patient care.

2) To maintain accurate record of effectiveness of cleaning, disinfection and sterilisation process.

3) To monitor the quality of sterilisation.

4) To maintain an inventory of supplies and equipment.

5) To provide a safe environment for patients and staff.

Check Your Progress 1

Whst are the objectives of CSSD?

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1.4 PLANNING AND DESIGN CONSIDERATION

1.4.1 Structure and Location

The CSSD should be located in close proximity to the areas it serves and to the areas that serve it for efficiency of function. Major users of the service are operation theatre, labour room, casualty and the wards units with this in view, the CSSD should preferably be located near the OT complex or in close proximity to these areas. Since the major requirement of CSSD is of steam, the availability of boiler service nearby is also necessary. As a rule of thumb following is suggested:

1) Hospital of 100 beds : CSSD in OT (i.e. TSSU)

2) Above 100 beds : CSSD in Service Area

3) Above 500 beds : CSSD in Service Area and TSSU in OT

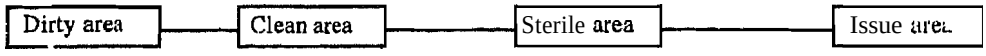
Layout

The functional areas in a CSSD should be so arranged that equipment and materials progress in a logical sequence from receipt of contaminated and used items to sterilisation, storage and issue of sterile items. **There should be no mixing of sterile and contaminated items.** To achieve this, the division as under should be planned:

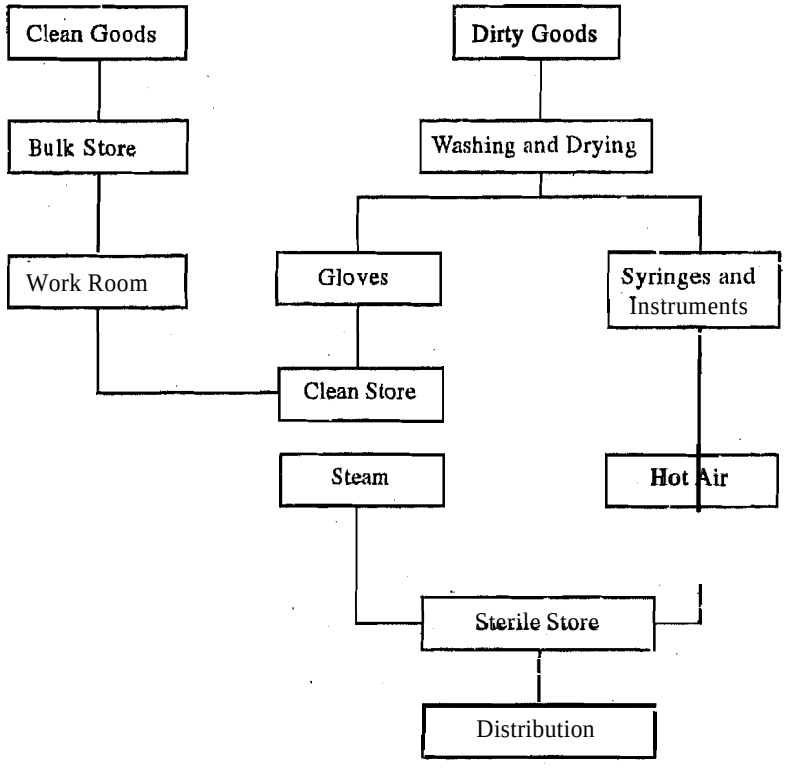
1.4.2 Organisation of Work Flow

The important steps in this process from receipt of the used articles to issue of sterile items is indicated in the work flow diagram given below:

A. Work Flow Diagram



B.



Disinfection

Chemical disinfection to be used for heat/labile items:

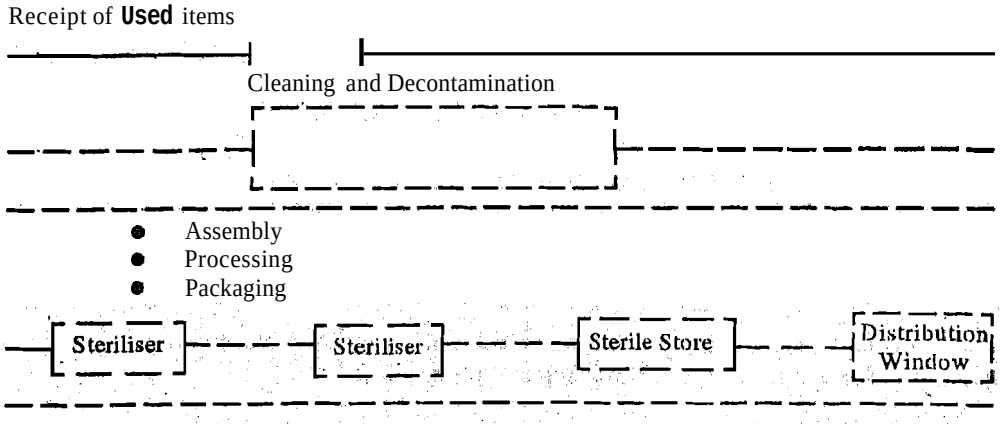
- Thorough cleaning prior to disinfection is necessary.
- Disinfectants must be carefully diluted to manufacturers specifications. Monitoring of disinfectants used should be carried out at a specified laboratory.
- Indicator strips to test the activity of 2% glutaraldehyde should be used prior to insertion of instruments.

Heat Disinfection for clean solid steel items only.

- Boilers must have a functional thermostat, a time lapse lock and thermograph.
- Washer disinfector used for cleaning and disinfection prior to sterilisation should be monitored by internal thermostats,

Accurate record keeping for the above monitoring systems must be carried out. Periodic check of records must be done.

Typical Layout of CSSD



Space Requirement

As a general guide for a Hospital of up to 400 beds, area of 1.64 sq. m/bed will be required for CSSD.

For a Hospital with >400 beds, area of 1 sq. m/bed will be sufficient. The total area needs to be divided to provide the following facilities:

Facilities	In **Sq. Meters**
Entrance	10.50
Lockers	7.00
Staff change room	7.00
Dirty receipt and Disassembly	7.00
Washing, disinfection and decontamination	17.50
Assembly	10.50
Linen processing	10.50
Sterilisation	14.00
Sterile storage	21.00
Distribution	10.50
Trolly wash	7.00
Trolley Bay	10.50
Bulk store	10.50
.Duty room . .	17.50
Toilet	3.50
Total per 100 bed Hospital	164.50

Note:

1) Walls, ceilings, floors, and work surface should be of smooth and of washable materials.

2)' Ventilation system:

   a) Should be designed to maintain circulation of air from clean to contaminated areas.

   b) Maintain Air changes of 10/hours

   c) Maintain positive pressure ventilation in sterile storage area.

   d) Storage system should be designed to enable items to be stored at least 8" from the floor, 2" from outside walls a'minimum of 18" from ceiling fixtures.

Equipment in CSSD

The under mentioned type of equipment needs to be provided in the CSSD such as Jetwater cleaning gadgets, ordinary cleaning brushes and ultrasonic washers,

1) Cleaning and decontamination devices

2) Hot air ovens for instrument drying and dry heat sterilisntion

3) Glove processing unit for processing of surgical gloves

4) ,Instrument sharpners e.g. needle sharpners

5) Steam, dry heat, gas or chemical autoclaves

6) Testing apparatus for efficiency of sterilisation

7) Others — Trollies, works surfaces, maintenance and repair equipment, telephones.

Cleaning and Decontamination **Devices:** The clean up or wash area needs to be provided with counter top work surface made up either of stainless steel top or of same hard easily washable material such as Kota Stone. These are to be fitted with large size sinks with foot operated taps. The ultrasound washers have been found to be very useful by ensuring adequate cleanliness with reduction in clean up or wash time by 50% or more. These washers produce ultrasound waves which when transmitted through solutions containing inert molecule set. These molecule in violent motion which loosens all surface material such as hactcrias. dried blood or anything else adhering to the surface.

Glove Processing Unit: The unit is available for glove sorting, washing, testing powdering, packaging and finally sterilisation. The glove room should be separate from other work areas so that powder does not contaminate other articles. The room should be properly sealed with rubber beadings for the purpose.

Autoclaves: The common method in use is steam sterilisation for which sterilisers of varying capacity and type are available. Dry heat, gas or chemical sterilisers are also available and used depending upon the requirement. Details from the manufacturers must he obtained and requirement worked out depending upon the work load and capacity of the equipment. Vacuum type steain sterilisers which are much more efficient and require less time to reach the required temperature rue generally used in the CSSDs of the hospitals in India. These are fitted with in-built cheeks and control system. The details have subsequently been discussed in Unit 3 of this block.

Testing Apparatus

Indicator tapes: Time, temperature and pressure sensitive tapes are available in the market. These tapes are put on the package. These do not indicate the sterility of items but merely indicate the items have been subjected to the required temperature pressure or have: undergone the required time cycle of processing.

Bacteriological indicators: Several indicators are available which compare known population of thermophylic spore bearing colonies before and after autoclaving. These indicators are placed in the centre of pack and after autoclaving are sent to laboratory for colony growth and count. The result is usually available after 24-48 hrs.

Stock

To ensure continuous availability of sterile items to the users at least five times the average daily requirement should he available as uuder:

– 1 1/2 x Average daily requirement in use in wards/deparuments so that there is inbuilt reserve in user departments

+ 1 1/2 x Average daily requirement in sterile state in CSSD

1 x Average daily requirement under processing

1 x Average daily requirement in reserve in **CSSD**

Organisation

The administrative head of CSSD is an administrative person whereas technical head of the facility is a Microbiologist. Under the administrative head there are CSSD Managers/Supervisors who supervise the work of personnel working in the CSSD. Normally there are 2 CSSD personnel per 100 beds.

Check Your Progress 2

1) Draw the work flow diagram of CSSD?

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2) What are the staffing norms for CSSD?

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2.5 STERILISATION PROCESS

Definition

Sterilisation is a process of freeing an article from all living organisms including bacteria, fungal spores and viruses.

Sterilization processes in use in hospitals in India are:

1) Heat sterilisation:

   3 By Steam

   b) Hy Dry Heat

2 ETO Sterilisation

3) Chemical Sterilization

4) Radiation Sterilisation performed by ISOMED at BARC, Mumbai (not suitable for Hospitals)

1.5.1 Heat Sterilisation by Steam

Steam destroys micro-organisms by irreversible denaturation or heat coagulation of cellular proteins. Advsntages of steam sterilization are as follows:

- Economical
- Steams contains enormous energy in the form of latent heat
- Does not require purging fitness prior to use (as in ETO sterilization)
- If used in a vacuum, penetration of steam occurs throughout the item.

Equipment

Two types of steam sterilisers:

— Gravity displacement,or downward displacement steriliser which displaces air from the chamber and load by gravity.

— Pre-vacuum steriliser which removes air from the chamber and load by a vacuum pump. This is a more rapid method,

Controls

Air removal efficacy of pre-vacuum sterilisers should be regularly monitored.

Controls carried out should be by means of micro-processors rather than manually.

Requirements of Control System:

- Online data on all stages of sterilisation cycle
- Storage of date

- Diagnostic programme for engineering services
- Automatic leak test cycle

Quality of Steam

- Steam should contain less than 3% moisture
- Steam at 0.92 to 0.95% dryness is best for sterilisation

  Steam supply pressure should be checked weekly by preventive maintenance department

- Regular weekly preventive maintenance to be carried out
- To avoid contaminated steam from entering steriliser, steriliser should not be operated during boiler below down.

Material Compatibility

The effect of steam on all material to be sterilized should be assessed in terms of corrosion, flexible properties, impact resistance, tangible properties, comprehensive strength, burst strength, tear strength, colour, permeability and optical transmission. This should be documented.

Preparation of Items for Sterilisation

1) **Rinsing**

2) **Cleaning:** thorough cleaning of items to be done. Ultrasound washers to be preferably used.

3) **Drying** of all articles to be done.

4) **Inspection** and **assembly:** Inspection for defects, breakages and then appropriate assembly.

5) **Packaging:** Items should be packed in porous material e.g. linen and papers. Individual packs should not exceed 25 cm x 25 cm in size. Weight should be less than 5 kg.

6) Labelling of each package should carry nomenclature of item, contents of pack initials of packer, date and initials of person who carried out sterilization.

Loading

All surfaces of items must be directly exposed to steam.

Instruments should be opened and disassembled. While loading care should be taken to allow adequate room for all items to allow steam penetration and circulation. Pouches must be placed on edges in loose contact with each other to allow quick removal of air.

Operation

Manufacturers' guidelines to be strictly followed. In case power failure cycle must be repeated.

Each type of steam steriliser is designed to achieve specific cycle parameters, usually 134° C for 3 minutes on 121° C for 15 minutes.

Unloading and Cooling

Load should be left in the steriliser until all steam has escaped and items are cooled.

- Cooking items should be placed separately on wiremesh racks and handled on] when entirely cool.

Record Keeping

The following documentation is to be maintained for a period of 2-3 years:

- Steriliser instruction manuai.
- Records of preventive maintenance, calibration and repair.
- Load records including contents of each load, duration and temperature of cycle, initials of operator, date, number and time of cycle.

Flash Sterilisation

Flash sterilisation allows quick sterilisation of "one of a kind" device that is urgently required for reuse. Flash sterilisers achieve a temperature and pressure for sterilisation in minutes.

Check Your Progress 3

Fill in the blanks:

a) Sterilisation process in India are:

i) .....

ii) .....

iii) .....

iv) .....

b) Individual pack size should not exceed ..... and weight should be less than .....

c) Flash sterilisation achieve a temperature and ..... for sterilisation in ..

1.5.2 Sterilisation by Ethylene Oxide Gas

Ethylene oxide kills micro-organisms by altering the DNA of micro-organisms by the process of alkylation. ETO may be used undiluted or diluted with carbon dioxide or nitrogen.

ETO is supplied in small cartridges of 100% Ethylene oxide snd large cylinders containing a mixture of 12% ETO and 88% other halogenated hydrocarbons.

Sterilisation by ETO is done for those items which cannot be subjected to heat sterilisation. Delicate surgical instruments such as cystoscopes, heart lung machinery, other electrical equipment, costly cathetar and implants are sterilised by this method.

Containment Area

ETO sterilisers should'be located at a place physically separate from other work areas. .This area must be large enough to ensure ETO dilution and provide adequate space for loading, unloading and maintenance of steriliser and aerators.

Preparation of Load

All items to be sterilised must be thoroughly cleaned.

Humidification

- All areas utilised for sterilisation process must have humidity of 35-70%.
- All moisture must be wiped from items to be sterilised.

  Moisture content of the steriliser and packing is important to facilitate penetration of ETO.

Packaging

Packaging material should be highly permeable to ETO and air. Paper should be used for packaging. Before sealing, all excess air should be removed to avoid bursting. The packaging pouch should not be folded. Instruments should be placed in perforated trays or wire mesh bottomed trays.

Loading

Items with similar aeration times should be sterilised together. Items should not touch steriliser chamber walls.

Operation

Cycle **parameters:** Manufacture's instructions should be followed, Common exposure conditions are temp. of 37-60°C, exposure time 105-300 minutes and chamber humidity of 45-75%.

Unloading

Following precautions must be followed during unloading:

- Steriliser without purge cycles—must be placed with an exhaust hood. Door must be opened and left open immediately on completion of cycle. The operator should enter the room after 15 min.
- Steriliser with purge cycles—can be unloaded immediately after the door is opened.
- Steriliser with built in aeration—aeration cycle occurs subsequently with sterilisation. This type is best for operator safety.
- Sterilised items must be immediately transferred lo aerator.
- Butyl rubber gloves must be worn by operator.

Aeration

Aerators should be used according to manufacturer's guidelines. Duration of aeration depends on composition, thickness design, weight of item and its packing.

- Permissible residual levels of ETO
- Size and arrangements of items in aerator
- Aeration is necessary before an item sterilised by ethylene oxide can be used to prevent its toxicity or side effects.

Precautions for Safety

- ETO is a toxic gas. Breathing apparatus for emergencies must be stored in an easily accessible place near ETO area.
- The permissible exposure level of ETO is 1 ppm/8 hours.
- Personal exposure to ETO should be minimised by:

  a) using a steriliser with purge cycles,

  b) use of exhaust system to exhaust gas to outside,

  c) use of exhaust hood over steriliser,

  d) use of alarm to indicate completion of cycle,

  e) use of metal baskets for sterilisation loads, and

  f) alarms to alert personnel in case of leaklspill.

1.5.3 Sterilisation by Dry Heat

This is carried out for sterilisation of items such as cutting instruments, vaseline gauge etc. in which steam cannot penetrate adequately. Uniform heating of items is achieved by means of a fan for forced air circulation.

Time and temperatures used in hot air sterilisation are:

160° C x *60* min.

170° C x 40 min.

180° C × 20 min.

150° C × 6 min. for some pharmaceutical products.

Equipment

- Indian standards IS 3119-1978 provide guidelines regarding specification of hot air sterilisers.
- Sterilisers must be automatically controlled.
- Steriliser door should have automatic locking system.
- A thermometer should be provided along with the temperature chart recorder.
- A lock out system should be installed to prevent overheating.

Precautions

- Steriliser should have interlocked doors. Door should be opened only when cycle is complete.
- Chamber should not be overfilled.
- Good thermal contact must take place between load items and their containers which can be wrapped in aluminium foil to facilitate this,

1.5.4 Radiation Sterilisation

This is one of the most effective method of sterilisation. Gamma rays provided by a source such as cobalt 60, caesium 137, or Electron beam generated by Linear Accelerator. This process is already being employed by ISO MED at BARC for bulk sterilisation of disposable items. This method cannot be employed at the hospital level due to high cost of equipment and safety standard requirement.

Advantages

- Reliable.
- Can penetrate all types of packing,
- Large and diverse shaped articles can be sterilised.
- There is no residual radioactivity at 2.5 mega roentgens.

Disadvantages

Glass becomes dark.

- Cotton loses tensile strength.
- Food may get undesirable flavours.
- Not practicable in hospitals.

1.6 OPERATIONAL CONSIDERATIONS

1.6.1 Functional Activities

a) **Rinsing** preferably to be carried out in CSSD. If done in wards it must be done by a trained person,

b) Cleaning: Manually or by ultrasound washers for ensuring adequate cleanliness,

c) **Drying:** All items must be appropriately dried

d) **Inspection and Assembly:** Each item must be inspected for functionality, defects and breakages,

e) Packaging must be done in porous material e.g. linen, paper. Each pack should not exceed 25 cm x 25 cm in size and 5 kgs in weight.

f) **Labelling:** The labelling note on pack must carry:

- Nomenclature of article
- Contents of pack
- Initials of packer
- Initials cf person who carried out sterilisation
- Date of sterilisation
- Shelf life

g) **Sterilisation** must be carried out by trained personnel on sterilisers in good state of maintenance and repair as per manufacturers' specifications.

h) **Storage:** Sterile and unsterile stores should be separate and there should be no intermixing of the items between the two stores.

i) **Distribution:** Distribution systems must ensure efficient delivering of appropriate items to the point of use without compromise of function and sterility en route.

1.6.2 Distribution Systems

Distribution Systems in use are:

1) Milk round **system:** Includes daily topping up of each OTs/wards stock levels to a predetermined level. If one round is made stock provided should be 50% extra of average daily usage and 25% extra if two rounds are made daily.

2) **Grocery system:** Wards send requisition to CSSD and stock is supplied accordingly,

3) **Clean for dirty exchange system:** One clean item for a used one is usual.

1.6.3 Operating Policies

a) **Procedure manual:** A standard manual of policies and include staff deployment, operating procedures maintenance of equipment, storage, receiving and issue of items, operating schedules, sterilisation, packing and labelling procedures should be laid down.

b) **Training:** Personnel should be adequately qualified and trained by means of classes and on-the-job.training.

1.7 MONITORING AND PERFORMANCE EVALUATION

1) Monitoring of sterilisation and disinfection processed should be under the gnidance of a medical microbiologist.

2) Recycling of disposable items should be controlled by Hospital Infection Control Committee.

3) The recommendad standards for monitoring equipment should be met. Good manufacturing practice (Drug and Cosmetic Act', 1996) should be followed.

4) Wet packs must not be accepted as sterile.

i) Steam Sterilisers are monitored by leak rate test and air removal tests.

- Thermocouple testing and air detection test to be performed at installation, recommissioning and yearly intervals.

- Each cycle should be validated by accurate thermographs.
- Colour change chemical indicators sensitive to pressure and temperature to be applied to each pack.
- Biological indicators should be used at installation and routinely at periodic intervals.

ii) Ethylene **Oxide Sterilisation**

- Biological indicators (Bacillus subtilis) are used for monitoring with an incorporated chemical indicator (results available within 24 hrs.)
- The following parameters must be ensured:

  Temp. 37-60° C, Exposure time of 105-300 minutes and humidity of 45-75%.
- Appropriate aeration time as per manufacturer's specifications must be ensured.
- Local exhaust ventilation checks to be carried out daily. ETO levels to be tested in specified laboratories (1 ppm/8 hours).
- If vaccum is used leak test must be carried out.

iii) Dry Meat **Sterilisation** to be limited to heat stable glass or steel.

- Chemical indicators to be used with each cycle.
- Biological indicators to be used weekly.
- Monitoring to be carried out by comparing temperature to a Master Temperature Recorder.

Check Your Progress 4

Fill in the blanks:

a) Time and temperature used in hot air sterilisation are:

i) .....

ii) .....

iii) .....

iv) .....

b) Steam Sterilisation is monitored by .....

c) Dry heat sterilisation to be limited to .....

1.8 MANAGERIAL CONSIDERATIONS

1.8.1 Maintenance and Repair of Equipment

As per manufacturer's specification there must be a specified schedule for preventive maintenance and record keeping of maintenance.

1.8.2 Inventory Management

a) Inventory management should identify:

- Items required
- Reorder levels
- Quantity to be ordered

— Schedule of ordering

— Cost of items

b) Regular inventory performance monitoring to be carried out to assess user satisfaction, inventory turnover/frequency of out-of-stock, frequency of overstocking and response time between order and receipt.

c) Record keeping and data analysis to be carried out for effective inventory managzment.

1.8.3 Budget Considerations

a) Assessing demand

b) Capital cost is considered under:

- Physical space and layout including scope for expansion'
- Processing and sterilisation equipment
- Initial investment on instruments, online expenditure of consumables e.g. pnckaging materials, indicators etc.

c) Maintenance cost including labour cost, replacement cost and cost of consumables.

d) Additional costs—cost of development, inventory carrying costs, cost of quality control.

1.9 LET US SUM UP

In this unit you have learnt that with the advance of medical technology and interventional techniques, the challenges to the **CSSD** to provide appropriate sterile supplies has enlarged.

You have also learnt that with an effective **CSSD** the rise in incidence of Nosocomial infections with corresponding increases in mortality, length of stay and costs can be brought down.

Further you have learnt that the perspective scope of the CSSD has enlarged from that of an autoclave steriiisation unit to a department that addresses the larger, vitally important issue of Hospital Infection Control throughout the Hospital.

You have also learnt about the planning and design consideratins, operational considerations and sterilisation processes. Towards the end you have learnt about some of the managerial issues in CSSD inventory, monitoring and performance evaluation,

1.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) To provide online supplies of sterile instruments, linen packs and other sterile items required for patient care.

b) To maintain accurate record of cleaning, disinfection and sterilisation process,

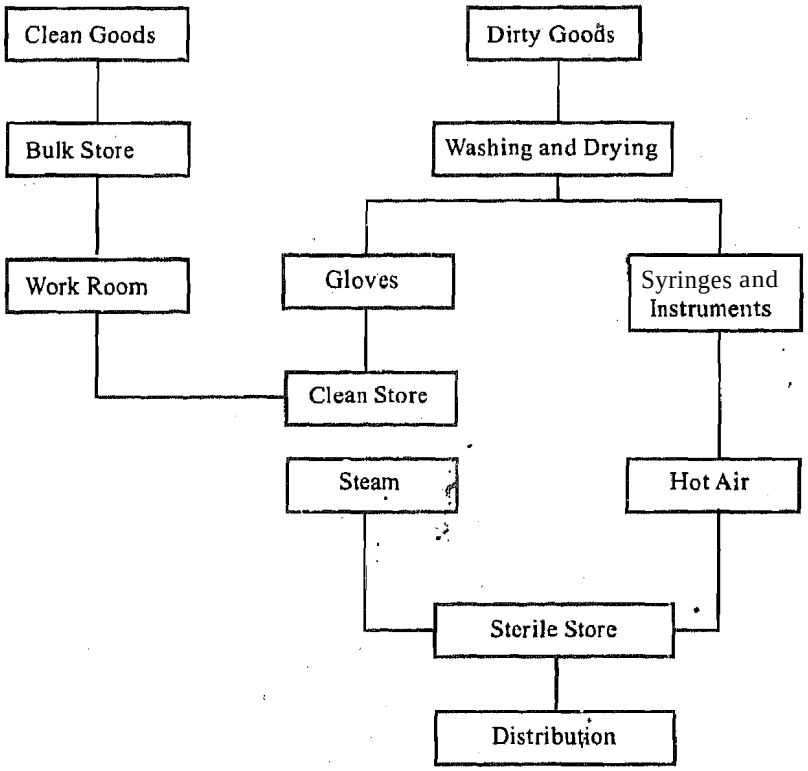
c) To monitor the quality of sterilisation.

d) To maintain an inventory of supply and equipment.

e) To provide a safe environment for patient and staff.

Check Your Progress 2

1)



2) 2 CSSD personnel per 100 beds.

Check Your Progress 3

a) 1) i) By Steam ii) By Dry Heat

2) ETO Sterilisation

3) Chemical Sterilisation

4) Radiation Sterilisation

b) 25 cm × 25 cm, 5 kg

c) Pressure, Minutes

Check Your Progress 4

a) 160°c × 60 minutes, 170°c × 40 minutes, 180°c × 20 minutes, 150°c × 6 minutes for some pharmacological products.

b) Leak rate test and air removal test.

c) Heat stable glass or steel

UNIT 2 MEDICAL RECORDS DEPARTMENT

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- define the inedical record;
- enlist the purposes of inedical records in relation to patient, doctor, hospital and medical education and research; and
- enumerate the steps in planning and organisation of medical record department in a hospital.

2.1 INTRODUCTION

In the first unit of this block yo11 have learnt about the planning and die organisation of CSSD. In this unit you will learn about another important area of hospital i.e. Medical Record Department. In tlie beginning you will learn about the definition of medical record including its purpose, planning, organising and staffing consideration. You will also learn about physical facilities planning, procurement and flow of medical records. Further you will learn about the storage and retrieval of medical records including functions and reports and return in a hospital. Towards the end of this unit you will learn about the medico legal aspects of medical records.

2.2 DEFINITION

Continuous development has taken place in the field of medical records over the period from the initial primitive form. The first medical records unit was established in 1667 at St. Barthlomew's Hospital in England followed by the practice of maintaining Patient's register ill Pennsylvania Hospital in the USA in 1752. The impetus to the idea of proper inedical records in the Form of standardised inpatients records came in USA from the American College of Physicians and American College of Surgeons in the first quarter of the current century.

In India, medical record keeping bas not developed to the same extent as in western hospitals. Bhore Committee (1946) first stressed the importance of keeping adequate

The individual at the OPD record room sends the folder to the appropriate deparunent on the presentation of token. The folder is deposited back after the visit.

To achieve the unique task of maintaining and storing medical records'in good order a medical records department is an integral part of hospitals irrespective of its size and type. In asmaller hospital, PHC or a subdivisional hospital it may be in the form of medical record section rather than a full-fledged medical records department.

2.3 PURPOSE

The medical record is indispensable from the standpoint of the patient, the doctor, and the hospital and for medical education and research. The purpose it serves in relation to these aspects is as under:

The patient: You will agree that the primary reason for record keeping is to improve the care of the patient. It is essential for immediate diagnosis, treatment and for the future welfare of the patient. Every illness, however, minor involves study and examination to the extent that it is impossible for any individual to keep all details in mind. The written report is evidence that the patient's care is being handled in a scientific manner. Other points in relation to this are:

- It serves to document the clinical story of the patient's illness and course of the disease.
- It serves to avoid omission or unnecessary repetitions of diagnostic and treatment measures.
- It assists in continuity of care in the event of the future illness.
- It serves as evidence in the event of when the legal question arises.
- Provides necessary information for insurance, contributory health scheme or for the employment purposes.

The doctor: From the point of view of doctor, the medical records serves as:

- Assurance of quality, quantity and adequacy of diagnostic and therapeutic measures undertaken.
- An assurance of orderly continuity of medical care.
- Evaluation of medical practice.
- An aid in research and the continuing education of health professionals,
- A protection in the event legal question arises.

The hospital: From the hospital point of view the medical records are necessary for following purposes to:

- Document the type and quantity of work undertaken and accomplished.
- Furnish proof of the type and quantity of care rendered to the patient.
- Evaluate the proficiency of the individual doctor, for administration and clinical purposes.
- Evaluate the services of the hospital in terms of accepted norms and standards.
- Protect the hospital in the event of legal matters.
- Serve as an administrative record of personnel performance and staffing needs, for budget preparation, justification for physical facility allocation and utilization, for statistical data for administrative use and evaluation, for estimating equipment and supply utilization and needs.
- Assist in future programme planning.

Medical **education and research:** Medical records can also be used for the medical education and research in following ways:

- Recorded observations are the basis for all clinical research.
- Group studies of records by the medical staff serve to further the education of doctors and other health personnel.
- Medical records supply pertinent data for the use by public health authorities in control of the diseases.

2.4 PLANNING, ORGANISATION AND STAFFING

Medical records department is generally organised on the basis of individual hospital. However, at times, such department in a larger hospital may cater for a group of smaller hospitals in situations where computerisation of record keeping has been done. The main factors that govern the organisation of work in a medical records department are:

- Medical records should always he available when required and in the form they me required.
- Adequate liaison should exist between different groups of staff using medical records to enable to give due consideration to matters such as design and contents, method rind storage availability, use and movement of records.
- Procedures should cause patients the minimum of waiting and inconvenience.

The overall responsibility for the efficient functioning of the medical records department is that of the administrator. However the department should function under the direct supervision of medical record officer/librarian who should he given authority commensurate to the responsibility assigned.

Necessary assistance to the functioning of medical records department is given by the 'Medical Records Committee' which is policy making body and which meets periodically to reviews the forms, records, existing policies and procedures. It evaluates the functioning of medical records department. The committee is composed of:

- Representative of the clinical discipline
- Representative of the nursing staff
- Member from the pathology services
- Administrator

Organisation

The medical records department is generally organised as undet:

Admission and Inquiry Office: You must be knowing that all admission lo the hospital takes place through this office, You will also appreciate that this office initiates documentation of inpatients, maintains records of all admissions, discharges and deaths, collects the documents after discharge and forwards the same to the central record office for further processing. It keeps up to date information of bed state of each ward. This office operates round the clock and provides all necessary information to the patients and their relatives. In the hospital where charges are levied for any services this office may also be performing the task of collecting and depositing the cash unless there is a separate billing section.

To perform the assigned tasks the office has following sections:

- Admitting office
- Admission check desk
- Census desk and
- Inquiry office

Central Record Office: The central record office is organised to perform the following functions:

- Receipt, checking, assembly and storage of all medical records of discharged patients.
- Discharge analysis and statistics.

  Coding of all diagnosis as per international classification of disease.
- Indexing of all discharged patients by disease, doctor and so on.
- Making records available for medico legal purpose.
- Issue of medical certificates of various types.
- Send notification of all communicable diseases to the public health authorities
- lssue of all records to the medical officers whenever required.
- Preparation of monthly abstracts and annual statistical details.
- Dealing with inquiries from Life Insurance Corporation regarding disease and cause of death of the insuree.
- Training of all categories of personnel.
- Storage of all types of forms used in the hospital.

Keeping this in view the medical records department is organised as under:

- Office for Medical Record Officer (MRO) and Asst. MRO.
- Document processing area comprising of :
  - Assembly and deficiency check desk
  - Incomplete record control desk
  - Coding and indexing desk
  - Discharge analysis and vital statistics desk
- Record storage
  - Activc-record storage
  - Inactive record storage

Out Patient Record Section: As discussed earlier in all modern hospitals attached to teaching institutions an elaborate system of documentation and storage is established for out patients. These records are as important as that of inpatients. However, with the overwhelming load of outpatients and other factors most hospitals in the governmental sector do not maintain OPD records in India.

Staffing

The staffing of medical records department. depends upon the size, type and services being provided by the hospital. Dr. J. R. McGibony has suggested staffing pattern for a 500 bedded non-teaching hospital as under:

•	Medical Record Officer	1
o	Medical Record Technician	4
o	Clerks	3
o	Peon	1
•	Statistician :	1 (on part lime basis)

For comprehensive services in addition to MRO staff as under may be considered for a teaching hospital of 500 bed and above. Each category of personnel should be computer literate.

- **Admission and Inquiry Office**
  - Asst. Medical Record Officer : 1
  - Medical Record Technicians : 5
  - Medical Record Attendant : 4
  - Receptionist : 5
- **Central Record Office**
  - Asst. Medical Record Officer : 1
  - Medical Record Technicians/ Asst. Medical Record Technician/Clerks : 8
  - Medical Record Attendants 8
  - Statisticai Asst. 1

2.5 PHYSICAL FACILITIES

While planning physical facilities for a medical record department, you sbould take following into consideration:

Location

Central admission and inquiry office should be located near the main entry of the hospital in close proximity of the outpatient department and accident and emergency services as the majority of the patient in the hospital come to these departments and admitted through these areas. Outpatient record section should also be located in the outpatient department near its main entrance. Central medical record office may form a part of administrative wing. Since this office deals with inpatient records, it should he in close proximity to the inpatient areas.

Space and General Facilities Requirement

a) **Admission and Inquiry Office: A** space of 125-175 sq.ft. is considered adequate. Counter should be aesthetically made to facilitate easy communication between staff and clientele. General office equipment will mainly be required for the staff working here. Separate counters for admitting clerk, receptionist handling information and billing clerk should be provided. The room should have adequate waiting space with facilities for waiting, toilet for the staff, patient and their attendants. Telephone with facility local calls/STD must be made available,

b) **Central Record Office**

i) The space requirement depends upon the size of hospital. As a rough guide a space of 2 to 3 sq.ft. per bed may be sufficient. The details are as under:

50 bed hospital—150-175 sq.ft.

100 bed hospital— 225-250 sq.ft.

200 bed hospital--450-500 sq.ft.

500 bed hospital—1000-1200 sq.ft.

ii) This area may be sufficient 10 store inactive medical records also. The space for this may be in the general record storage area or on a separate floor. Space ranging from 120 sq.ft. to 500 sq.ft. with adequate shelves will be required.

iii) In addition to the coinputers if the functioning is computerised, general office equipment for the medical record technicians/clerks will be required. Adequate facility for holding meetings, medical staff/trainees to pursue the record needs to be catered.

c) **Out Patient Record Section:** Average 2-3 square feet per bed of space is required for outpatient record section also. A space of 150 sq.ft. for the 50 bed hospital to 1200 sq.ft. for a 500 bed hospital may be adequate for the outpatient records. Separate counters for the registration of old and new, male and female patients are to he provided. Counter 24" wide, 40" high with file drawers beneath it is required. Wailing area adjacent to registration furnished with chairs, benches, announcement boards and health education visual aids need to be catered.

2.6 PROCESSING OF RECORDS AND THEIR FLOW

Steps in **Initiating Records:** Flow chart showing development and movement of medical records upon the admission of a patient is given in Fig. 2.1.

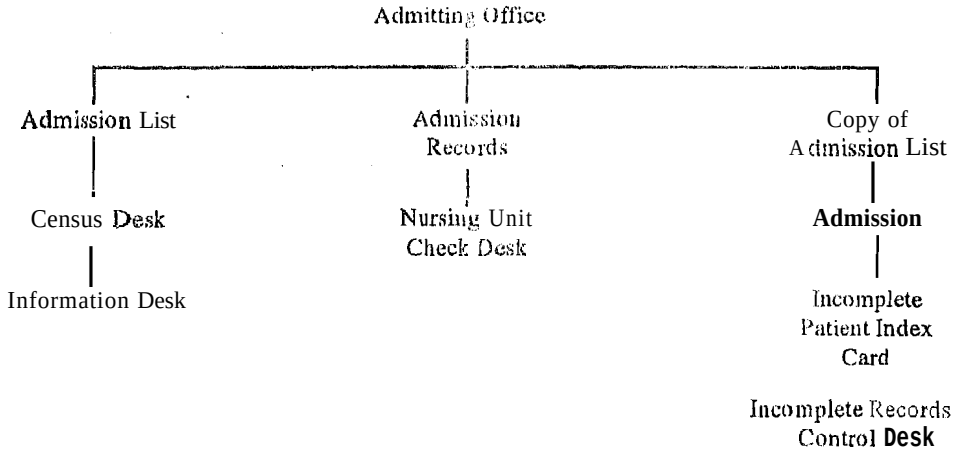


Fig. 2.1: Flow Chart Showing Development and Movement of Medical Records upon Admission of a Patient

Whenever a patient present for admission the steps involved are:

- Initiate **Inpatients** Records: The admitting office keeps assembled set of blank clinical record forms which are initiated whenever the admission of a patient takes place.
- **Pill in a Patient Index Card:** Usually a 3" x 5" card with patients identifying data such as name of the patient, address, date of birth, sex, name of father and so on is filled at the time of admission of the patient. This card is retained in a file in alphabetical order to give information regarding patient.
- Inscribe **in an** Admission **Register:** The identification data of a patient with date of admission as and when admitted.
- Identifying Number: Each patient is given a unique identifying number, which is recorded in all the documents. Unit or serial system is followed in assigning the number. Under the unit system the patient on his first admission receives a number which is the identification of all the documents pertaining to him in all subsequent visitsladmissions. All documents are filed in the same folder. This system is suitable for hospital serving a population of defined catchment area and ordinarily gives repeated care to the patient over a long period. Under the serial system the patient receives a new serial number on each admission and records for each admission are filed separately or brought forward and filed together in the rolder of the most recent admission. Most hospitals begin a new series of numbers at the beginning of each fiscal year with the admission number followed by the year such as 1973-99.
- Medical records so initiated on admission containing patient's admission number and identification **data** are sent to the ward with the patient.
- a The important actions taken by various functionaries at the admitting office are summarised below:

a) **Admitting Office**

- Initiates patient's hospitalisation record
- Assigns admission number.
- Prepares Admission record:
  - i) Admission number
  - ii) Identifying Data
  - iii) Signature of authorisation.
- Sends patient to nursing unit.
- Sends admission record to nursing unit.
- Sends copy of admission record to admission check desk.

b) ***Admission* Check *Desk***

- Receives admission advice from Admitting office.
- Checks patient index for previous admissions.
- Enters this admission on patient index card of previous admissions.

  If no previous admission, make new patient index card.
- Sends index card to incomplete record control desk.
- Sends records of previous admission to nursing unit.
- Prepares record folder with admission record and name and sends it to complete records control desk.
- Makes entries to accession register.

c) **Census** Desk

- Prepares admission list from admitting office.
- Collects discharge patient records from nursing units daily.
- Prepares discharge list.
- Prepares census reports.

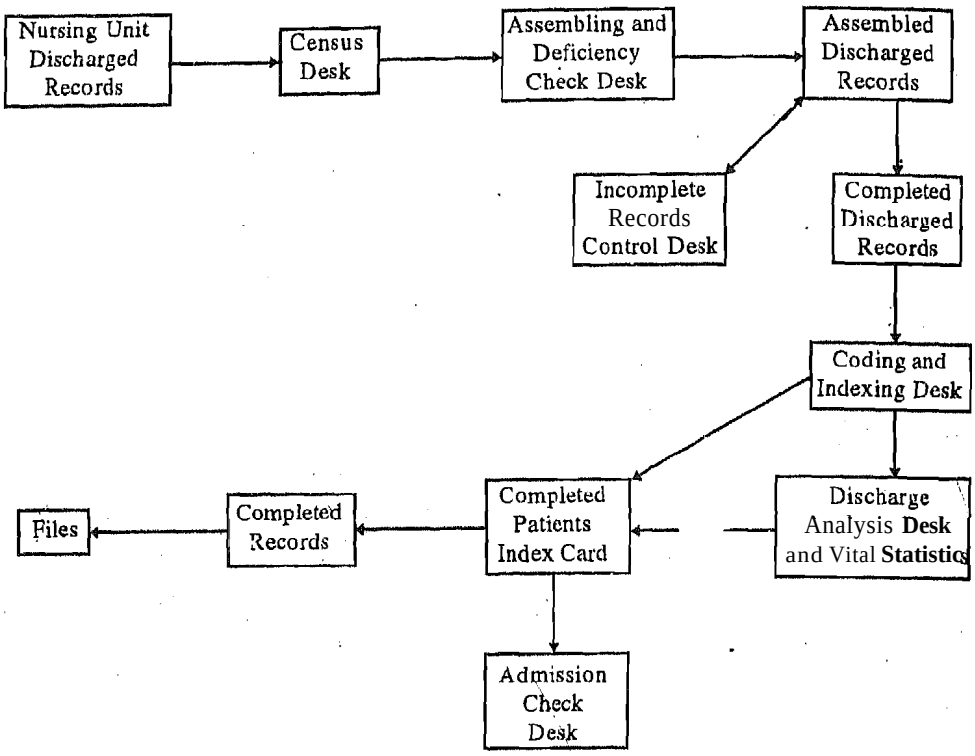
Medical *Records* at the Enpatient **Unit:** The patient document in the ward are filled in by the attending doctors, residents and interns for history, physical examinetion, orders for diet, treatment, operation procedures and progress notes. Nurses fill in the charts for temperature pulse, and respiration.

Medical *Records* Upon Discharge: The attending doctor completes all the entries in the clinical case documents including preparation of discharge summary and discharge slip. Case documents are submitted lo the medical records department. The movement of medical records and action taken upon discharge are depicted in Fig. 2.2. .

At the medical records office action taken by the various functionaries is summarised below:

a) ***Assembling* and deficiency *check* desk:**

- Receives discharge patients record from census desk.
- Assembles records in standard order and staple binds.
- Checks deficient entries on record.
- Sends records to incomplete control desk.



Pig. 2.2: The Chart Showing the Movement of Medical Records upon Discharge of a Patient

b) incomplete record control desk:

- Receives discharge records frcm assembling desk.
- Receives index card from admission check desk.
- Maintains "In hospital" file of index cards of patients not discharged.
- Maintains gone "home file" of index cards of patients discharged but whose records are incomplete.
- Sends reminders to doctors of incomplete records.
- Completes patient index card for discharge patients whose records are complete.
- Sends index card to admission check desk for filling
- Sends records to discharge analysis desk.

c) **Vital statistics desk**

- Collects birth reports, enters data into the birth register and submits reports to municipal authorities.
- Collects death reports, enters data into death register and submits report to the municipal authorities.
- Collects infectious disease reports enters data into the register (If maintained) and submits reports to the municipal authorities.

d) **Discharge analysis and administrative statistics desk**

- Receives records from incomplete records desk.
- Enters discharge date in accession register.
- Analyses and develops statistics and daily, monthly or annual reports for entire hospital, each service, each doctor, as required, on such items as:

  a) Admissions

  b) Discharge

c) Births

d) Deaths

e) Rates

f) Gross results

g) Hospital days

b) Length of stay

i) Occupancy

j) Patient by age, sex, religion and geographic distribution

k) Operations

1) Autopsies

m) Consultants

n) Occupations

o) Others

e) Coding and indexing **desk**

- Receives records from discharge analysis desk.
- Codes diagnosis and operation on medical records, using international classification of disease and operations.
- Enters data into 5x8 inch diagnostic and operation index cards.
- Prepares medical statistics.

f) **Completed records control desk**

- Receives records from coding desk.
- Checks for full processing,
- Places records in folder and stores vertically in peimanent file shelves for quick and easy accessibility.
- Make available records on readmission of patient and for research and group studies.
- Maintains record of withdrawn medical records, sends reminders for return.

Check Your Progress 1

Draw a chart showing the movement of Medical Records upon discharge of a patient,?

.....

.....

.....

2.7 CODING AND INDEXING

Coding

In each medical records International Code Number is assigned to the diagnosis based on "International Classification of Disease" issued by the World Health Organisation. This is to bring about accuracy and uniformity in the reporting of the, diseases by the various hospitals.

Indexing

The various forms of indexing as under of the medical records is done depending upon the purpose:

a) **Alphabetic or Master Index:** Indexing basecl on patient's name sequenced in alphabetic order. The primary purpose of a name index is to provide entry into the filing system and finding out medical record for a patient. The patient index card is usually 3"×5" card giving identification data, registration number, address, date of admission, date of discharge, diagnosis and department to which admitted.

b) **Disease index:** Disease index is a catalogue of cards of 3"×5" or 5"×8", maintained to find outgroups of clinical records of patients having the same diagnosis. Besides patient's identification data, age, sex , result of treatment and complication may be also mentioned.

c) **Operation index:** It is a calalogue containing the details of patients who have undergone the operations. Additional details such as site, procedure used, postoperative complication as a result may be documented.

d) **Physician's index:** Catalogue containing the details of all patients treated by particular physicians. Analysis of such records may be utilized for evaluating the performance of a physician. Columns can be made in the card based on the information desired.

e) **Unit index:** Details of all the patients treated in a particular unit are indexed. These records may ultimately be utilized to evaluate the performance of a particular unit.

2.8 STORAGE AND RETRIEVAL

Storage

Completed medical documents are stored in the main medical records by following a filing system. The following factors are considered for an effective filing system:

a) Compactness to reduce physical effort and cost of storage space.

b) Accessibility for speedy location and identification.

c) Simplicity for understanding of all concerned.

d) Economical both in the cost of installation and operation.

e) Elasticity to expand according to future requirement.

f) Tracer system for document in circulation.

System of Filing: Any one of the following can be followed for filing:

a) **Decentralised system:** Under this system inpatient and outpatient department have their own individual records and file them independently within the department. If a patient is transferred from one department to another the file may be loaned to other department. This system is labour intensive and the operating cost are higher.

b) **Centralised system:** In the centralised system, medical records arc filed centrally in the medical records department. The centralised system is more efficient, provides better control and followed in most hospitals.

Methods of Filing: The various methods available are:

a) Numerical method

b) Alphabetical method

c) Chronological order

d) Terminal digit system

e) Mid digit system

Numerical method of filing is the commonest method in use. As already discussed in Section 2.6, each patient is given a unique number at the time of his registration/ admission and the filing is done in the numerical order. This method is most suitable for retrieval of files. The disadvantage of the system is that the files are added to one end of the system, which usually is the furthest from the working area and most active for retrieval and filing purpose.

In alphabetical and chronological order, the filing is done in alphabetical sequence of their names and sequence based on their date of admission respectively. The system requires maintenance of indexes to allow access to the documents as maintained in the libraries.

The terminal digit system consists of six numbers. In case the numbers are less than six digits, zeros are added to precede the number. Terminal two digits are the primary numbers, whereas the two middle digits become the secondary numbers and the last two digits being the sequence number of a particular file. Dividing the storage spaces into 100 equal parts running from 00 to 99 creates the primary section. The primary section is further sub divided in 100 equal parts again running from 00 to 99. To retrieve a particular file say 123456; one should locate primary section 56 and secondary section 34. Thirteenth file is in the secondary section will be the required file. In die middle digit system, the middle two digits are the primary number, the first two digits the secondary number and the last two digits the sequence of file in the secondary section.

Filing Procedure

Types of Files: It is useful Io use files of different colours for different years for easy retrieval and identification. Files should be of uniform standard size depending upon the size of forms in use in a hospital. For the most forms a standard size of 8½"×11" is preferable. The filing jacket should be ½" bigger than the length and width of the biggest form in use.

Filing: The three types of filing procedure are generally used are as under:

i) Vertical

ii) Suspended

iii) Horizontal

The vertical system is universally used in which the file are kept vertically on its spine or edge and supported by the other files or cards within the section. Open storage steel racks with shelves of standard size are suitable for the storage. This system is economical, affords easy reference, adaptability and scope for extension.

In the suspended system especially made filing cabinets are required and the records are suspended from frames in drawers in the cabinet. The system is fairly costly and not easily adaptable but the securily of the documents is better.

In horizontal filing the medical records arc inserted in folders/files which are kept one upon another in a chronological order. The retrieval of records is difficult and storage in orderly manner cannot be maintained. Whenever any record is taken out, it usually upsets the other records.

Microfilming of Medical Records for Storage: In large teaching hospital the space for medical records storage may pose a big problem. Microfilming may be the only answer for inactive storage of medical records. The advantages of microfilming are:

a) **Saving of space: 90%** of the space can be saved if the records are microfilmed.

b) **Easy accessibility:** Due to easy storage in a smaller area, the accessibility of the records to students, faculty and staff become very easy.

c) **Protection:** Micro filmed records cannot be easily tempered.

d) **Elimination of misfiring:** Incorrect filing of the records is impossible after the same has been filmed. They can be easily classified and stored.

e) **Saving of time and manpower:** More economical in the long run because it reduces the waste of time and manpower.

Microfilming requires special equipment such as microfilming camera, processors, viewing machine, duplicating and photostating machine in addition to certain expendable items such as microfilming rolls, fixer and developer. Micro filming technicians will also be required for the purpose.

Computerisation of Medical Records: Technological advances and decreasing cost of computerisation have brought about revolutionary changes in the medical records system, their storage and retrieval. Key to the future is the computerisation of medical records. Today it is possible to even store all types of images such as that of X-ray, CAT Scan and MRI. By networking the system throughout the hospital, it is possible to give desktop access to doctors, nurses, technicians and administrators and yet maintaining the confidentiality of the whole syslem.

Retrieval of the Medical Records: The retrieval of medical records is usually required for any of the following purposes:

a) When the patient attends to follow up

b) Patient is admitted in the ward or casualty for observation.

c) When the files are issued to research workers for academic purposes

d) For medical reimbursement and

e) For producing in the court of law for medico legal purposes.

The method of retrieval will depend upon the system of storage being followed in an institution. In a conventional system where medical records have been stored in shelves, the file is traced by the number allotted. The file folder is taken out and a tracer card is placed in its place as a marker. The tracer card contains basic information regarding the recipient of the document such as the name of the borrower, purpose for which the documents are required, date of issue, identification data of the docuinents issued and the signatures of the individuals issuing and receiving the documents. The tracer card remains in its place until the file is returned.

2.9 REPORTS AND RETURNS

Wide ranging reports and returns can be generated in the medical records department. The basic purpose of these reports are:

a) Evaluating the quality of care being rendered'

b) Locating the deficiencies in:

   i) **Means:** Staff, physical facilities, equipment including plants and machine.

   ii) **Methods:** Operating policies and procedures

   iii) **End results:** Outcome of the benefits derived by the community from the hospital

c) Effectiveness of hospital administration and

d) Prevention of the diseases.

The types of reports and their frequency will vary with the type of hospital and their administrative requirement. The reports may be generated daily, weekly, monthly, quarterly and annually depending upon the requirement. The reports generally pertains to:

a) Vital Statistics

b) ADT Analysis (Admission, Discharge and Transfer Analysis)

c) General Health Statistics

Comprehensive list of such reports and returns cannot be laid out since there will be so much variation from hospital to hospital. Some of the reports that can be commonly generated by the hospital are:

a) **Reports Related to Hospital Bed**

- Daily Census
- Maximum patients on any one day
- Minimum patients on any one day
- Daily average
- Bed occupancy rate
- Total patient days care
- Bed turn over inlerval

b) **Admission**

- Daily admission
- Daily admission unit/speciality wise
- Total admission over a period
- Patients distribution by age, sex, religion and region

c) **Discharges**

- Daily discharges
- Total patients discharged over a period
- Days of care to the patients discharged
- Average length of stay

d) **Deaths**

- Daily number of deaths
- Total deaths over a period
- Total deaths over 48 hours
- Total deaths under 48 hours
- Net death rate
- Gross death rate
- Foetal death rate
- Maternal death rate
- Infant death rate
- Post operative death rate
- Anaesthetic death rate

e) **Work load statistics**

- Total number of outpatients:
  - New cases
  - Repeat cases

- Total number of operations
- Total number of X-ray and other related investigations
- Total number of lab investigations/lab wise investigations
- Department wise workload statistics

f) **Hospital Care Evaluation Statistics**

- Post operative infection rate
- Post operative complication rate
- Caesarian section rate
- Autopsy rate
- Consultation rate
- Rate of normal tissue removed
- Percentage of disagreement between final and pathological diagnosis
- Gross result of treatment, i.e., patients recovered, improved or not relieved

Following will give you clear understanding of some of the most commonly used terms:

Admission

Admission is the acceptance of a patient by the hospital for inpatient service, which may be for investigation and/or treatment. Normal babies born in the hospital are not considered as admissions. The premature or diseased newborns are considered admission, As a general rule the newborn figures are not mixed up with other hospital data. These figures should he tabulated separately.

Discharge

Discharge is the release of an inpatient. Death of an admitted patient is also considered as discharge.

Hospital **Deaths**

Death of an admitted patient is considered as a hospital death. Death of a patient in the casualty, OPD or in an ambulance, before the actual admission of the patient is not counted as the hospital death.

Total deaths of hospitalized patients is known as Gross Deaths. Total deaths after 48 hours of admission is considered net deaths.

Patient Day

A patient day is the period of service rendered to an'inpatient between the census taking hours of two successive days. While counting, the day of discharge of an inpatient is not counted, irrespective of the time of discharge. Similarly the day of the admission is counted always regardless of the time of admission.

Patient day is a valuable unit used fox expressing the various activities of a hospital such as patient days of service rendered during a given period, cost of food per patient per day etc.

Bed Complement

Bed complement is the number of hospital beds normally available for use by the in patient. It includes the following types of beds:

a) Adult beds

b) Crids

c) Bassinets for use of infants other than new borns

d) Incubators for prematures

e) Casualty ward beds

f) Post-operative ward beds

g) Intensive cure unit beds

h) Isolation beds

i) Staff sickness beds

The following types of beds are not included in the bed complement of a hospital:

a) Recovery room beds

b) Observation beds of casualty

c) Examination beds

The methods of calculation of some of the commonly used statistics are given below:

Average Daily Census

Average daily census is the average number of patients in the hospital at a given time per day and is expressed as:

$$\frac{\text{Sum of daily census for a given period}}{\text{Number of calendar days in the period}}$$

Death Rates

a) Gross death rate:

$$\frac{\text{Total number of hospital deaths during a given period} \times 100}{\text{Total discharges (including deaths) during the same period}}$$

b) Net death rate:

$$\frac{\text{Total deaths of in patients after 48 hrs of admission during a given period} \times 100}{\text{Total discharges (including deaths) during the same period}}$$

c) Specific death rate:

$$\frac{\text{Number of net deaths in a ward or department during a given period} \times 100}{\text{Total discharges (including deaths) in that department during the same period}}$$

Net death rate is used as a indicator of quality of care in an institution. In advanced countries the value of this rate is about 4%. In India in the teaching hospitals it is about 6-7%. Similar institutions dealing with more or less the same type of clinical material should show similar death rates. Excessive death rates of the hospital should be investigated.

Percentage of Occupancy or Occupancy Rate

It is the ratio of actual patient days expressed as a percentage of the maximum possible patient days (based on bed complement) during any given period. The formula is:

$$\frac{\text{Number of patient days (based on discharges) during a given period} \times 100}{\text{Bed complement} \times \text{days during the same period}}$$

Average Length of Stay

Average length of stay is the average number of days of service rendered to each discharged patient during the given period of time. Patient days are compiled from the discharge summary of discharged patient, The formula is:

$$\frac{\text{Total patient days during a given period}}{\text{Total discharges (including deaths) during the same period}}$$

Turnover Interval or 'T' Interval

'T' interval is the average period in days a bed remains vacant between one discharge and another admission and is expressed as:

$$\frac{\text{The maximum patient days–Actual patient days (Bed complement x period) during a given period}}{\text{No. of discharges (including deaths) during that period}}$$

The value of 'T' may be negative or positive.

i) A negative 'T' is indicative of scarcity of beds and over utilisation.

ii) A long positive 'T' is indicative of under utilisation because of either defective admission procedures or poor quality medical care.

iii) A short positive 'T' is indicative of optimum utilisation.

'T' interval is a very sensitive index of hospital utilisation. It can also be used to assess the bed utilisation of different nursing units and departments.

Anaesthesia Death Rate

$$\frac{\text{Number of deaths due to anaesthesia x 1000}}{\text{Number of patients anaesthetized during a period}}$$

Post Operative Death Rate

$$\frac{\text{Post operative deaths x 100}}{\text{Total operation during a given period}}$$

The usual value of this rate is 1 to 2%. But it varies greatly with the type of surgery being undertaken in an institution.

Maternal Death Rate

$$\frac{\text{Total deaths of obstetric patients x 100}}{\text{Total discharges (including deaths) of the obstetric wards}}$$

The usual value is less than 0.25%. Excessive rate should be enquired into.

Neo-Natal Death Rate

$$\frac{\text{Total deaths of neo-nate during a given period x 100}}{\text{Total viable newborns discharged (including deaths) during the same period}}$$

A new natal death rate of more than 2% should he investigated.

Autopsy **Rate**

$$\frac{\text{Number of pathological autopsies performed x 100}}{\text{Number of deaths during a period}}$$

An autopsy rate of more than 15 to 20% indicates enquiry type of medical staff, progressive in outlook.

Caesarean Section Rate

$$\frac{\text{Total caesarean section performed x 100}}{\text{Total viable births during a period}}$$

The normal' value of this rate is 3 to 4%. A higher caesatean section rate should be enquired in to.

Consultation Rate

$$\frac{\text{Total written consultation during a period x 100}}{\text{Total discharge (including deaths) during that period,}}$$

A consultation rate of more than 15 to 20% is indicative of high quality of medical care.

Bed-Death Ratio

An extensive study of vital statistics and hospital data of different areas has revealed that a close relationship exists between the deaths in a population and number of hospital beds needed. It has been found that 0.5 general beds are needed per annual death in a population.

In a population having 10 deaths per 1000, 5 beds per 1000 are needed in the acute general hospitals for optimum medical care.

If total number of annual deaths in a regions are 200, ,then this population needs 100 general beds. This formula is used extensively for planning medical care facilities in a region.

Check Your Progress 2

Fill in the blanks:

The usual value of the following are:

a) Maternal mortality rate .....

b) Post operative death rate .....

c) Caesarian section rate .....

2.10 MEDICO LEGAL ASPECTS OF MEDICAL RECORDS

The medical records are not merely a collection of paper recounting the tale of patient's stay in the hospital. It is an important legal document and can help the patient, aid and protect the doctor and act as a big shield to any institution. To meet the legal requirement and avoid complication at a later date, medical records must fulfil the following criteria:

a) **Complete:** The records must contain sufficient data to identify the patient, justify the diagnosis, warrant treatment and outcome. These must contain all basic records, nurses' bedside record and special records as applicable,

b) **Adequate:** The documents should not be sketchy. It must contain all necessary form and all relevant clinical information.

c) **Accurate:** Document should be so made that it is easily subjected to quantitative analysis.

d) **Legible:** The records must be legible which can'be easily deciphered at a later stage. The names of all the signatories must be written in capital letters/affixed with the rubber stamp.

Ownership of the Medical Records

The medical record is the property of the hospital and not of the patient, the clinical department or the attending doctor, The hospital is the owner and the custodian of the document. The patient also has no proprietary right in the medical record, The attending doctor should give the patient desired information. He is also given a brief summary of his condition; the result of various tests and types of treatment carried out in broad terms. Similarly the doctor has no proprietary right over the medical recotd: When he is given access to the record of a patient, it is a courtesy extended by the hospital and not as a matter of right.

The medical records must be considered from two points of view:

a) **As a personal document:** The information contained in the medical record is confidential and privileged and cannot be publicly divulged without the consent of the patient except under due process of law. If a patient is admitted to another hospital, the written information can be forwarded through the administration if requested for. Information with regards to the condition of the patient and the date of admission, discharge, death or birth of child can only be furnished to the friends or relatives.

b) **As impersonal** document: As a impersonal document the contents of the medical record can be used for education, research and information to public health authorities and so on without revealing patient's identification data. However in public health interest some personal information is required to be divulged whenever notification regarding disease is made.

Indian Evidence Act of 1872 as Amended

Medical records are the documentary evidence under tlie act and may be required to be produced by a witness who may be a hospital representative or the treating medical officer in some of the situations discussed below:

a) **In the** court **of law:** The medical document may be summoned by the court in the following types of suits:

The liospital will be required to produce the same as and when asked for.

- Malpractice suits against tlie hospital employee or the hospital itself in the civil court personal injury suits arising out of negligence or fault of others and authorisation for medical examination operation ctc. Medical examination carried out without the consent, expressed or implied will usually amount to action assault. Similarly any surgical intervention or procedure without consent will also tantamount to assault. The facts rendered in the medical document can be invaluable evidence in deciding all such cases.
- Cases in consumers courts.

Medico legal cases in the criminal courts: As soon as the case is declared medico legal, the medical officer is required by law to give a report about injuries to tlie police whether treated outdoors or indoors. In all such cases the hospital cannot be forced to hand over tlie original record to the patient or to the police. They arc however required to be produced in tlie court whenever summoned to do so.

b) **Life Insurance Corporation** of **India: LIC** frequently asks for details of hospitalisation or cause of death of the patient to dispose claim that arises of insurance policy. Release of such information without the prior consent of the patient is permissible because the patient has waived his claim of this privilege at the time of taking a policy by signing a declaration lo this effect.

c) **Income tax:** Under the proviso of section 38(5) of the Act income tax officer can call for the hospitalisation records and the information has to be made available for which no prior permission from the patient is necessary.

d) **Patients** will: If a patient other than in a mental hospital expresses the desire to make a will he is ordinarily allowed to do so. If any questions arise at a subsequent stage regarding tlie mental state of the patient at the time of making the will, hospital medical records may be called for to decide on this point.

e) **Queries regarding birth or death:** Vide Act 18 of Registration of Births and Deaths Act, 1969, all birth and death occurring in the hospital are to be notified to the registrar of births and deaths (Municipal bodies/cantonment Boards), This is done by making certificate to this effect and by making necessary endorsement in the medical documents. Any questions arising to this effect, the hospital may be required to produce the required certificates/documents.

Retention of Medical Records

The factors affecting the retention period of medical records are:

- Need of the patient
- Medico legal requirement
- Education and research requirement

With the applicability of the Consumer Protection Act, it must be borne in the mind that even an innocuous looking case may turn out to be very serious and retention of documents must be done for sufficient long period. As a general guide the documents be retained for the following periods:

a) OPD records : 5 years

b) Indoor records : 10 years

c) Medico legal records : Permanently

Safety of Records

Responsibility of safety of records lies with the administration. Proper records of their movement must be kept during its transit from indoor to medical records department or whenever a document is taken out for education/research. A single person should control all medico legal records of the hospital, perferably medical record officer or any other officer designated by the hospital administrator.

Medico legal record should always be kept in safe custody, i.e. under lock and key. Separate medico legal record movement register should be maintained at the medical records department. Any movement of the medico legal record along with its purpose, should be recorded in the aforesaid register. A responsible person from the medical records department should he detailed to present the medico legal records in the court of law whenever the need arises.

Check Your Progress 3

Fill in the blanks:

Medical racords to be retained for the following period:

a) Indoor patient .....

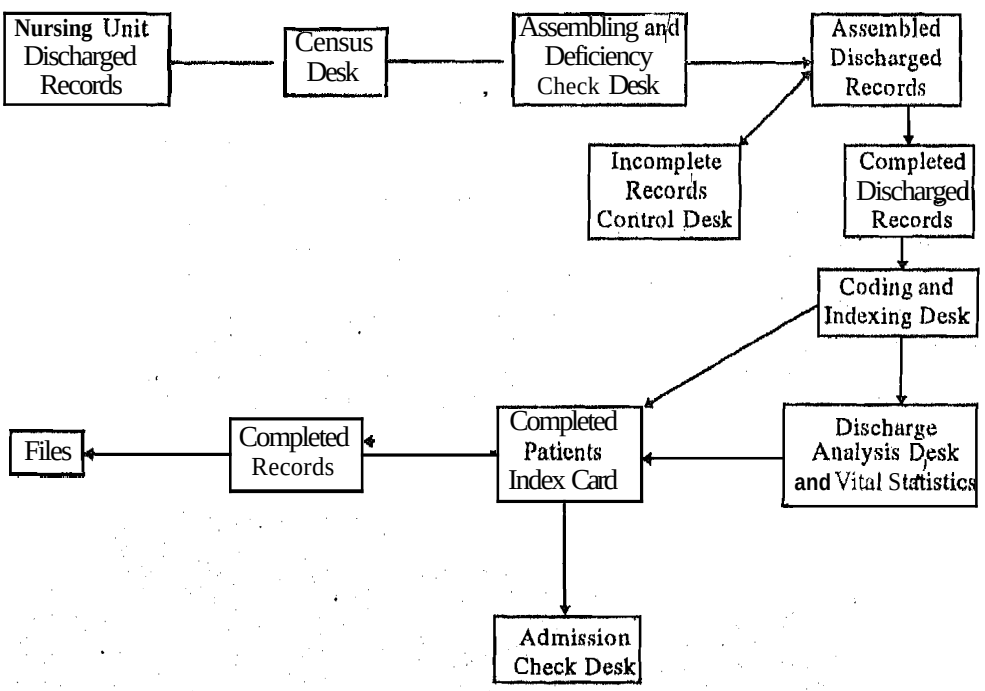
b) Medico legal case .....

2.11 LET US SUM UP

In this unit you have learnt about medical record department. This unit deals with importance of medical record. How the records flow in a hopital. How these have to be processed and duration Tor which it has to he preserved. Staff and area required depending upon the size of the hospital has been adequately covered. You have also learnt about various hospital statistics and the reports which are prepared by the medical record department.

2.12 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1



Check Your Progress 2

a) Less than *0.25%*

b) 1 to 2%

c) 3 to 4%

Check Your Progress 3

a) 10 years

b) Permanently

UNIT 3 LINEN AND LAUNDRY SERVICES

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- define the term hospital linen;
- describe the importance, roles and functions of linen and Laundry services;
- list the types of laundry services and categories of linen;
- describe parameters of planning, organisation and staffing of linen and laundry services;
- enumerate the steps of main process of laundry and procedures of washing;
- explain briefly the systems of distribution of linen;
- list the various administrative policies and pr'ocedures; and
- describe linen control and quality assurance programmes;

3.1 INTRODUCTION

Out of all the supportive services in a hospital, linen and laundry are one of the important services. The main objective of this service is to provide adequate quantity

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- describe linen control and quality assurance programmes;

3.1 INTRODUCTION

Out of all the supportive services in a hospital, linen and laundry are one of the important services. The main objective of this service is to provide adequate quantity

of the right quality linen to the indoor patients—the operalion theatres—OPD and other areas and to the medical and para-medical personnel engaged in medical care services provision in hospital. In this unit, you will learn about the planning, organisation and management of this important service. To begin with you will learn about the what constitute good laundry service in a hospital, its importance, and various types of organisation of laundry services. Further you will learn about various planning considerations including physical equipment.

You will also learn about main laundry processes including linen control programme and distribution of linen. Towards the end, you will learn about various administrative problems and procedures including quality management.

3.2 DEFINITION

The word laundry is derived from launderer/laundress--which means washerman or washerwoman. By hospital linen we mean all clothings made of cotton, linen or wool or synthetic fabrics, which are used by the patient or for him. Linens or textiles are composed of certain basic fabrics which are spun into yarn. Yarn inturn is woven into cloth by one or more of the basic weaves.

It is recommended that fabrics used in hospital have certain specific qualities so that it may not affect adversely on the health of patients, medical and para-medical personnel. The linen must have proper moisture repelliency, dry efficiency, surface fluff, strength etc. It should be static safety and must not be of high flammability.

For the hospital linen service, from the administrative point of view, due consideration should be given to the three basic factors i.e. service, quality and economy.

- Service involves frequency of changing patient linen, linen control, distribution procedures and duration of time at the laundry.
- Quality involves the sanitation of linen, its visual appearance and the microbial status.
- Economy involves the consideration of what it actually costs the hospital to provide linen service per patient per day.

3.3 IMPORTANCE, ROLES AND FUNCTIONS

The importance of providing clean linen to the patient can be discussed under the fallowing headings:

i) Cross Infection

Providing of clean linen to the patient, frequent change of linen and its effective washing serve as a well known preventive and hygienic measure in controlling cross infection in hospital.

ii) Patient's Comfort and Satisfaction

A patient not only expects hut demands clean bed and body linen during his stay in the hospital. Supply of adequate clean linen helps in ensuring patients satisfaction. Fabrics, properly chosen, can give comfort, warmth or coolness to the patient.

iii) Aesthetic Aspect

Clean linen in a ward makes it look more cheerful and aesthetically beautiful and pleasant. It pleases the patient and the staff working in the ward. For decorative value specific fabrics may be cboosen.

iv) Human/Public Relation

Clean ward displaying bright, crisp and clean linen makes pleasant impact on all who work or visit in the hospital. The good impression instills confidence in the patients

and the public, and enhances their faith in the medical services rendered by the hospital. Simultaneously, it bespeaks of competence and efficiency of the medical care service.

3.4 TYPES OF LAUNDRY SERVICES

i) **In-plant System**

Here a hospital runs its own laundry. The system can only be justified for very large hospitals and teaching institution as it is very expensive.

In this system, the hospital has its own linen and laundry and all the activities of the hospital laundry service like washing, mending arid replacement are done in the hospital premises.

ii) **Rental System**

In the system hospitals hire laundered linens from rhe contractor. The contractor is also responsible for the replacement as well as laundering of patients and staff linen. The main advantage of Rental Linen Supply System is that the hospital does not have t o spend much for this vital service.

iii) **Contract System**

Here, hospitals own their linen but have no means of laundering. Washing, conditioning and pressing are carried out on contract basis from outside. In some cases, however, a subsidized contract type is prevalent and in such case the hospitals provide water and washing area within the hospital premises.

iv) **Co-operative System**

A single laundry is run on co-operative system to cater for a number of hospitals. This system is very economical. It can ideally be adopted for government hospitals/a group of smaller liospitals.

The centralised laundry tends to be more beneficial for the smaller hospitals than the larger hospitals as many small hospitals share the services of highly qualified laundry managers and most modern machineries and automation. The centralised laundry organisation can maintain standardization of linen for all tlie hospitals and evolve common policies of purchase, supplies and maintenance of linen.

3.5 CATEGORIES OF LINEN IN HOSPITAL

Hospital linen can be classified in the following categories:

1 **Store Linen**

i) Patient linen:

a) Body linen

b) Bed linen

ii) Staff linen: Linen used by the hospital staff such as apron.

iii) Departmentlservicc linen: Linen used by the departments.

2) Laundry Linen

Here, the linen is classified according to the processes it has to undergo for washing.

i) Soiled *Linen*

The linen that has been used by the patient is termed as soiled linen. It undergoes the usual process of collection, washing, conditioning and pressing. To avoid hospital

infection, it has been suggested that sorting of soiled linen should not be done in a ward or operation theatre area. They must immediately be placed in washable bags properly marked or labelled, and must be sent to laundry.

ii) ***Infected Linen***

The linen contaminates by infected material such as pus, blood, body discharges etc. is termed as infected linen. Contaminated/infected linen is collected in polythene bags secured by red ribbon and it is least handled. It goes through the process of sluicing and soakage in disinfectant solution prior to passing through the normal process of washing, conditioning and pressing. Baby napkin is always considered as contaminated linen.

iii) ***Foul Linen***

This type of linen contains faeces, excretions and blood stain. In the past, for this type of linen, hand sluicing was done, by Nursing Orderlies or sweepers.

After sluicing, this type of linen was sent to laundry for washing. Now-a-days, this type of linen is collected from the patient care area in water proof containers and sen to central sluicing plant from where, after sluicing, the linen is sent to laundry for washing.

iv) ***Radio-active*** Linen

Linen contaminated by a radio active inaterial is segregated and monitored with suitable detector. The articles are put into a special washer rcscrved solely for this purpose and when found to be free from detectable radiation'these are sent to the hospital laundry and processed with other linen.

Check Your Progress 1

1) Define the term "Hospital Linen".

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2) List the types of organisation of Laundry Services.

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3.6 PLANNING CONSIDERATION

3.6.1 Linen Requirements

Linen requirements are calculated based on operational planning of areas of different activities.

- Fixed areas (OPDs and other departments)
- a Operation Theatre and labour room
- Indoor and private ward etc.

The requirements for fixed areas, OTs and labour rooms are based on the actual performance, whereas, requirements for indoor and private wards are estimated at the rate of 2 to 3.5 kg of dry linen per patient per day, For planning purposes, it is just sufficient for alternate day change of linen.

Ideally a hospital having 100% bed occupancy sliould have six sets linen per patient as given below:

1) One set in patients' bed

2) One set,en-rou te to laundry

3) One set in process in laundry

4) One set ready for use ,

5) Two sets for active storage for work and use in case of emergencies.

2.5 kg/bed/day can be taken as average which is with alternate day change sets of linen will be sufficient.

Replenishment System

Once the numbers of beds and tlie specific quota of linen are fixed, replenishment of linen is made on the basis of the total number of different linen items sent for condemnation.

It is always better to put tlie year and mode of issue. Whatever linen condeinned should be deducted from the perpetual inventory and additional input should be made. This system will provide the figure of total input of linen in tlie course of the year. IS the number of condemnation is very high, it needs immediate investigation.

3.6.2 Mechanised Laundry Service

Mechanised laundry service has already been established as tlie best method for washing of linen. It is not only convenient but safe, dependable and cheaper in comparison to other methods. Due to lack of knowledge, the introduction of mechanised laundry in Indian hospitals is rather poor.

Report of tlie study group on hospitals (Jain Committee) in the year 1968, has recommeiided very clearly that "Mechanised laundry should be adopted as method of washing linen in teaching hospitals." Small hospitals should group together and obtain benefits of mechanised laundry. Even very smaller hospitals should employ domestic washing machine. Rao Committee has again emphasised the need of machanised laundry system.

3.6.3 Physical Facilities

Space and accommodation requirement:

1) Location of Laundry

The location should be convenient to the user units and on tlie ground floor. If possible, the laundry sliould be in the close proximity to CSSD and dietary services due to common requirement of steam from boiler plant.

2) . Floor Area/Space Requirement

It is always better to have space more than what is actually required in view of future expansion. According to Dr. J.R. McGibony, tlie area for laundry for a teaching hospital in India sliould be at least 5800 sq. ft. According to a survey of Delhi hospitals the space requirements is 10 sq. ft. per bed or 10 sq. ft. for 2.5 kg of linen per day. In term of number of beds to the space requirement is cited below:

No. of Beds	Space
200-350 bed	3750 sq. ft.
350-500 bed	4000 sq. ft.
500-650 bed	4500 sq. ft.
>-650 bed	5000 sq. ft.

3) **Physical Layout**

'U' type, 'Rectangular' type or any other form may be adopted as considered suitable keeping in view scientific workflow and availability of space.

4) **Design of functional areas.**

Reception Bay → Sorting Area → Sluice Room → Main Washing Area: washing, hydro extracting, Drying → Ironing Area → Clean Storage Area → Issue Bay

Ancillaries

- Laundry Manager's Office;
- Stores;
- Tailoring Bay;
- Worker's Rest Room;
- Toilet;
- Boiler Room

5) **Material and Decor**

i) Flooring should be smooth, non-slippery, water-impervious.

ii) Walls should have a smooth, washable surface and should bc free from all unnecessary corners, edges or projections, which could become a cleaning and mainteuance problem. Walls should be painted in soothing pastel colours rather than white to reduce glare.

iii) Ceiling should be smooth and washable surface and should be high enough to allow installation and repair of all equipments. The main laundry building should have a clear headroom of 14 ft., and the roof should be built free from dust collecting surfaces.

iv) Doors should be wide enough to admit heavy machinery and trolleys.

6) Ventilation

Recommended air changes are 10/hour. Exhaust Sans should he provided on a liberal scale, so as to provide a comfortable environment throughout (lie year to enhance personal comfort and efficiency of the workers.

7) **Lighting**

Day light should be used whenever possible. Good lighting is an important factor for increasing productivity and quality of work. It should be free from glare and shadows.

8) Power Supply

Usually it is 220 or 440 watts, 3 phase, alternating current, connected to alternative standby generator. The distribution panel must be readily accessible, preferably located near the load centre away from the direct path of escaping steam or vapour. The power requirement are as under:

i) For motorised equipment : 25 kw/h/25 kg, of linen loaded in a drying tumblers

ii) For lighting: 3 Watts per 1/sq. ft. of floor space.

9) Steam

Requirement is 170°C with 100 PSi. Ideal is 178°C at 100 PSi. I-Iowever, specification given by the manufactures of washers and caldering machine must be adhered to.

10) Water

Provision of adequate water supply throughout the day is of great importance. 'For washing every kg of linen, 30 litres of hut water at a temperature of 70°C to 80°C and 10 litres of cold water are required. The hot water supply should be piped to the

laundry directly from the boiler room. For general planning 100 litres of water per bed per day is required for laundry purposes.

If hardness of water exceed 3-4 grains, then water softening plant should also be used, otherwise, scaling of elements will be a constant problem. Linen also acquires yellow hue if washed with hard water.

11) Fire Safety Measures

Provision of fire extinguishers is a must throughout the laundry. workers should be aware of the use of fire extinguishers and must be trained for fire fighting. They should be instructed not to smoke inside the laundry. No electrical equipment should be left on after the working hours.

12) **Toilet, Locker and Shower Facilities**

Enough facilities should be provided so that worker should change their clothes before they start to work and before going home afler work. Facilities to wash and clean theinselves should be provided. Soap, Oil etc. should be made available.

13) **Sewing Room**

The sewing room should be located near the clean linen and pack preparation room so that wrappers, surgical or obstetrical drapers etc. found torn and reparable could'be sorted out, stitched and stored there, so enough space should be provided for the sewing function.

14) **Laundry Manager's ,Office**

This office should be located as centrally as possible so that the manager may properly supervise the entire laundry operalion. The walls should include large vision panel to allow for full view of each area.

3.6.4 Equipment Requirements and Maintenance

Equipment planning must be done based on single eight hour shift per day. As and when expansion of hospital takes place a second eight hour shift can be started doubling the capacity of laundry without adding any equipment. The following type of equipments ace generally required for the mechanised laundry:

The number of equipments required inay be estimated considering the linen load i.e. total weight of linen (in kg, or lb.) to be washed. For practical purposes the following factors—the number of beds; the proportion of superspeciality and surgical beds; cost incurred; space available; number of laundry shifts per day; and capacity of the equipment etc. should be taken into account.

1) Trolleys (Dry linen trolleys—diff capacity 50 and 100 kg., Wash room trolleys—diff capacity 50 and 100 kg)

2) Sluice Machine—(15kg capacity)

3) Boiler(s) (Boilers which generate steam or hot water are required for laundry)

4) Washing Machine(&-50-1 00 kg.

5) Hydro Extractors—50 kg.

6) Drier(s) '(Drying Tumblers)—25-50kg.

7) calendering Machine—(single roller) 80" × 60"

8) Steam Bed Press—(47" x 14" × 9")

9) Electric Irons (Hand Press)

10) Sewing Machine

11) Ironing Table (For using hand presses)

12) Weighing Scales

13) Fire Extinguishers

14) Air cornpressure for calendering machine

The laundry machines are available in different capacities in India from 5 kg to 100 kg. The number of machines and its capacity is calculated on the basis of total quantity of dirty linen to be washed divided by working hours so that linen need to be washed per hour is known and accordingly machines can be purchased, On the basis of 2½ kg linen per bed to be washed the requirement of machines can be calculated.

Maintenance of Equipment

Installation and commissioning should be under close supervision and every stage of it should be inspected and checked properly. Warranty period and after sales service should be well defined. Record of initial cost, operating cost should be recorded and maintained. Availability of spare parts should be ascertained. Various utilisation rates and ratios should be found out periodically. 'Log book' and 'History sheet' of the equipment should be maintained. Breakdown periods and down time for all equipments should be maintained. First level maintenance should be carried out diligently by the user. System of regular and timely repairs either by in-house staff or on 'service contract' should be adopted.

Check Your Progress 2

1) Enumerate 'the sets of Linen required per patient.

.....

.....

.....

2) Fill in the blanks:

a) Acoording to survey of Delhi Hospitals the space requirements is ..... of linen per day.

b) In terms of bed the space requirement for 200 to 350 beds is ..... and for 500 to 650 beds is .....

3.6.5 Organisation and Staffing

Number of Personnel Required

The operator must be trained. He must know how to operate it otherwise even a good machine will yo out of order in no time. It is always better to ask the supplier to train the operators, before the hospitals take charge. It has been found that one dhobi/ laundry operator can handle at least 55–60 kgs of linen or one dhobi for 30 beds.

Apart from laundry operational staff, a manager should be made overall incharge. He must be Diploma holder in machanical engineering with experience to run laundry for 5 years. If laundry is going to function more than one shift, then, every shift must have a supervisor as Incharge of the shift.

i) **Parameters of Staffing**

(e.g. for 500 beded teaching hospital)

1) Linen Load @ 2.5 kg/Bed/Day

= 2.5 x 500 = 1250 kg/Day

2) Staff (Laundry Operator) @ 1 Per 60 kg/Day = 1250/60 = 20 (Excluding Manager)

— Manager 1

— Laundry Supervisor 1

— Laundry store keeper 2

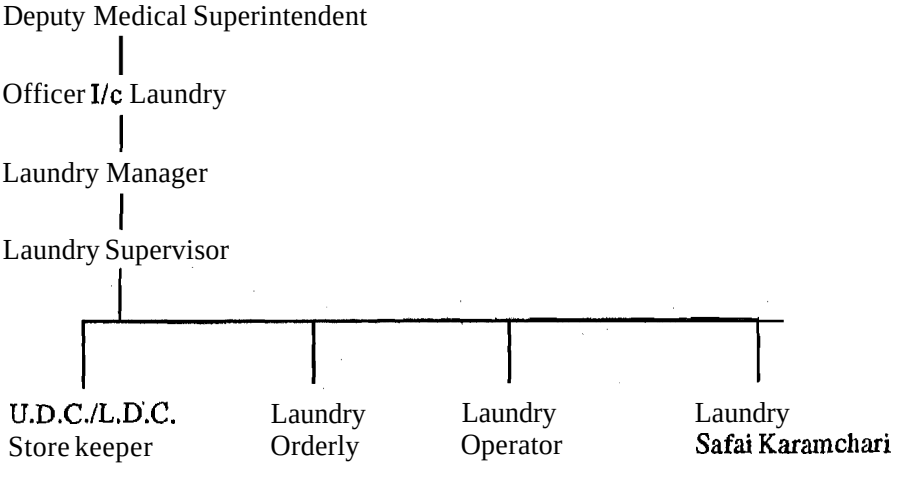
— Laundry orderlies		6
— Tailor/Mender		1
— Safai Karamchari		1
— Washermen/Laundry operator		17
Receipt ← Sorting		2
Sluice		1
Washing Machines	4	
Extractors	2	6
Driers		2
Calendering		4
Steam Press		1
Folding + Storage.		2
Despatch/collection	2 (By Laundry orderlies)	

Other supporting staff

• Boiler Attendant	3
Electrician	2
• Mechanic	1

Note: The supporting staff can be dedicated to the laundry or made available from the pool of engineering services of the hospital.

ii) **Organisational Structure**



Manpower Deployment

Suitable pattern may be adopted for deployment of personnel for the desired shifts i.e. Morning, Evening and Night.

3.7 LAUNDRY PROCESSES

3.7.1 Main Laundry Process

Generally, delivery and collection of linen is made by laundry staff. After receiving the linen in laundry if not infected, soiled or fouled, it is weighed. If it is infected or fouled then it is processed through sluicing machine. In sluicing linen is washed with cold water to remove dirts, vomitus, faecal matters, blood and body fluids deposited on clothes. Dirty linen after weighing undergoes following processes:

- Washing: For optimum removal of dirts from clothes combined action of detergents and mechanical movements of clothes through water is required and applied in mechanical washers.

  Hydroextraction: By process of centrifugation, hydroextractor machine extracts or expells water from damp washed clothes.

- Drying: Drying tumbler agitates the hydroextracted mass of washed linen inside a cylinder so that steam passes through tlie clothes at high temperatures. This results in drying of linen.

- **Calendering/Hot** Ironing, Pressing or Hand Ironing: Flat bed steam press consists of concave, convex presses with tiny holes for passage of steam. Fabrics get pressed by mechanical pressure and steam.

- Mending

  Folding, packing

- Distribution/despatching and collection

3.7.2 Operational Aspects of Washing

It consist of the following procedures:

a) Breaking

This is the first operation of adding soap chips and detergents like washing soda or commercial detergents to high temperature water in the washing machine and allowing the mixture to break and build up suds.

b) **Sudsing**

Soiled linen are thrown in the basket containing the soap suds and machine is operated to agitate there by causing the suspension of dirt. Multiple sudsing of shorl duration alternated by 3 minute rinses is more effective than continuous sudsing or rinsing.

c) Bleaching

Commercial bleaching agents like Tinopal, Chlorine bleach or hydrogen peroxide may be used. Bleaching suds should not exceed 10 minutes duration and the temperalure should not be more than 160°F.

d) **Rinsing**

Rinsing is flushing water through the linen in the machine to remove suspended dirt, detergents or bleaching agents.

e) **Starching**

This is better done after the final washing operation. Light, medium and heavy starching should be consistently and uniformly done to the linen.

f) **Souring**

This is done to neutralise the alkalinity in the wash lo give a good finishing appearance to the linen. By adding a mild acid like boric acid or any fluoride acid in the washing operation, the washed linen is freed of the yellowish colour.

g) Blueing

This should be the last operation. Any commercial blue will serve the purpose.

h) Ironing

Calendering machines, flat work ironers and tiand-presses may be used for this purpose. Normally 70% of washed linen will be for flat iron work, 25% rough dry and 5% press work.

3.7.3 Washing Formula

Washing Formulae

		Cotton white 100 lbs dry weight	Cotton coloured 100 lbs dry weight	Woollen 100 lbs. 100 lbs dry weight
1.	Washing Soap Chips	1.5	1	1.5
2.	Washing soda	1	0.5	–
3.	Bleaching powder	0.5	–	–
4.	Whitener	0.05	–	–
5.	Starch	–	1	–
6.	Temperature	140° F-160° F	150° F	60° F

Note: It should be adjusted to the degree of hardness and softness of the water.

Life of Linen

The life of linen is determined by the following factors:

a) overall availability of sets of linen.

b) Type of laundry system under operation in the hospital. An in-plan1system will ensure a longer life span.

c) Type of the detergent being used for washing purposes and effectiveness of the Linen Control Committee. As per general experience 15-20% of the linen being used in the hospital becomes unusable after a period of 3 months or after 35 washes.

3.8 LINEN DISTRIBUTION SYSTEM

In most of the hospitals, three common types of linen distribution systems are practised:

3.8.1 Centralised Linen Distribution System

In this system, the issue of linen and linen circulation is controlled by a central linen room; which is also responsible for linen replacement, repair and condemnation.

1) Centralised Linen Services

There are four patterns of issue of linen from the central linen room:

i) ***"Clean for Dirty" Exchange System***

In this system, the issue of clean linen is done in place of dirty linen,

ii) ***Topping*** Up ***System***

Under this system, the daily ward stock is calculated on the basis of 24 hours requirement. And this agreed ward stock is replenished every morning by the staff of central linen room.

iii) ***Exchange Trolley System***

To avoid handling by too many people in many of the hospitals in USA, average daily stock of linen is supplied to the concerned hospital area and the linen is replaced by another trolley the next day.

iv) ***Pack Systeni***

In this system, linen packs (full set of required linen for one patient) are prepared in the linen room, and in a trolley these packs are distributed every day to each ward and patient care areas.

2) **Decentralised Linen Services**

Under this system, the various units, wards, operation theatres etc. are allotted with required quotas of linen articles. Washing is done by the laundry. For the purpose of linen exchanges, sister incharge of these areas send the dirty linen to the laundry and from laundry the linen comes back to these areas, after washing. In this system, linen are labelled and are marked, to avoid missing and mixing with that of other areas. Sister Incharges are responsible for storugc and maintenance of linen.

3) **Mixed Linen Service**

In the mixed linen supply system, the special areas e.g. Operation Theatres, Private Wards etc. are given required quality of sufficient linen and they run the linen supply on the basis of decentralisation, whereas rest of the areas follow centralised linen supplies.

3.8.2 Linen Inventories

Regular record of total quantities of clean and dirty linen, daily load, average daily load, and of how many old and new linen are in circulation in hospital, should be maintained.

3.8.3 Maintenance of Linen

Maintenance of linen plays an important role particularly in a hospital. It should be done right from the time of purchase of linen to the condemnation.

Check Your Progress 3

Enumerate the main laundry processes.

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3.9 ADMINISTRATIVE POLICIES AND PROCEDURES

Every hospital should have a manual on its Linen and Laundry Services and it should define in clear terms the policies and procedures to hc followed. While developing the manual the following points should be taken into consideration:

1) Collection and Despatch of Line

- Centralised System
- Separation of Soiled and Fouled Linen
- Collection

  Daily: from OT, ICU, CSSD, Labour Room

  Alternate Days: from Wards

  Timings, Routes of Tracrion etc.

2) Policy for Equipment

- ISI Standard Bquipments
- Annual Maintenance Contract

3) Training of Staff

- Proper Handling of Machines

- Fire Safety Precautions
- Optimum Use of Detergent

4) Detergent Stock

Adequate Buffer Stdck

5) Washing Formula

6) Cooperative System

7) Standardization of Linen

8) Quality Control

3.10 LINEN CONTROL

Linen Control Committee must be constituted to oversee the linen control programme. Members of the committee should be chosen from those working in Store, Laundry, Purchase Section, I-Iospital Management of the Institution and having experience of seleclion, purchasing, use and handling of linen.

One of the members of linen committee offer IC laundry must be selected as incharge of Linen Control Programme.

Elements of Linen Control Programme

1) Linen Purchase: Adequate quantity of good quality linen should he purchased and made available in hospital for use.

2) Centralised Control of linen and laundry services generally ensures better control over the laundry workers.

3) Proper locking of stock room and restriction of number of persons having access to them.

4) Proper scaling of containers and bags during transit of linen from one urea to another, and system of receipt at each stage.

5) Fixing of responsibility to staff holding the charge of linen in different areas

6) Constant and positive supervision at all the stages of linen circulation.

7) Regular physical verification to pinpoint the extent and type of loss with proper preventive action hy the administration.

8) Frequent and adequate condemnation of linen articles.

9) Proper maintenance of all the records.

10) Proper security arrangements at the exit of hospital areas. Reduction of exits to a minimum level.

3.11 QUALITY ASSURANCE

Quality assurance programme should be developed, Some of the points to be taken into consideration while developing quality assurance programme in hospital laundry are presented in the form of questionnaire as given here under:

Organisation and Personnel

1) Whetlier the hospital laundry is properly staffed?

2) To whom the laundry manager is responsible aiid whether the organisational hierarchy is proper or not?

3) Proper layout, dressing room and rest room with toilet facilities for laundry employees.

4) Laundry workers—whether trained or not?

5) Working hours per week/per day.

6) Precautionary 'measures to prevent laundry accident.

Physical Plant and Equipment

1) Location of the laundry in relation to the boiler room, steam pressure, source of hot water, electrical capacity.

2) Proper lighting with no glare and glaze.

3) System of ventilation ideal or not.

4) Whether steam is exhausted properly from laundry?

5) Disturbance due to noise and vibrations.

6) Daily work load (lb or kg) and the capacity of the plant.

7) Proper work-flow is maintained or not'?

8) Maintenance system (including preventive maintenance)—by laundry personal/by engineers/by contractor it exists or not.

Linen Handling

1) System of delivering dirty, stained, infected and contaminated linens to the laundry. How is it marked for identification?

2) System of control—accounting for linen sent to the laundry, physical counting when laundry leaves the floors and again when it is sorted. Record keeping is proper or not?

Laundering Process

1) How is linen sorted for wash loads?

2) Normal wash load and the length of time requiring to complete the washing cycle.

3) Test conducted to adjust the washing formula to the actual condition of hardness of water.

4) Steps taken to remove stains.

5) How is the laundering of special fabrics, such as woolens and silks, handled? What precautions are taken to prevent fading of drapes etc.

6) Time taken between the receipt of dirty linen for laundry and stage when they are ready for delivery.

7) At what points are damaged linens detected and mended'? Person responsible for mending.

Linen Control

1) What authority does the laundry manager have in determining the quality and quantity of linen to be purchased? Other departments are consulted before purchase or not. What tests are done for durability before purchase'!

2) What inventory records are kept lor the linen in stores and in circulation?

3) Record to determine the length of service the linen gives. Is the linen marked of the date it is put in service?

4) Total cost of linen replacements per month. What part of this amount is represented by worn and discartled linen and theft? What is the ratio of linen in circulation to the number of beds in the hospital?

5) How is clean linen delivered and by whom, how often?

6) In what areas of this hospital are coloured linens used? Is the laundry responsible for the dying of linen?

7) How often is a physical inventory verification held?

8) What group of hospital employee are furnished uniform? How often are they laundered? What procedure is followed in issuing these uniforms?

Sewing Room

1) Location in relation to laundry.

2) What items are stitched/made in the sewing room?

3) What type of machine is found in the sewing room?

4) What means of marking new linen? At what places of the sheets arc markings placed?

5) Personnel employed and differentiation of their duties.

Costs

1) What is total laundry cost?

2) What is the respective distribution of laundering costs to various user departments?

3) What factors are used in determining laundry costs?

4) Policy of laundering of personal linen of employees. At what charge if personal linen of employees is laundered.

5) Which of the laundry machines are deprecialed. What depreciation schedule is followed?

6) What is the present valuation of the hospital laundry?

3.12 LET US SUM UP

In this unit you have learnt the important roles of linen and laundry services in controlling cross infection, ensuring patients comfort and satisfaction, good public relation, and enhancing elegance/aesthetic look of the wards in hospital.

It-is also learnt that out of various types of laundry services, mechanised laundry service has emerged as the most preferred system of laundry which can render desired service, expected level of sanitation of linen at reasonable cost particularly for bigger hospitals or smaller hospitals that could group together to set up centralised mechanised laundry service.

Jain Committee and Rao Committee of union government emphasised tlie need of mechanised laundry service for hospitals. By proper planning, organisation of Mechanised Laundry Service, and pursuing quality assurance programme, hospital managers/authorities will be able to meet the desired linen need of hospitals.

3.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your 1'1-ogress 1 .

1) Hospital linen means all clothing made of cotton linen, wool or synthetic fabrics which arc used hy the patients or for him.

2) a) In-plant system

   b) Rental system

   c) Contract system

d) Co-operative system

Check Your Progress 2

1) Six sets

i) One set for patient beds

ii) One set en-route to laundry

iii) One set in process in laundry

iv) One set ready for use

v) Two sets for active storage for work and use in emergency.

2) a) 10 sq.ft. per bed or 10 sq.ft. for 2.5 kg.

b) 3750 sq.ft., 4500 sq.ft.

3) i) Trolley, ii) Sluice machine, iii) Boiler(s), iv) Washing machine, v) Hydro extractors, vi) Drier (Drying tumblers), vii) Calendering machine, viii) Steam bed press, ix) Electric Iron (Hand Press), x) Sewing machine, xi) Ironing table, xii) Weighing scales, xiii) Fire Extinguishers, xiv) Air cornpressure for calendering machine.

Chech Your Progress 3

a) Washing

b) Hydroextraction

c) Drying

d) Calendering, hot ironing, pressing or band ironing.

3.14 FURTHER READINGS

American Hospital Association, Chicago, U.S.A. (1960), *Hospital Laundry Manual* of Operution.

Brown, R.E., *Hospital* Laundries—In *and* Out *Hospital Management*, Chicago, 1965 Vol. 99 No. 2.

Central Health Services Council (1959), *Hospital Laundry Arrangements*, London H.M.S.O.

Institute of Science and Technology, University of Michigan U.S.A. (1966), *Hospital Staffing Methodology Manual*—MM 21.aundry.

Kupuswami, T.N., *Hospital Laundry*, Selection Reading in Hospital Administration 1990.

Macualley, H.M.C. el *al.*, Hospital Planning *Administration*, WHO, Geneva, 1966.

McGibnoy, *Principal of* Hospital *Administration*, 2nd Ed. 1969, Putnam's Sons, New York.

Porrall, V.M., Sotne Special Considerution *in* Purchasing Textile Hospital, JAHA 1963, 37:67.

Poussard, R.P., Hospital Laundries—In *and Out* Hospital *Management*, Chicago, 1965, Vol. 99, No. 2.

Sinha, R.P., Hospital Linen *and Laundry Background,* Paper of Department of Hospital Administration, AIIMS, 1983, New Delhi.

U.S. Department of Health, Education and Welfare, "Public Health Service"; The. Hospital Laundry, Washington D.C. (1966).

UNIT 4 DIETARY SERVICES

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the functions of dietary services of a hospital;
- outline the planning requirements of such a service;
- explain its organisation and management; and
- identify various management issues.

4.1 INTRODUCTION

In the earlier units of this block you have learnt about various utility services of a hospital inter connected with these, dietary services is another important area which aims at improving the patient care.

In this unit you will learn about the planning and organisation of dietary services of a hospital. To begin with, you will learn about the role and functions of dietary services department in a hospital. Thereafter you will learn about various planning considerations which one need to take into account while developing a dietary services department. Towards, the end you will learn about some of management issues including policies, processes and control mechanisms.

Hospitals these days receive patients of varying nature, with different cultural background, with varied food habits and with different diseases. The clinicians and dieticians have not only to meet the requirements of patients as per their nature of diseases, their nutritional status and to tackle any problems related to underlying pathological conditions. In fact the doctors and the dieticians have to coordinate their activities in the best interest of patient care. Dietary service is one of the most important hospital supportive services contributing to the recovery of health, through scientifically prepared diets, educating the patients attending the hospitals for treatment regarding use and utility of different foods and balanced diets.

Dieticians or the Food Service Managers have to be fully involved during the Planning Process of dietary services of a hospital. Proper Planning and laying down clear cut policies and procedures will enable in smooth functioning of the service and lead to the patient satisfaction and thus better patient care. In day to day management of the

service planning of menu is critical because it affects the work schedule, purchasing plans, equipment use, production and distribution. The main objective of the department should be to provide a balanced diet to the patient as per physician's instructions, properly prepared, distributed in an aesthetic manner and considering his underlying disease condition wherever applicable.

Hospital dietary service is a service which caters to the needs of outpatients regarding diet and food counselling and provision of diet to in-patients as per their requirement considering the nature and type of disease.

4.2 ROLE AND FUNCTIONS

Todays' hospitals are committed not only Io the provision of medical care to the patients but also to the welfare of its employees and needs of the attendants of the patients and their relatives who attend and visit tlie patients. Dietary Department is responsible for the selection of food and other related items and has to have liaison with Purchase Department. Requirements of all items have to he worked out. Some items like vegetables, meat, chicken, etc., have to be purchased daily arid some items like rice, pulses and oil can be purchased at weekly/monthly basis. The items have to be received inspected and verified as per the ordered specifications. These are properly stored and supplies issued per meal everyday. Daily menu planning is done including that of therapeutic diets. The food prepared is then distributed under proper supervision of catering supervisors/dieticians. As such the functions of a hospital dietary services can be grouped under four headings:

1) Inpatient Catering

2) Diet Counselling

3) Commercial Catering

4) Education, Training and Research

1) **Inpatient Catering:** It pertains to provision of meals to the patients admitted in the hospital. It should be a balanced diet providing adequate calories, taking into account the type of underlying illness, any extra nutritional requirements and the general food habits of patients in tlie state. Different types of therapeutic diets is shown as Annexure I.

2) Diet Counselling: This service can he provided as out-patieti1 diet clinics where patients are referred by clinicians to tlie dieticians for calculating their dietary requirements considering the body weight, height, underlying disease, food, habits availability and acceptability of different foods locally depending upon the economic condition of each patient. Patients are usually given a diet chart to be followed by them along with tlie certain foods either to be avoided or to be preferred.

   Admitted patients in the hospitals especially with certain diseases like diabetes, hypertension, heart ailments, anaemias etc. are advised during admission and the time of discharge regarding food intake.

3) Commercial Catering: The service caters to tlie needs of staff members who are on duty in various shifts by way of provision of meals, tea, snacks, cold drinks etc. The service usually takes the shape in the form of staff canteens open from early morning till late evenings and the food provided works out to be cheaper to the employees when compared lo the costs run by private parties. Moreover, the administration can control tlie quality of food services.

   This type of service can be extended ro the attendants/visitors of the patient who are usually desparate to find a good quality of food at a reasonable price and at a convenient place within the hospital. The hospitals can provide this facility in a separale place other than staff canteen and even can have mobile/vending machines in certain locations like OPD, Casualty, Ward Block ctc,

4) Education, Training **and Research:** This forms an integral component of any department. The staff of the hospital like Nurses, Residents, Nursing aids,

Technicians, Cooks etc. could bc educated regarding types of foods, their caloric value, balanced diets clc. Moreover, hospitals having a full fledged dietary service department can have inservice teaching programmes for their staff members and others like diploma in dictitics and therapeutics, diploma in nutrition. Such training programme can be started with collaboration of other departments or institutes depending upon the availability of facilities.

The department on its own or in collaboration with other departments should be involved in research activities on subjects related lo its role and functions.

Check Your Progress 1

List the functions of hospital dietary services.

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4.3 PLANNING CONSIDERATION

Inpatient catering is the major activity of the dietary department and proper planning leads to the economy of operation and adds to the efficiency of the service. While planning we have to consider:

1) Location and site.

2) Number of hospital beds and the specialities existing.

3) Numhcr of meals served per day and the type of foods to be served considering the local food habits of the people.

4) Catering to staff members of the hospital and number of employees.

5)' Extension of facilities to attendants of the patient.

6) Centralised vs. decentralised scrvicc.

7) Type of equipment available.

Location and Site: The area should bc located on ground floor, easily accessible to outside roads so that supplies can be carried directly lo the storage area. It should be nearer to the wards and lifts so that less time is utiliscd in carrying the food to different wards. The kitchen has to close to Boiler facility due to requirement of steam in cooking.

Number of Reds and Specialities: This will determine the work load and types of diets to be served, e.g., the requirements of neonates in neonatology ward are different than other palient. Patients admitted in the departments like Cardiology, Endocrinology may have different requirements of therapeutic diets than those in general medicine.

It will also depend upon the type of hospital e.g. a government hospital with only general beds, a government hospital with general and paying wards, a privately owned corporate hospital where patients are chargcd for meals. In a government hospital with general beds where meals are issued without any charges and the budget is limited meals catered for may kc simple without much variety in menu. In a corporate hospital where patients are charged for the scrvicc, menu's can bc elaborate and ala-carte type of meals can be preferred. Even food for each palient can be prepared and packed individually. They will as such need more staff and more space.

Food Habits and Cultural Background: The local food habits of the population Io be served will determine the daily menu in general and thus enables us to plan for equipment and space needed. People in Kashmir ate mainly non-vegetarian and rice eaters. Procurement of bulk rice cookers will be needed. Whereas in Punjab people prefer chappatis and vegetables. Type of dishes will vary from State to State. While

planning we have to consider the food habits, usual timings the food is consumed by the people and their preferences in general.

Catering to the Staff Members and Extension of Facilities: This aspect needs to be considered during planning stage. This will help us in designing the facilities. We may prefer to run staff canteen departmentally so that cost of foods served works out cheaper especially the cost of manpower and equipment etc. may not be calculated by the department while calculating cost of foods as a staff welfare measure. Moreover, the department can run such facilities on "no profit" "no loss" basis. Extension of such facilities to the attendants of the patients whether departmentally or through a contract will help in planning for staff itself. Preference now-a-days is for running such a facility on contract.

Centralised Service Vs. Decentralised Service: Having a centralised service enables effective control, eliminates duplication, helps in maintaining standards and effecting economy in operations. The centralised service should be preferred as far inpatient catering is concerned especially in a large hospital.

Separate service is better for commercial catering as there is a variation in menu and timings and also helps in maintaining accountability,

Type of Equipment Available: Preference should be given to such equipments which reduces inanpower requirements like automatic cookers, vegetable cutters, doughing machines, bread slicing machines, grinders, dish washing machines etc. These help in reducing processing time and ensures reduction in man-handling.

Check Your Progress 2

What are the advantages of centralised dietary services?

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4.4 PHYSICAL FACILITIES AND LAYOUT

Space Requirement: Food production is the core activity of the service and the design should follow the function to minimise the labour and reduce space needs. The area and shape of the floor space will influence equip-ment arrangement and work flow patterns.

As per Dr. J.R. McGibony 50 sq ft per bed is required for a 50 beded hospital and 15 sq ft per bed in the 500 beded hospital. In U.K. 8-10 sq ft per bed of space is provided. In Indian conditions 10-15 sq ft of space can be recommended per bed for food production area for inpatient catering.

Location: It should be located on the ground floor, nearer to the service lifts, having easy access with the roads of the hospital for receipt of supplies and should be as far as possible nearer to the inpatient area. It will be preferable that the main hospital kitchen is planned within the service area of the hospital and if the equipment is running on steam boilers, the distance from the location of steam boilers should he less as far as possible, if such a service is centrally placed and feeding to other areas of the hospital especially so in a big hospital. In smaller hospital small steam generators could be used within the patient kitchen itself.

Layout: It has to be arranged in such a manner that different functions are carried out. systematically. Facilities required are:

i) Receipt and storage area

ii) Day Store

iii) Preparation area

iv) Cooking area

v) Service area

vi) Dish washing and pot washing area

vii) Record room

viii) Staff room

ix) Store area for dead stock and unserviceable items.

Receipt and Storage Area: The area should have easy outside access for receiving of supplies, loading, unloading platform with platform scales are needed. Door space should be enough to permit handling of crates. There should be enough space for storage of food items and includes shelves, racks, barrels, drums etc., which are needed to store various items. **Walk-in-refrigerators** are needed for supplies to be kept in reserve for certain food items. 15-20% of total space is needed for these activities. The storage area should be rodent free.

Day Store: In this store supplies for one day's requirement issued from main store are temporarily stocked. We need few bins and 1-2 refrigerators in this area.

Preparation Area: Preliminary preparation of food involves peeling, washing, soaking, cutting, chopping, slicing, mincing, kneading and sorting before being sent for cooking, The area should be located between the storage and the cooking area. It should have all facilities of washing with sinks, drain boards work top tables, peelers, slicers, grinders, mincers etc.

Cooking Area: This area should be located between preparation area and the point of distribution for direct flow and to avoid any criss cross traffic. It should be fitted with cooking ranges, bulk cookers, fat frying equipment, chapati puffers, baking ovens.

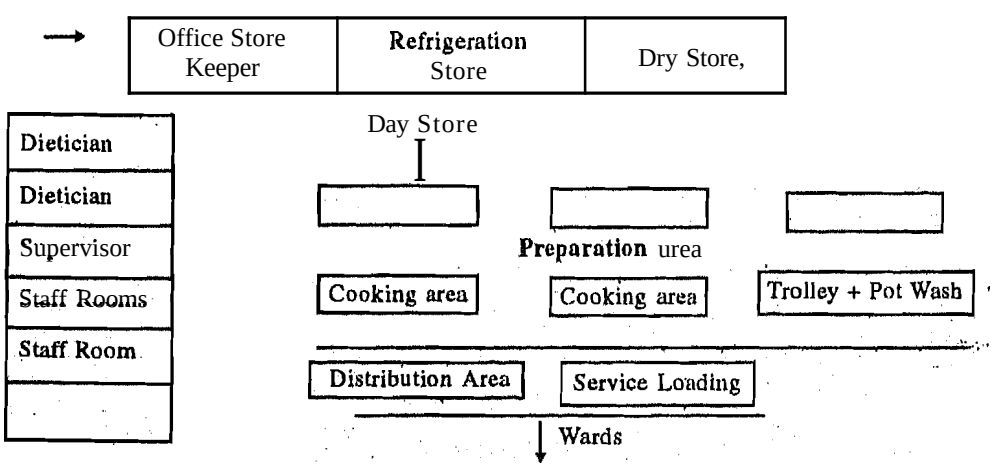
Service Area: This should be adjacent to Lhe cooking area, where the cooked food is put in the different pot and can be carried in food service trolleys which have normally a double jacket in keep the food warm till it is served. For such patients who are on different therapeulic diets and to be prepared for each patient, the food can be arranged in specially designed trays which are also loaded in the Food trolleys.

Dish Washing and Pot/Pan Washing: Adequate facilities need to be provided with proper equipment and hot and cold water. The automatic dish washing machines are also available now-a-days. Area for pot/pan washing should be separate hut adjacent lo each other preferably.

Other Facilities: The area should be properly ventilated and have good lighting arrangement. Adequate number of exhaust fans should be fixed to let out any steam and fumes. In addition we should have L.P.G. cylinder Bank, steam supply and electrical points for utilising different equipments. Flooring with tiles/kota stones for easy washing and cleaning is needed. A seminar room in a large teaching hospitals is needed for training student nurses and dieticians and other staff members.

Adequate space is needed for the offices of Catering Manager, Dieticians and other staff members working in the department. Provision should be made for staff change rooms, lockers for each worker, attached toilets and resl room for staff working there. 'A room is also needed for clerks maintaining different records.

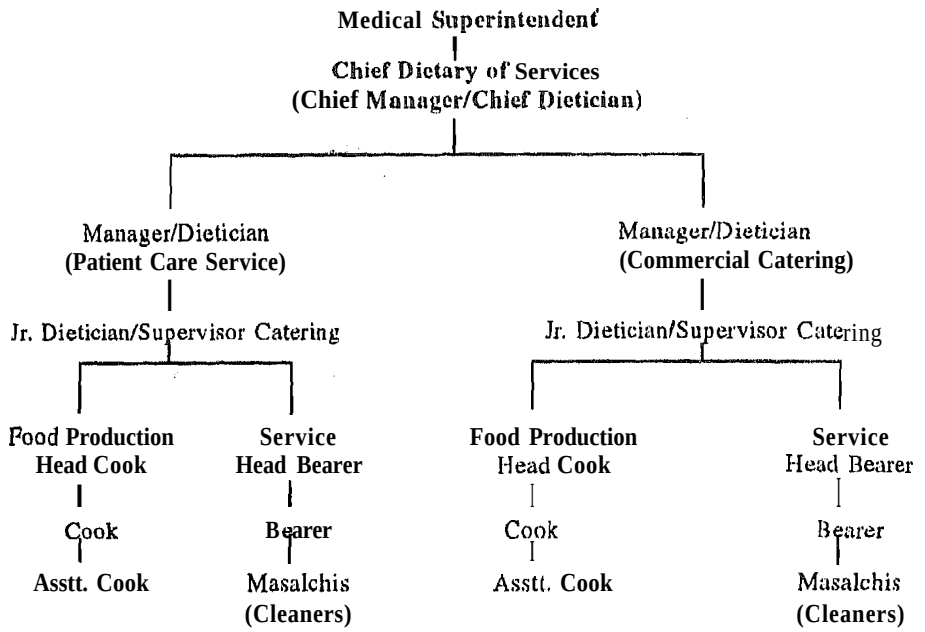
Luyout of a Patient Kitchen



Equipment: Detailed list of equipments is enclosed as Annexure II. The choice depends upon the budgetary provision, facilities to he provided rind the policies of the hospital.

4.5 STAFFING

It may not be possible to generalise the requirement of staff according to the size of the hospital. It will vary from hospital to hospital due to the differences in the type of foods served, physical facilities, equipment, type of service. Following type of organisational structure is recommended for large hospitals of 500 beds and above.



The department should be headed preferably by a person who possess a degree in Hotel Management/Catering, Dietitics and Nutrition and having experience of working in a hospital setting. The other supervisory staff should also be trained and experienced. There should also be at least 2 dieticians for hospital catering so that 1 dietician could supervise therapeutic diets and other normal diets. Number of cooks, bearers will vary, however, as a broad guidelines there should be tit least one number of service personnel (bearers etc.) for every 25-50 mid-day meals served and same numher for food preparation. The hierarchy of workers like Asstt. Cook, Cock, Head Cook has been recommended to allow the promotion of these employees from tlie point of entry. The following estiinates may be considered for staffing for in-patient dietary service:

Category of Employees	Beds						
	50	100	200	300	400	500	750
Chief Dietician	-	-	-	-	-	1	1
Dietician	-	1	1	1	1	1	2
Jr. Dietician	1	1	1	2	2	3	4
Head Cook			1	2	2	3	4
Cook	1	2	3	3	4	4	5
Asstt. Cook	2	4	6	7	8	8	1 0
Read Bearer			1	2	2	3	4
Bearer	2	4	6	7	8	10	15
Masalchis (Cleaners)	2	4	6	8	8	10	15
Total	**8**	**16**	**25**	**32**	**35**	**43**	**60**

Besides these workers, a store keeper, an orderly/porter and secretarial assistance is needed.

4.6 MANAGERIAL ISSUES

The department should be concerned with supply of proper diets at fixed timings maintaining good hygiene. The quality of preparation and cooking of different meals should be strictly monitored. The feed back from the patients/staff to whom the food is served acts as a control mechanism for improving the service. It is important to involve the staff members of the hospital like nurses, doctors, other para-medical workers in decision making like purchasing, inspection of materials; opinion and advice regarding the diets served, fixing of cost of diets for staff etc. Regular feed back from the staff working in wards regarding the diets served to the patients is equally important. The officer incharge should ensure:

1) Regular cleanliness of the food preparation area.

2) Regular maintenance of equipment and proper day to day cleaning of utensils, crockery, cutlery etc.

3) Periodical health check up of staff working in department is essential. This should be done every year. Proper health record of each employee should be main trained.

4) The employees should be given 2-3 sets of uniforms and ensure they wear it.

5) On the Job training of new employees who join the department should he done.

6) Food prepared should be checked by the dieticians before serving.

7) The menu should be displayed.

8) Dieticians and officer incharge should make regular visits towards and enquire from the staff and the patients about any observations in the diets served.

9) Budgetary provisions act as a regulatory mechanism to control costs. Working out food costs regularly (weekly/monthly), helps in guiding the department.

10) Proper maintenance of records in the department regarding materials received, daily issue, number of diets served, etc.

Check Your Progress 3

Fill in the blanks:

a) Total staff required in 500 bedded hospital will he .....

b) Number of cooks required for 300 beds hospital will be .....

4.7 POLICIES AND PROCEDURES

1) The Dieticians/Officer Incharge of the dietary services should be responsible for determining the quantity/quality of food items to be purchased.

2) Dieticians should form part of the team to identify the sources of purchase either spot purchase or on rate contract basis. They should determine the frequency of purchasing different items.

3) The procedures for purchase should be laid down. It will be economical and convenient to have most of the food items on rate contract basis fixed for a year.

4) Powers of emergency purchases whenever required should be delegated to the officer in-charge of the service.

5) The food items received should be inspected by a team comprising of 3-4 members which should include Dietician/Officer in-charge as well. After receipt of goods the stocks should be entered in the stock registers and maintain proper consumption records under the supervision of the controlling officer.

6) The storage bins, racks, cupboards, refrigerators, coolers etc. should be properly maintained and kept clean.

7) Proper sanitation and cleanliness including rodent control measures should be observed.

8) A supervisory staff should be available in the patient kitchen during all the working hours.

9) Work schedule should be planned properly avoiding split shifts as far as possible.

10) Dieticians should visit the wards everyday and have liaison with the staff nurses and the patients.

11) Requisition of different diets from the wards should be signed by the sister in-charge giving the bed number, ward number and the type of diet required by the patient.

12) Nurses should also check and supervise the distribution of meals in the wards.

13) Supplementary requisitions for those patients who are admitted late in the day, should also be entertained by the dietary department.

14) Service timings should be fixed with due regard to the traftic on floor, lifts aiid local food habits of the people in general.

15) Menus should be planned in advance and also displayed everyday on a notice board in the main kitchen. The meals should supply physiological needs and should be appealing and attractive to the patients.

16) Records pertaining to the diets served should be maintained on daily basis and compiled on weekly and monthly basis. Cost analysis of diets should be worked out every week/month.

17) Charges for meals for staff members and visitors should be fixed by a committee involving management and staff members which should be reviewed periodically.

4.8 CONTROL AND EVALUATION MECHANISM

Food service department is a major cost centre and generally labour intensive. The department should be headed by a trained person in dietetics and also hotel management/catering. This enables the department to plan and organise the affairs.

There should be a committee comprising of medical staff, nursing staff, purchase section and officer in-charge dietary service. This committee will facilitate in taking important decisions like fixing of diet scales, purchases, policies, changes in menus, fixing charges and also develop a sort of inter departmental relationship.

Officer in-charge of the dietary services (Dietician/Manager) should be able to organise the staff and its work to achieve the maximum output at the minimum cost without affecting the quality and nutritional value of the meals. Cost controls and effective management rely on the technology of various operating systems and careful resources control strategies.

There should be separate supervisors like Catering supervisor/Jr. Dietician posted for patient kitchen and commercial catering and also available in two shifts as the department has to work for at least in two shifts to cover the breakfast and dinner.

Petty thefts and pilferages are common in the food service department. These mostly involve food dishonestly consumed in the premises, stealing patient food, eating leftover foods and pilfering food items from the stores. The offenders are usually the employees of food service department, housekeeping and maintenance personnel.

Proper inspection and receipt of materials, maintaining stocks, issue of materials under authorisation of dieticians enables a proper control and check pilferage of materials. Moreover, the stores should always be locked and have very limited accessibility to the stores.

Cost control measures include cost analysis of materials consumed, working out unit costs and developing standards by adopting standard costing techniques. With this we

can develop norms and also detect any deviations and take corrective steps. This will also enable budgetary control and fixing charges for commercial catering purposes.

·Daily checking of foods prepared and served, feed back from patients and staff act as a strict control mechanism and also helps in taking corrective measures. Officer in-charge/Dieticians/Supervisors should go around the wards, talk to the patients and discuss the food problems with them.

4.9 LET US SUM UP

A good quality of food service is not only necessary for improvement of health of a patient but also an important aspect for public image of a hospital. Careful planning, proper layout, adequate equipment, efficient menu planning, proper cooking, motivated staff and adequate supportive supervision are essential for a good dietary service. In addition to these following efforts should be made by the management:

i) Proper and timely purchase of food items.

ii) Inspection-of materials received.

iii) Contacting nurses and patient in the wards by the Dieticians/Jr. Dieticians1 Catering Supervisors to get feed back from the patient and ward staff.

On a regular basis the dietary service should be evaluated by undertakings:

- Patient satisfaction surveys
- Food wastage rate
- Variety of menu
- Physical check for usual impact, temperature of food, taste and variety of food
- Method of serving
- Method of transportation
- Remarks of patients in suggestion books
- Kitchen hygiene and sanitation

4.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress **1**

1) a) In-patient catering

b) Diet Counselling

c) Commercial Catering

d) Education, training and research

Clreck Your Progress 2

Effective control, eliminate duplication helps in maintaining standards and effective economy in operations.

Check Your Progress **3**

a) 43

b) 12

4.11 FURTHER READINGS

Geervani, P., *Situational Analysis of the Economics of Hospital Dietary Services with Special reference to Andhra Prudesh,* Proceedings of the XXII Annual Convention, Indian Dietitics Association, Hyderabad, 1990.

Gibony, Mc Jr., *Hospital Dietary Department: A guide to Planning and Service,* Jan. 1961.

Kaushik, P., *The Organisation and Management of Hospitul Dietary Services,* Background Document Course on Hospital Administration, National Institute of Health and Family Welfare, New Delhi.

Malik, A.Q., *Hospital Dietary Services,* Sher-i-Kashmir Institute of Medical Sciences, Mimeograph.

Quadiri, G.J., Tabish, S.A., Bukhari, I.A., *Costing of Dietary Services and Part of an Operational Management,* Health and Population – Perspectives and Issues 16 (1 and 2), 31-36:1993.

Therapeutic Nutrition

The normal diet may be modified to:

1) provide change in consistency;
2) increase or decrease the energy value;
3) include greater or lesser amount of one or more nutrients;
4) increase or decrease bulk;
5) provide food bland in flavour;
6) include or exclude specific foods; and
7) modify the intervals of feeding,

Types of Therapeutic Diet

1) **High energy well balanced:** For convalescing patients and those with wasting disease or who are under nourished.
2) **Low energy well balanced:** For patients with obesity, with or without maturity onset diabetes.
3) **Very low protein, low to moderate energy:** For patients with acute glomerulonephritis or with hepatic encephalopathy.
4) **Very low protein moderate energy:** For patients with acute renal failure.
5) **Low protein sodium restricted:** For patients with chronic renal failure.
6) **High protein sodium restricted:** For patients with Nephrotic syndrome or hypoalbuminaemia.
7) **Very low fat high carbohydrate:** For patients with nausea due to hepatic or obstructive jaundice, malabsorption and steatorhoea.
8) **Low sodium low energy** : For patients with severe heart failure.
9) **Reduced saturated fats:** To lower plasma cholesterol.
10) **Gluten Free:** For patients with coeliac disease.
11) **High fibre diet:** For patients with diverticulosis and constipation,
12) **Liquid/Semi-liquid:** For patients with difficulty in chewing or swallowing or who are severely ill with ulcerative or malignant disease or G.I.T. Iract.
13) **Bland soft Diet:** To relieve symptoms in patients with peptic ulcer gastrites and some other gastrointestinal diseases.
14) **Tube Feeds:** For patients with surgery of head and neck, Esophageal obstruction, gastrointestinal surgery, severe burns, comatose patients etc.

Annexure II

List *of Recommended* Important Equipments.

I) Production Area

1) Cooking range with different size burners
2) Potato peeler
3) Chapatti plat:.
4) Boiling pan:; (steam/gas operated)
5) Pressure cookers (steam/gas/electric operated)
6) Deep fat fryer
7) Tilting fat fryer
8) Food cutier
9) Vegetable mill
10) Mixing machine
11) Meet mincer
12) Kneading machine
13) Dough dividing machine
14) Masala grinders
15) Tandoors' gas/electrical operated
16) Coffee machine
17) Juicers and mixers
18) Ice-cream making machine
19) Microwave ovens
20) Toasters
21) Kitchen racks
22) Dust bins
23) Working S/S tables.

II) Distribution Area

1) Pre heated food trolleys
2) Rice cookers
3) Milk Boilers
4) Backing ovens
5) Range of cutting knives
6) Chopping boards
7) Weigh bridge/machine.

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UNIT 5 HOUSEKEEPING SERVICES

Structure

5.0 OBJECTIVES

After going through this unit, you should be able to:

- describe briefly the historical perspective;
- understand the importance of housekeeping services;
- know and plan the organisation structure, staffing pattern and training;
- know the equipment and materials requirements;
- learn the correct procedures and techniques of housekeeping;
- list the evaluation parameters of housekeeping services in hospitals; and
- know the parameters to achieve Total Quality Management in housekeeping services.

5.1 INTRODUCTION

In this unit you will learn about what constitutes housekeeping services and its important roles. You will also learn how to plan the staffing, equipment and materials for effective housekeeping. Evaluation of the housekeeping services are also dealt in this unit. As you are all aware that the hospital is not only an institution for the treatment of sick but has many attributes that of a school, hotel, cafetaria, laboratory and also a factory. The patients admitted in the hospital do not get cured only by the medicallnursing care, drugs and surgical procedures. There is a combination of factors which contribute to the healing process. Palatable food, clean linen, a congenial atmosphere and good interpersonal relationships have been recognised to be essential in the recovery of the sick in the hospital, A patient coming to an alien environment of the hospital gets tremendously influenced by its physical and social environment hence, the aesthetics and the cleanliness of the hospital premises have gradually been given more and more importance particularly in modem corporate hospitals.

The housekeeping services has its origin in the hotel industry and has along with the people's expectations of a hygienically clean and zesthetically well maintained room for stay and rest. Later the concept of housekeeping got incorporated as a hospital service also. However, there exists differences in concept and practices between the housekeeping in hospitals and hotels. Whereas a hotel liouses mostly the healthy, a hospital takes care of the sick and the injured. Control and prevention of hospital infection is one of the most vital functions of hospital housekeeping whereas in a hotel the aesthetic's receive the maximum emphasis.

Definition

Housekeeping services in a hospital is entrusted with maintaining a hygienic and clean hospital environment conducive to patient care. The hospital housekeeping services comprises of the activities related to cleanliness, maintenance of hospital environment and good sanitation services for keeping premises free from pollution. Housekeeper literally means "keeper of the house". Hospital housekeeping management may be defined as that branch of general management which deals with cleanliness of the hospital, general environmental hygiene, sanitation and disposal of waste using appropriate methods, equipment and manpower. The housekeeping services can be summarised as **"All the activities directed towards a clean , safe and comfortable environment[9]".**

Check Your Progress 1

1) Houskeeping Services had its origin in:

   a) Hospitals

   b) Hotels

   c) Motels

   d) Business organisations

2) One of the most vital effects of hospital housekeeping is:

   a) Control and prevention of hospital infection

   b) Accreditation of the hospital services

   c) Effective utilisation of hospital resources

   d) Visual cleanliness

5.2 BRIEF HISTORY OF HOUSEKEEPING

As you are all aware that women have been keepers of the house since time immemorial and this has been practiced in all primitive tribes and ancient civilisations.

In the early 19th century Pasteur Fliedner and his wife established a training centre in Germany for deaconess nurses. The schedule of training included cooking, housekeeping, laundry and linen.

In the St. Thomas Hospital in London, the nursing school was headed by Miss Nightingale. All housekeeping activities were done by student nurses. A nurse in training was supposed to scrub floors, learn other essentials of sanitation and nursing care.

In 1910, the first book on Hospital Housekeeping was published which was written by Chartotte A, Aikens. In 1930, the organisation of the National Executive Housekeepers Association was formed in America which was the first professional association of its own kind. It was not until the 20th century that housekeeping began to emerge as a speciality in its own right. I-Iistorically the housekeeping department in the housekeeping activities moved from department under nursing service to a separate department under the direction of an executive housekeeper.

You will appreciate that the housekeeping scrvices arc generally done by the housekeeping staff but nursing services do play an important role including that of supervision in the housekeeping activities of the wards/departments.

Check Your Progress 2

1) The first book on hospital housekeeping was written in 1910 by:

a) Charles Dickcns

b) Edward Earnest

c) E. Woodwards

d) C. A. Aikens

2) The first .Housekeeping Association was formed in 1930. in:

a) USA

b) United Kingdom

c) India

d) kussia

5.3 COMPONENTS OF HOUSEKEEPING

Housekeeping services in a hospital is entrusted with maintaining a hygienic and clean hospital environment conducive to patient care. It is an essential ingredient in the health care delivery system and acts as the 'eyes" and, 'ears', of the hospital.

The hospital housekeeping services comprises of the activities related to cleanliness, maintenance of hospital environment and good sanitation services for keeping premises free from pollution.

Key Responsibilities of the Housekeeping Services

- Clean room Floors. furniture, fixtures, wall, ceilings, curtains, windows and bathrooms
- Disposal of hospital wnstc
- Replace supplies in utility rooms
- Clean nnd maintain housekeeping equipment
- Exterminate bugs and pests

According to Branson and Kennox a housekeepers work may consist of some or all of the following:

a) Cooperation 'with other departments

b) Recruitment, dismissal and welfare of his/her staff

c) Supervision, control and training of his/her staff

d) Compilation of duty rosters and wage sheets

e) Checking the cleanliness of .office and rooms

f) Checking and reporting of all maintenance works

g) Control and supervision of the work of the linen room and possibly the laundry

h) Prevention of fire and other accidents in his/her department

i) Ordering and control of stores in the department

j) Keeping inventories and records of equipments. .

5.4 IMPORTANCE, ROLE AND FUNCTIONS

(The hospital is a complex combination of specialised activities. As each of these activities became increasingly important to the efficient care of the sick, each has merited a special and separate department within the hospital. Together with this departmentalisation there developed greater need for supporting administrative and organisational services. Amongst these, housekeeping activities rank high in importance. Hospital housekeeping is one of the service functions of the modern hospital). It is an activity upon which all the health giving services of the hospital depend. Housekeeping services provide the correct setting in which high standards of patient care take place. Ineffective housekeeping may lead to increase in the infection rate. Tlie aim of the housekeeping department should be to become operationally efficient so as to inspire confidence in the organisation so that the patients, their attendants and visitors feel that they are welcome.

Infections are the most common health hazard associated with poor'hospital waste management which has been magnified with tlie advent of AIDS, I-Iepatitis B virus. Used syringe needles are good reservior of infection and workers in sanitation department may suffer injuries due to improper handling. It is thus essential that housekeeping personnel be educated on proper handling of hospital waste and be provided with protective clothing including masks. Appropriate waste handling and disposal is an essential requisite for safety of workers and prevention of recycling of disposables. Protective clothing, masks, gloves gum boots must be issued to personnel engaged in handling biomedical wastes.

Objectives of Housekeeping Department

- To attain and maintain high standards of cleanliness and general up keep.
- To establish courteous, reliable and congenial atmosphere.
- To train, control and supervise staff under its establishment.
- To attain good relations with other departments.
- To ensure safety and security of all staff under tlic department and to keep superior authorities informed of day to day activities.
- Control and issue of cleaning materials and equipments.
- To maintain official records on staffing, cleaning materials and training.

Functions of Housekeeping Department

You will appreciate that the functions vary according to the lype of hospital, services provided and services expected . They can be generalised as follows:

1) Interior decoration

2) Hospital waste disposal

3) Infection control

4) Pest and rodent control

5) Odour control

6) Environmental hygiene ,

7) Sanitation and hygiene

The housekeeping function is performed in every department of the hospital. The importance of good liousekeeping has grown with the knowledge on prevention and control of hospital infection in which the housekeeping plays a major role. The prevention and control of in ection reduces the average length of stay of patient, reduces pharmaceutical costs, rninimises suffering and maximises utilisation of beds.

According to the American Association Manual on Housekeeping the main function of the housekeeping department is to maintain a clean, healthful surroundings for patients and staff members alike. Housekeeping has a direct effect on the health, comfort and morale of the patients, doctors, visitors and all hospital personnel. A well kept hospital gives the public a feeling of confidence. Amongst the important functions of liousekeeping services is to provide highest degree of efficiency and effectiveness which would ensure patients, attendants and visitors to feel tliat they are welcome and secure in hospital surroundings.

A flow chart of functions of good liousekeeping are shown in Fig. 5.1.

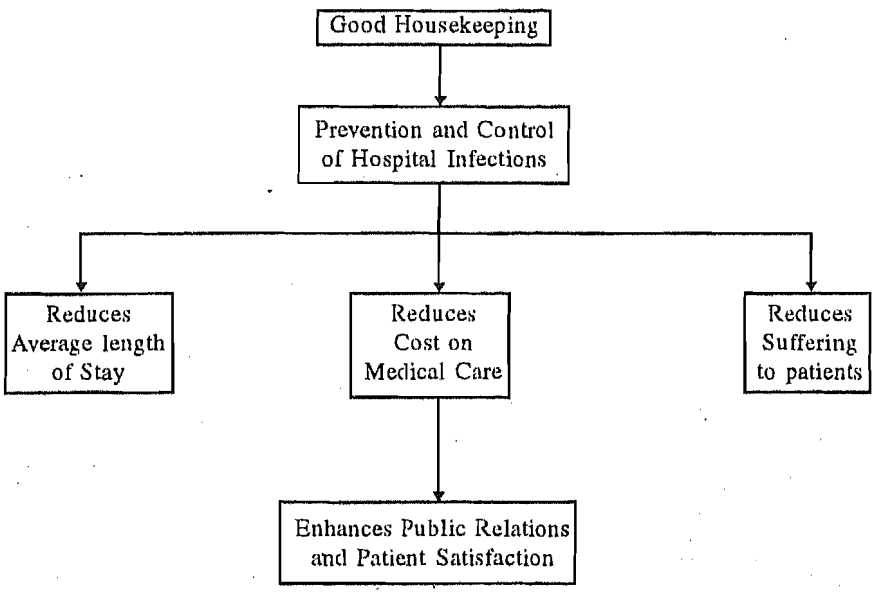


Fig. 5.1: Functions of Good Housekeeping

An appropriate housekeeping service can reduce man hours, reduce costs and raise sanitation levels. L. Broome has summed up the functions of the housekeeping services as "Anything that seriously has to do with housekeeping is of social and economic consequence to every body." In fact liousekeeping is an important variable in the provision of 'Quality Assurance' of hospital care.

Check Your Progress 3

1) A good housekeeping service is an asset which no hospital can afford to neglect. The functions of the liousekeeping department in a hospital include all except:

   a) Mechanised cleaning of floors

   b) Interior decoration

   c) Waste disposal

   d) Provision of sterile linen to operation theatres

2) The housekeeping services include:

   a) Odour control

   b) Infection control

   c) Pest and rodent control

   d) All are correct

5.5 TYPES

There arc two types of housekeeping practices carried out in health care institutions.

1) In-house

2) Out sourcing

In the in-house housekeeping the staff are employed by the health care institutions. Hospital especially the corporate ones are gradually handing over hospital services like housekeeping, building maintenance, information technology support, car parking and security on contract. In such circumstances the hospitals are not giving up responsibility for the services but bringing in expertise and resources to offer alternate solutions for delivery of services.

Out sourcing/contracting out or handing over services on contract has the following advantages:

1) It reduces the work load of the hospital management in that they are absolved of procurement activities for the services e.g. procurement of cleaning agent for housekeeping activities.

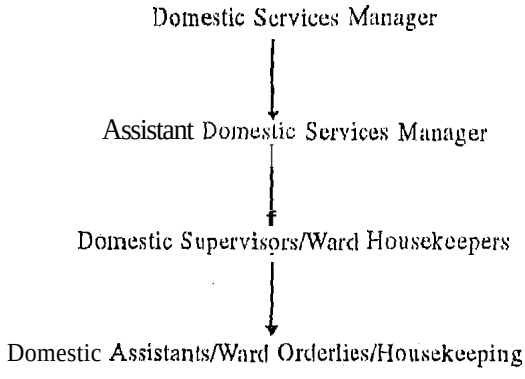
2) Manpower management and its allied activities are the responsibility of the contractor.

3) Since the service is being provided by the specialists in the respective fields, there is enhancement in the quality of services being provided.

4) There may he a resultant reduction in cost if services are contracted out.

5.6 ORGANISATION STRUCTURE, STAFFING AND TRAINING

In the United Kingdom the housekeeping services generally follow the organisation pattern as given below:



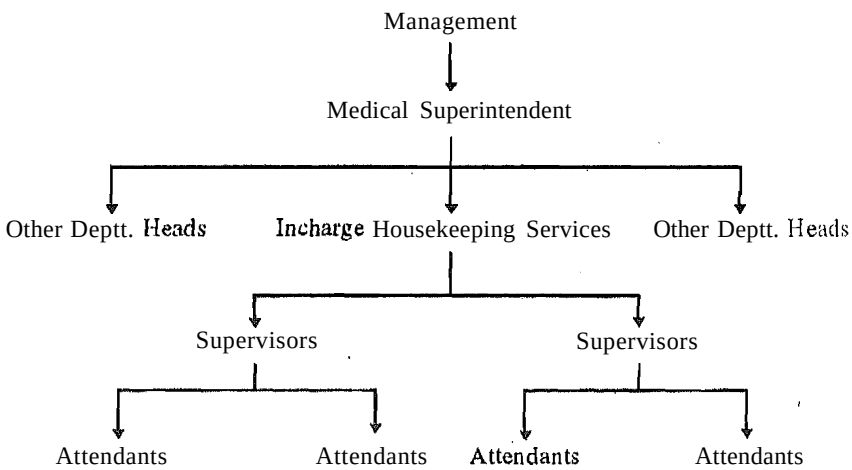
Managerial posts are graded according to a points system which relates floor area as 1 point to 500 square meters.

Designation	Points
Domestic Services Manager	20-100 points
Assistant Domestic Manager	10-20 points
Senior housekeepers	03-10 points

Domestic supervisors are responsible for the direct supervision of the domestic work in the specific area allotted to them. Generally they would supervise 10-20 domestic staff.

Keeping in view the importance of the department, it is essential that the personnel at different levels arc given adequate responsibility and authority. Moreover housekeeping services should not be clubbed with the nursing services. However coordination between those two services is essential for achieving the objectives.

A suggested structure of housekeeping department is shown in Fig. 5.2.



Pig. 5.2: Suggested Organisational Structure

Housekeeping Staff

In this section you will learn the factors determining housekeeping staff; planning modalities and training schedules.

Principal Factors in Determinutionof Housekeeping Staff

- Architectural design and planning
- Areas to be serviced
- Type of service rendered
- Amount of traffic
- Accessibility of work areas
- Type and amount of equipment provided
- Policies of the rnanagement
- Housekeeping staff's knowledge and skill

Manpower Planning

Tlie methods used fox manpower planning generally select one or two (for example from three areas of service like time, activity and patient progress) which influence the staffing and study them in detail. The proposed methods are:

a) Time study

b) Activity study

c) Patient progress sludy

Each of these approaches relies on annual estimates of staff, time available and care provided in all major areas of the services. The annual count of service are also used to supplement the result of these studies to develop a staffingpattern.

Selection of a method will be based on judgement and the selected method in turn depends on feasibility and appropriateness to the actual planning situation.

Different approaches may be grouped under two broad categories:

1) Top down approach

2) Bottom up approach

Top Down Approach

This is a method of strategic planning that relates manpower number to measures of output of activity, often through statistical methods. However, it also extends relation of these to cost and strategic priorities and constraints.

Under these category various methods are studied, which can he grouped as:

1) Simple norms/ratios

2) Statistical formula

3) Point in time establishment approach

Bottom Up Approach

This is a scientific or measurement approach and is usually based on measures of activity analysis, time study, patient dependency and professional judgement. This highlights the professional judgement at the clinical and local management level. Most of these are found suitable for hospital set up.

Work Load

You will appreciate that the allotment of work area to a sanitary, attendant depends upon the degree of cleanliness required, type of hospital, whether it is a closed or an open area, the size of the robin, kinds of drain (open/close). It also depends upon whether the housekeeping attendant is assigned to the intensive care unit, emergency, or a general wards. A sanitary attendant should generally be employed one for 10 hospital beds or for a work area of 1,200 to 1,500 square feet.

For nursing unit one sanitary attendant over 10 beds is recommended on the basis of round the clock services. More sanitary attendants may be required for intensive care units/emergency wards.

Very few hospitals have an adequate number of supervisors. The currently accepted basis for establishing the number of supervisors is one supervisor to a floor or lo a division. It is an inequitable and inconsistent pattern. It is advisable to keep a leave reserve of thirty per cent. Ideally one supervisor for 10 sweepers is recommended.

A great part of the criticism that is directed at the housekeeping department can be traced to the supervisory staff. A closer supervision will also relieve the nursing staff of supervision of all the sanitation duties being done in the ward. The supervisors will be responsible for their area of responsibility on tenns of manpower and materials. They should also be made responsible for carrying on-the-job training for the personnel working under them.

Simply assigning sanitary attendants to a division/ward which is the hospital's per unit of measurement is not a sound or accurate basis for estimating the number of personnel.

As a general rule a maid can clean anywhere from 3000 to 6500 sq ft per day. Experience and research have shown that a minimum and maximum amount of floor area which a mopper can be expecled to cover ranges from 1800 ta 4000 sq ft per man hour.

EL. Gillbert, manager of the London-Liberty in Philadelphia devised a formula which employs "work units" instead of square feet as the basis for assigning cleaning quotas. Through close observation and time studies Mr. Gilbert estimated the time required to perform each task and the amount of coverage in terms of square feet that could be

expected of the worker in daily operations. A point value was assigned to each item e.g. cleaning a chair was assigned a value of one unit, 10 sq. ft. of floor to be cleaned was also allotted one unit.

Some organisations operate cleaning schedules as per the time required to perform each cleaning operation. The most equitable method is a coinbination of work unit and timing plus the wisdom and experience of the housekeeper.

Time Needed for Tasks

The effort should always be made to make a work schedule flexible and adaptable to the hospital. A schedule should not be so rigid that an emergency situation cannot be handled.

As per Silman and Mannhalter following may be taken as standards:

	Time required per 1000 sq. ft.
Dust mopping	6 minutes
Wet mopping	12 minutes
Machine scrubbing	2 hours

It has been found that in general hospitals that when using efficient equipment, methods and management techniques the hours required for normal basic cleaning in ward areas are:

a) 52 hours per week in 30 bedded ward averaging 9.29 M (100 sq. ft.) per bed plus 12 hours per week for heavy cleaning.

b) 100 hours per week in a 30 bedded ward averaging 27.87 m (300 sq. ft.) per bed plus 25 hours per week for heavy cleaning.

Training for Supervisors

Supervisors are the representatives of management who are closest to the workers and they must be fully indoctrined in management principles and policies. The supervisors must possess a working knowledge of human relations in management.

Personnel management is perhaps the most important aspect of the executive housekeeper. No amount of technical knowledge of equipments, cleaning supplies and procedures possessed by the housekeeper will make the hospital more pleasing to look at or more sanitary unless the executive housekeeper is able to transmit this knowledge to the employees who actually do the cleaning jobs. Since the cost of personnel constitutes the main share of housekeeping expenses, the ability to schedule tasks and assess staffing needs determines to a great extent whether the housekeeping expenses are wisely spent.

Training Programme

The training programme should include on the job and class room training. The contents of the class room training should include:

1) Need for training

2) Benefits of training

3) Organisation of housekeeping departincnt

4) Personnel and housekeeping policies

5) Use/care and cost of housekeepiiig equipments

6) Use of housekeeping supplies

7) Correct method of using mops

8) Safety in housekeeping

Training is essential to develop skills and habits necessary to do a good job in the minimum time, with minimum cost and maximum effect. Uniformity of methods in carrying out housekeeping procedures saves time, effort and materials . A higher level of cleanliness in maintained when standards are met. Surface and equipments are preserved when the right kind of cleaner is used on the right item. Accidents are prevented through teaching of safety measures. Better human relations are developed when the workers is encouraged to feel the importance of his job and take pride in his work. Continuous training is needed to repeat and emphasise previous learning.

A well planned training programme in the housekeeping department is beneficial both to the hospital and the personnel of the department. The head of the housekeeping department is generally titled an executive housekeeper. He/She must be a person with intelligence, tact and poise and who has a clear concept of duties.

Most workers in 'the housekeeping department are unskilled at the time of their employment, they have varying educational and social background. It is very important that care and deligence be taken in their selection, orientation, training and supervision. Many of the jobs in the housekeeping department are monoronous and offer little change for substantial promotion yet for these employees job interest must be maintained. Furthermore, recognition and appreciation of accomplishments must be made and employees must be given an opportunity for personal growth and development within the limitations of their job.

A successful housekeeping requires considerably more knowledge than a mere understanding of effective cleaning agents and efficient cleaning procedures. The role and functions of the housekeeping have increased with the overall technological development. The management of housekeeping department in hospitals has advanced rapidly in recent years and requires not only a knowledge of technical skill but also an understanding of tlie tools of management.

The details of the job description and job analysis for housekeeping as recommended by National Council for Education Research and Training (NCERT) are enumerated below:

Job Analysis		
Task	**Knowledge**	**Skill**
A) Sanitation		
1) Supervises sanitation of the hospital environment a) Basic Cleaning — Dusting — Sweeping — Moping — Polishing — Washing	1) Basic principle of sanitation peculiarity to hospital environment 2) Basic principles of personal hygiene 3) Basic knowledge about different detergents and disinfectants 4) Different cleaning procedures applicable to different hospital area	I) Supervise the cleaning operation of cleaners 2) Check the preparation of different detergents *3)* Prepare disinfectant used by cleaners. 4) Check the function order of the equipment and the cleaning operations
2) Basic Cleaning of — different types of floors — walls and ceilings — doors and windows — furnitures and fixtures — venetian blinds	5) Basic knowledge about cleaning equipments — their operation techniques — their maintenance	5) Ensure standards and uniform cleaning operations *6)* Help the workers in learning special cleaning operations

Task	Knowledge	Skill
B. Odour Control		
1) Identity and determine the type and sources of unwanted odours in hospital premises	1) Basic principal of ventilation composition of air, air flow, humidity and temperature	1) Identification of odours in hospital premises
2) Ensure control and removal of bud odour	2) Common types of odour and their source of origin	2) Supervise the preparation of different chemicals and solutions used for removal of odour
	3) Removal and control techniques of different types of odours	3) Supervise and guide the work of cleaners and other staff engaged in odour removal and control nctivities.
		4) Check the equipments and appliances used for odour control/removal operations.
C) Waste Disposal		
1) Supervise hospital waste disposal: — collection — transportation — disposal	1) Hospital Waste — source and generation hazards of hospital waste — to hospital population and community	1) Identify the source of different waste
	2) Principal of collection of different type of hospital wastes and special precautions	2) Ensure correct method of collection, transportation and disposal
	3) Transportation methods of different types of hospital waste from the sources to the place of final disposal	3) Instruct the cleaners to use safety measures against hazards
	4) Basic principles and methods of holding and disposal of solid, liquid, pathological waters	4) Check the working conditions of the waste disposal equipments like incinerators
	5) Final disposal of waste: — sewer disposal — incineration — land filling — other methods of disposal	5) Make arrangement for labelling and segregation of pathological wastes
D) Pest, Rodent and Animal Control		
1) Identify pest and rodent nuisance in hospital	1) Basics of life cycle of pests and rodents	1) Identify pest and rodent nuisance in hospital
2) Organise and supervise the precaution, control and eradication of the pests and rodents	2) Vulnerable areas of pest and rodent nuisance	2) Select methods of control
	3) Diseases transmission by pests and rodents	3) Supervise preparation and use of different pesticides and chemicals for destruction of different types of pests and rodents
	4) Prevention, control and eradication of pests and rodents	4) Organise and supervise control eradication of pests. and rodent?

Task	Knowledge	Skill
E) Hospital Linen Services 1) Procure linen from store 2) Ensure proper storage of linen 3) Maintain linen properly 4) Issue linen in wards/ deptt. 5) Proper accounting 6) Ensure proper sorting of linen	1) Acquire basic knowledge in: — linen and their importance in hospiral — classification of linen — characteristics of linen of different types — sources of fabrics and uses 2) Linen selection, procurement, storage, physical facilities required for linen room: — preparation — mending — security, safety and control — collection of dirty and clean linen — condemnation — replenishment 3) Role of good material management in effective linen services	1) Store linen as per required storage conditions 2) Supervise sluicing and on the spot stain removal 3) Ensure collection, distribution of linen 4) Do correct accounting 5) Send linen for condemnation at right time 6) Ask for replenishment 7) Supervise packing of linen for laundry, autoclaving 8) Apprice hospital authority in case of discrepancies in demand and supply affecting patient care
F) Housekeeping Equipment Management 1) Ensure proper custody operations and maintenance of all hospital housekeeping equipment. a) Basic cleaning — Dusting — Sweeping — Mopping — Polishing — Washing	1) Acquire basic knowledge of the different types of equipment in use — Operational procedures of equipment — Safety measures in operations 2) To have working knowledge in preventive maintenance of the housekeeping equipment which includes: — maintenance scheduling — maintenance processes — fault detection — minor repairs	1) Demonstrate operations of housekeeping equipment to the staff who use them 2) Check safety arrangements during operation of equipment 3) Carry out daily and periodical check-ups 4) Take the equipment in inventory and keep in custodv. 5) Report breakdown to engineering authority.
G) Managerial Task 1) Plan, organise, co-ordinate, control and monitor all housekeeping activities for effective utilisation of resources	1) Principles of management and their application in housekeeping 2) Supervise effective use	I) Estimate and project the requirement of housekeeping 2) Maintain housekeeping record 3) Periodically assess and suggest improvement for better resource utilisation to hospital authority 4) Train and educate the cleaners and other workers under command

Training programme should incorporate the essentials of proper hospital waste handling and disposal. Personnel must be educated on the hazards of improper hospital waste handling. Provisions as enunciated by the Extra Ordinary Gazettee No. 406 dated 27 July 1998 of the Union Ministry of Environment and Forests on Hospital Waste Management should be included in the curriculum.

Check Your Progress 4

1) In general, a sanitary attendant is employed for:

   a) 10 beds

   b) 100 beds

   c) 200 beds

   d) 1250 beds

2) For housekeeping services on supervisor is advocated for:

   a) 10 sanitary attendants

   b) 50 sanitary attendants

   c) 100 sanitary attendants

   d) 200 sanitary attendants

3) A manual mopper is expected to mop:

   a) 1800 to 4000 sq.ft. per hour

   b) 4000 to 5000 sq.ft. per hour

   c) 5000 to 7000 sq.ft. per hour

   d) 7000 to 10000 sq.ft. per hour

5.7 CLEANING AGENTS

Cleaning agents are perhaps the most critical aids to housekeeping staff. The essentials of cleaning process is to remove dust and grit. While normal dusting with a cloth or vacuum cleaner removes dusts in its loose particle state, cleaning agents would be required when dust becomes grit and is stubborn to remove.

Some of the common agents used these days are:

Water is probably the most common and widely used agent as it is freely available. Warm water dissolves soap more readily than cold water, hence it must be used to remove dirty soap lather. Caution musl be taken that the water is 'soft' as no detergent is effective in hard water. Moreover, hard water does not wet the surface well which is a precondition for good cleaning action, While in modem days we have one or two multi-purpose cleaning agents it is useful to know some traditional liquid cleaning agents. Liquid cleaning agents can be either agents diluted in a little water or used directly with a dry cloth.

- Ammonia is an alkali which softens water and emulsifies grease.
- Methylated spirits are effective against grease stains.
- Paraffin is also a grease solvent.
- Turpentine is a grease and pain1 solvent.
- Vinegar is a mild acid unaffected by hard water and useful in removing light bath stains,
- Hydrochloric acid is useful in removing stubborn stains in bathrooms but care must be taken in its use as it is damaging to the skin and destroys fabrics and light bathroom fittings

- Carbon tetrachloride is also an excellent grease solvent. Care must be exercised there, too as its fumes are harmful.

Washing Soda: This agent is vastly outdated due to the advent of modern domestic detergents. However, it is particularly useful for emulsifying grease on drain pipes, gutters or stone surfaces. In a strong concentration it could be injurious to skin, fabrics, brushes, wood and paint. Washing soda is useful as a water softener.

Soda-bars: Soaps have now been replaced by excellent synthetic soapless detergents which are unaffected by hard water, In these cases rinsing is not important as these product suspend dirt and grit most effectively without leaving a smear. However, some housekeepers may not have access to these detergents and may have to rely on soaps.

Powders **and Flakes:** Powders and flakes are useful in getting instant lather but are expensive. When used, care should be taken that they are thoroughly dissolved. Being expensive, one shoyld know exactly how much powder or flake is dissolved to get an optimum benefit as also how long the resultant solution is effective. Good bar soaps are still most economical but much more strenuous than modern methodologies. They should be stored on open shelves in a dry store.

Abrasives: As they could themselves leave scratches on surfaces, their use is limited to removal of very stubborn stains on various surfaces.

- Silver sand, steel wool, glass paper may be used for removing stains on plain wood, stone or cement floors.
- Emery paper is suitable fur removing rust from steel,
- Pumice powder is used for removing stains from skins and bath tubs.
- Whitening scourers are mild abrasive for cleaning white paint.
- Nylon scourers are made today lo have an abrasive effect and yet prove less damaging to surfaces.

Polishes: Polishes fall into three types—liquid polishes, pastes, and creams. These are either spirit, oil or water based.

Spirit based: Used for metal mirrors, window panes aud bakelitc.

Oil based: Used for stained, wax polished or painted wood, linoleum and synthetic floorings with an oil or resinous base, cork or wood waste, leather and leather substitutes enamelled and lacquered metals.

Water based: Used on sealed floors, thermoplastic floors and rubber flooring. There are some basic principles applied in using polishes. They are as follows:

1) Polishes should be used only after dirt and dust on surfaces are thoroughly removed,

2) Polish must be used in small quantities as excessive polish could smear surfaces.

3) Polish should be rubbed off thoroughly as surfaces could then become sticky or greasy and thus show finger marks when touched.

4) Surfaces provided with permanent or semi-permanent polish sheens must he polished very carefully as the original sheen could be destroyed. Examples are:

   a) Wax polish must not be applied to French polished surfaces.

   b) Wax polish must not be applied to a floor treated with a shellac dressing (which is a semi-permanent polish).

   c) Metal polish must not be applied to chromium-plated or lacquered metals,

5) Polishes are expensive, therefore lhey must be stored correctly and controlled in use,

6) Palishing of floors is more economically done by polishing machines.

Selection of Cleaning Agents: General Principles

- Use mild rather than strong agents as they are less injurious to surfaces.
- Quality of products is also important. There are cheap substitutes that might show immediate results but on the long run may damage surfaces as they are likely to contain strong chemicals and abrasives.
- Buy polishes in manageable containers which are utilised within one or two sittings. The container must have reliable lids, corks, etc. as defective ones could result in wastage due to evaporation and drying.
- Multi-purpose polishes could save managing many types of polishes which requires more supervision.
- Strong smelling agents (e.g. paraffin) must be avoided due to the offensive smells they lend to the environment.
- Dust being composed of loose particles is comparatively easily removed dirt, however, owing to its adhering to surfaces by means of grease or moisture requires the use of cleaning agents as well as equipment.

Detergents are cleaning agents which when used in conjunction with water can loosen and remove dirt and then hold it in suspension so that the dirt is not re-deposited on the clean surface. There are three basic properties which the detergents have:

a) Wetting power to lower the surface tension of water and enable the surface of the article to be thoroughly wetted.

b) Emulsifying power to break up the grease and enable the soiling to be loosened.

c) Suspending power to prevent re-deposition of the soiling.

Disinfectants are often misused and rationalization of their use in hospitals is desirable for control both of infection and costs. Infections may be caused by micro-organisms which contaminate disinfectants during use especially when objects such as mops are stored in disinfectants. Unnecessary use of disinfectants is not only wasteful but may increase the microbiological hazard of the hospital environment.

Soap is cheap and effective but in hard water it does not lather readily. Soap is not effective in acid solution. At present synthetic (soap less) detergents are also in use. Toilet cleansers are crystalline powdered or liquid and they rely on their acid content. Powdered toilet cleansers consist of a soluble acidic power, bleach, finely ground abrasive to help when a brush is used and an effervescing substance which helps to spread the active ingredient throughout the water.

Window cleansers in use are a mixure of isopropyl alcohol detergent and alkali. A mixture of water and methylated spirit may also be used.

Criteria for a Good Disinfectant Cleaner

- Has good bacteriocidal properties and a wide micro-biological spectrum
- Has good cleaning properties
- Must not be highly toxic or irritating to the users
- Has some degree of odour control (not simply mask control)
- Must not be corrosive to floor.

Check Your Progress 5

Enumerate the criteria for selecting an effectivedisinfectant cleaning agent for housekeeping activities in a health care institution.

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5.8 BASIC CLEANING OPERATIONS

Dusting

Dusting is a cleaning operation to remove dirt. More specifically, it entails removing dust. The stress is on removing dust, not moving it to another place or stirring it up. The dusting technique is customarily used on furniture, equipment, ledges, window sills, woodwork and panels. Low dusting is dusting of all places easily reached by standing on the floor; it should be done at least daily to maintain a thorough and complete standard of cleanliness. High dusting refers to those areas over windows, doors, overhead pipes, walls and ceilings, and is done periodically as needed.

Two types of dusters are utilised:

1) **Treated clusters: A** treated duster is soft lint-free cloth (usually sugar—liner or flannel) treated with a small amount of oil. Treated duster are used for most dusting operations because they hold more dust and do not permit it to be scattered about the room.

   Damp duster: A damp duster is a clean piece of cloth moistened with water and wrung out dry. Damp dusters are used to dust mirrors, window shields, door glass and most other glass surfaces with the exception of windows.

Procedure

Let us examine the scientific procedure of dusting:

1) Fold cloth in series of squares. (This permits many clean surfaces.) A surface cannot be cleaned with a soiled cloth, and a cloth carelessly wadded provides insufficient clean areas.

2) To dust rootn, commence at entrance and proceed around room.

3) To prevent overlapping of strokes and skipping corners and edges, use long straight strokes. Hold cloth loosely so that it will absorb dust easily. Avoid flicking dust cloth since this action raises dust.

4) Start with highest point to be dusted and work down towards the floor.

5) Two cloths—one in each hand—may be used to save lime.

6) Inspect work. A properly dusted area will be bright and will appear clean. It will bc free of dust streaks, oily spots and smudges.

Sweeping

Sweeping is a cleansing operation to remove dirt from a floor area. It normally entails the use of a brush or a broom. This process is used on rough surfaces; a sweeping mop is employed on smooth surfaces. Sweeping should precede other cleaning operations, such as mopping or waxing. The frequency or sweeping depends upon the amount of traffic and type of surface of the area, The size of the brush and the type of sweeping stroke to be used will be determined by the size of the area and the amount of furniture or equipment in il.

Equipment

1) **Floor brush: A** wide one to sweep unobstructed areas or a narrow one to sweep obstructed areas.

2) **Sweeping mop:** To determine the most efficient size, the handle should reach the eyebrow of worker when the block is resting on floor.

In areas where there is lighl dust on a smooth surface, dusl mopping may be substituted of sweeping with a broom. Where there is a heavy amount of surface dirt, dust mopping may supplement sweeping.

Special Considerations in Sweeping Process

1) In unobstructed floor area where relatively large amount of small dirt particles accumulate, the 60-inch stroke is most efficient.

2) If dirt consists of small particles, the 3-foot push stroke is recommended. The brush may be tapped on the floor to clear it of dirt at the end of each stroke.

3) .If the outer edges of an area are particularly dirty, sweep dirt away from wall to about a foot before continuing general sweeping. Use counter brush in corners.

4) If dirt consists mainly of large particles and fine soil and if area is unobstructed, the continuous stroke may be used.

5) If area is busy thoroughfare, one side should be swept while traffic is directed to the other.

Mopping

Mopping is a cleaning operation lo rub or wipe a floor area. It entails the use of a special cleaning tool known as a mop. While mopping can be done with a dry mop, as suggested under sweeping the process usually is done with a solution. For mopping an area which is not too soiled, clear water may hc used with success. However, where there is much dirt, a cleaning solution is often necessary. It is important to know the type of surface to be cleaned since too much water may harm wood floor coverings. In order to ensure a good mopping job, mops and solutions must he clean.

Procedure

1) Fill one container two-third lull with cleaning solution. If bucket is not on cart, place on mat, tic cloth around bucket, or place on a little spilled water to avoid staining lloor.

2) .Fill second container two-third with clear warm water.

3) Sweep floor first if necessary, moving furniture to simplify operation.

4) Dip one mop into cleaning solution and wring slightly to prevent dripping.

53 At beginning of stroke, stand with feet well apart. Place mop flat on floor about 4 feet to left side. Handle at 40 degree angle. Pull mop along edge of floor next to basehoard to depth of 6 to 8 inches. This prevents splashing baseboard.

6) Take position. Move mop to right in arc-like stroke, in front of body, parallel to baseboard to avoid splashing wall. Mop stroke should he spread out for maximum coverage.

7) At end of 6 to 9 foot stroke, renew direction by lapping mop and swinging it from right to left. By developing rhythm, no time is lost in change of direction. (Ry push-pull method one-third more time is consumed. Worker is in awkward position, causing him to become tired and limiting him to lour-foot stroke.) Width of stroke depends on height and weight of worker.. Mopper works backward, continues figure "8" in front of him until mop is ready lor second dipping (after ahou t 120 square feet)

8) Dip second mop in container of clean water, wring out and rinse floor.

9) Dip the second mop again into water rinse, wring it thoroughly and dry floor using side to side stroke.

10) Continue the three steps of mopping, rinsing and drying until the area has been covered. To avoid streaks, overlap strokes.

11) Wipe off baseboards immediately with a damp cloth if any water has been splashed.

12) Change solution and water frequently.

13) Inspect work. A properly mopped floor should have a clean surface. There should be no water spots. The corners should bc clean.

14) After mopping is completed, clean mops and buckets.

Scrubbing

Scrubbing is an operation to remove dirt by rubbing and scouring while it is similar to mopping, more water is used and a brush, hand or electric, is employed to scour the surface. Electric floor machine have a disc brush attachment for scrubbing. Some also have special containers which automatically discharge the solution to the floor during the cleaning operation. Suction equipment is also available for removal of solution from the floor.

Procedure

1) Sweep floor if necessary.

2) Dampen area to be scrubbed (as described under mopping)

3) Sprinkle cleanser lightly over area which has been dampened, if necessary.

4) With scrub brush or scrubbing machine, scrub area with back and forth motion. Machine scrubs in circular movements. Start in corner of room and work towards door.

5) For particularly soiled area, use steel wool by hand or under brush.

6) Remove dirty solution with squeegees mop or vacuum. Never put soiled solution in clean container.

7) Dip second mop into container of clear water, wring out, and rinse floor with' side to side motion to avoid streaks, overlap strokes.

8) Continue wetting, scrubbing, picking up soiled solution and rinsing until area has been covered.

9) Change solution and water frequently.

10) Inspect your work a properly scrubbed floor has no soiled spots, is not streaked, and has no water spots remaining on it.

11) After scrubbing is completed, clean equipment as directed and return them to proper place.

Washing

Washing is an operation to remove soil by use of water; a cleaning agent is usually employed in this process. The technique includes removing loose dirt, washing, rinsing, and drying. The operation is used to clean furniture, fixtures, woodwork, equipment, and walls. It should be done at least once a week and more frequently if the state of cleanliness desires.

Equipment

1) Three cleaning cloths or sponges

2) Two containers

3) Cleanser

4) Ladder and scaffolding for high places

Procedure

1) Fill one container two-third full with cleaning solution.

2) Fill second container two-third full with warm water.

3) Wipe away loose dirt in area with dry, clean cloth.

4) Dip cloth or sponge into cleaning solution. Wring cloth or squeeze sponge to prevent dripping.

5) Wash small area with circular motion.

6) Dip second cloth or sponge into clear water, remove excess water, rinse-wash area with up-and-down motion.

7) Dip cloth or sponge, rinse same area with side-to-side motion.

8) Dry with third dry cloth.

9) Continue washing, rinsing and drying over entire area; overlap strokes to prevent streaking.

10) Use ladder or scaffold to wash high places or fixtures.

11) Change water frequently.

12) Inspect work. A properly washed area should be uniformly clean with no streaks; no water spilled on the floor or other furnishings.

13) Clean equipment as directed and return to proper place.

Automated Equipment: With automation being introduced in almost all areas of health care institutions, the housekeeping services arc no exception. The equipment includes vacuum cleaners, wall washing machines, floor washing and polishing machines. It is essential that the personnel utilizing these machines should he well versed with the operational methodology and maintenance. Steps should also be taken to carry out preventive and breakdown maintenance as and when required . The equipment should be brought from reliable manufacturers/suppliers and an Annual Maintenance Contract (AMC) be done for maintaining functionality of the equipment.

5.9 COSTING OF HOUSEKEEPING SERVICES

In costing in hospitals the housekeeping services are often clubbed either with the administrative cost head of the general store or the utility head. It is essential that unit costing should consider housekeeping as a separate head so that planning, budgeting and control of housekeeping activities is scientifically done.

As per McGibony the cost on housekeeping services in hospitals amounts to 3% of the total cost.

The main cost incurred in housekeeping centre is the salaries of the staff employed. The other being cost of the materials like soap, detergents etc. used for cleaning and the depreciation of the equipment used/utilised. Labour costs constitute 90-95 % of the total housekeeping services costs,

There are two alternatives for apportioning the costs of this centre among the various centres in the hospital. Such costs can be apportioned on the basis of the square foot area of each cost centre since greater the floor area greater is the time required and more are the resources consumed in cleaning. Alternatively, the costs could he apportioned in the ratio of the number of staff of the housekeeping department deputed lo work in each cost centre.

When the apportionment is done on the basis of floor area covered, it has Lo be borne in mind that the costs incurred will depend not only on the area covered by the centre but also on the importance attached Lo it e.g. the private wards catering to the VIPs might have a disproportionately higher number of sanitation staff deputed to it.

The main potential cost savings in the housekeeping department are:

a) Scheduling work

b) Avoiding pil erage and wastage in cleaning materials

c) Mechanised cleaning

Cleaning and Portering

There is evidence through work study and costing investigations carried out in a number of hospitals that there is scope for considerable improvement in minimising the cost of the cleaning and housekeeping service in some hospitals and a unit cost should help towards obtaining it. Costing should normally be done as follows:

For wards — per bed

Other parts of the hospital — per 10 square metres.

In a study at AIIMS, a 1560 bedded hospital costing of housekeeping services assessed was as follows:

a)	General store items related to housekeeping	Rs. 1.22 (per bed/day)
b)	Disinfectants	Rs. 1.29 -do-
c)	Cleaning materials	Rs. 2.24 -do-
d)	Insecticides	Rs. 2.37 -do-
	Total =	Rs. 7.12 (per bed/day)

The proportion of the cost of sanitation services per bed per day was a follows:

Manpower	86.01%
Equipment	0.16%
Materials	13.83%

It was observed that the cost of manpower and materials accounted for 86.01% and 13.83% respectively of the sanitation services. These figures were at variance with the figures which arc quoted for developed countries i.e. 95% and 5% for manpower and materials respectively.

The above variation are expected since the methods employed, cost of manpower, level, type and quantum of cleanliness and its related procedures differ in the different institutions in the various parts/countries in the world.

Check Your Progress 6

The highest cost in housekeeping services is incurred on

a) Labour

b) Cleaning Materials

c) Germicidals

d) Equipments

5.10 CONTROL, EVALUATION AND QUALITY ASSURANCE

The housekeeping department probably is the most under rated of all the hospital service departments. Many hospitals now realise that in addition to quality of care, the factors that consumers consider in choosing a hospital are location and appenranccs. It is essential that quality house keeping services are ensured.

As you are well aware that different people view quality differently. In the hospital setting the patients are the customers. Quality is based not only on patients perception (a function of their attitudes based on culture and experience) but also on the accurate synthesis of medical observations.

The relation between quality and cost though capable of breeding endless complexity is also simple in its fundamentals:

1) Quality costs money

2) Money does not necessarily buy quality

3) Some improvements in quality are not worth the added cost.

Indicators for Quality Assurance *in* Housekeeping Services

- Time taken to clean patient room

- Inspection
- Compliance with infection control and safety procedures
- No. of times repeat cleaning is required
- Time elapsed between request and performance of service
- Patient satisfaction
- Compliance with health standards.

The Indian I-Iospital Association in their Quality Assurance Programme (QAP) have listed the following as indicators of quality in housekeeping services.

1) Degree of automation
2) Number of staff
3) Training programme for housekeeping staff
4) Team spirit amongst staff
5) Are checks on effectiveness of disinfectants carried out?
6) Availability of incinerator

However, the most comprehensive quality indicators in housekeeping services have been given by Brown and Johnson in the American College of Hospital Administration Text-Colleges Visualised. The salient features of these are enumerated below:

Organisation

What is tlie organisational structure and the line of authority of the housekeeping department?

Functions

1) Does the hospital use strong deoderisers to cover up odours? What is the remedy for the hospital smell?
2) How dose the housekeeper ensure the right kind of cleaner on various floors?
3) What specific measures are taken for pest control ?

Personnel

1) What personnel policies are written for workers within the nousekeeping department?
2) Are manual dexterity and adaptibility tests utilised in the recruitment of new personnel?
3) Have job standards been established for the housekeeping staff?

Equipment and Methods

1) What type of soap or detergents are used on various surfaces?
2) What equipments are in use in the housekeeping department?

Interior Decoration

How does the housekeeper attempt to make the liospital appear friendly, warm and cheerful?

Planning

1) When tlie hospital was built was it planned with regard to the problems of cleaning and maintenance?
2) Is the hospital planned so that the housekeeping department could have adequate storage and work space if tlie hospital is enlarged?

Interdepartmental **Relationships**

1) What is the functional division of labour between the nursing service and housekeeping department?

2) How and to whom is the communication done to clean the room when vacancy occurs?

Administrative Control

1) What are the reports sent to the administration by the housekeeper incharge?

2) Is an inventory of furniture and equipment maintained?

Level of Cleaning

Roemer and Anguilar have classified the level of cleaning into three categories, namely, Level-I, Level-11 and Level-111. They are:

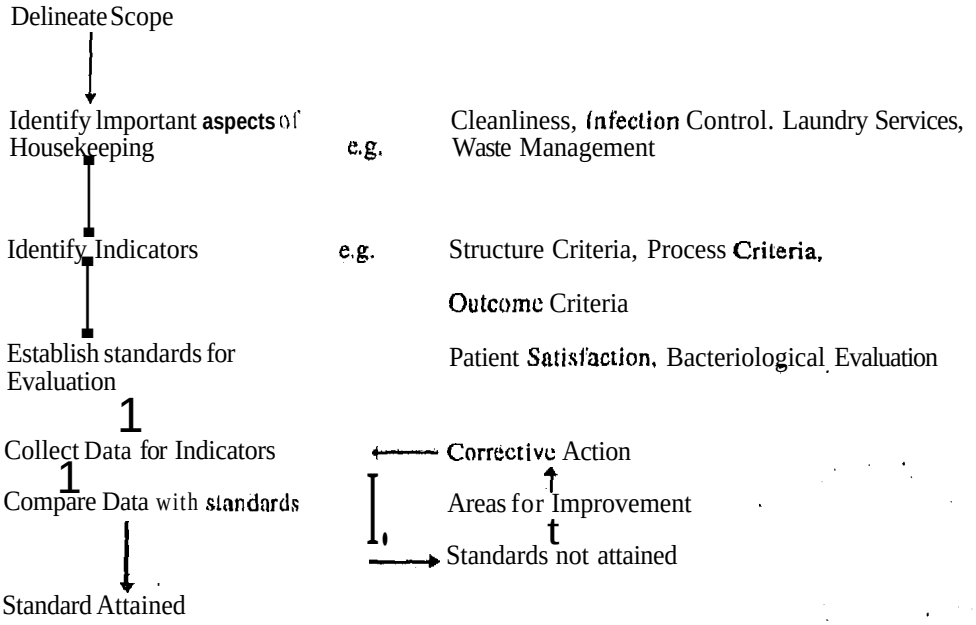
Level-I: All the floors are washed once a day with soap or detergent. Dry sweeping in prohibited except in special cases as outpatient public areas.

A random sample of ten patients should be questioned on the frequency of the floor washing and methods used. The personnel of the service should be asked about the basic instructions that they have received with regard to the cleaning .

Level-11: The institution/hospital has an individual responsible for thu cleaning and the procedures are standardized including instructions for the use of disinfectants. There are standards for the specific treatment of potentially polluting elements or excreta.

Level **III:** The committee on infections and/or a nurse epidemiologist participate actively in the preparation and supervision of the cleaning standards.

Application of the US Joint Commission on Accreditation of Health Care Organisation (JCAHO) ten step quality assurance model to housekeeping services is diagramatically shown below:



Check Your Progress 7

Housekeeping is an important variable in the provision of "Quality Assurance" of hospital care. For effective housekeeping services, all are essential except:

a) Scientific recruitment of staff

b) Training

c) Attitude of staff of all departments

d) Zero based budgeting

5.11 RECENT TRENDS RELATED IN HOUSEKEEPING SERVICES

Housekeeping is a colnplex activity requiring constant attention to many different details. The plan for tlie housekeeping department must provide for the combination of personnel, materials and procedurds in such a way as to accomplish the objective of keeping the hospital constantly clean, healthful and safe.

Some of the recent trends incorporated in tlie liospital housekeeping are as follows:

1) **Mechanised** Cleaning

In recent years there has been a shift from manual cleatiing to mechanised cleaning of wards and corridors in hospitals. Some of the hospitals in the developed countries even have centralised vacuum cleaning system built into an establishment where ducts carry dust direct to a basement dusl room and the spread of dust and micro-organisms is thus avoided.

2) **Choice** of Colours for Wards and Corridors in Hospital

It is now known lhat many colours have a similar effect on different people e.g. red, orange and yellow are found to be warm and stimulating. Green is cool and has a soothing and pleasing effect, dark blue can be depressing, pale blue is fresh and cool, white appears hygienic and cold, peach and pink may therefore be preferable to white. Hospitals are now having a more inviting atmosphere than in the past by the use of warmer colours, textured surfaces and more modern designs particularly in the public areas. Thus close carpeting, comfortable furniture and attractive soft furnishings are to be found in foyers and waiting rooms of the modem hospitals.

3) **Elimination** of Unpleasant Odours

Good ventilation and cleanliness are essential factors in controlling odours. Electrical devices which work on tlie principle of ionisation are also being used in modern hospitals.

4) Noise Control

To control noise from becoming a nuisance to the patients hospital designers are using matted excelsior, shreded asbestos or steel wool to deaden sound.

5) Manpower Planning

Manpower planning for housekeeping services is being done utilising mathematical programming. Rescheduling techniques have also been suggested to save housekeeping manpower.

6) Contract Services

Quite a few hospitals are going in for contract services in hospitals for housekeeping rather than having an inservice.

7) Infection Control

Sound housekeeping practice, has to be based on bacteriological principles. Routine cleaning must not only he effective in removing dirt but also in maintaining low levels of micro-organisms. Bacteriological testing of floors to test the effectiveness of cleaning agents and cleaning practices form the basis of scientific housekeeping in some of the present day health care institutions.

8) Pneumatic Transport System

Some modern liospital have chutes or pneumatic pipeline transport system which are used for intramural movement of waste.

9) Evaluating Detergents — Germicides for Hospital Use

Presently in the Indian market there are numerours cleaning agents and germicidal detergents available. To name a few TEEPOL-300, SPIRAL, AZAX, **BRISK: SPIC** and SPAN, SAPONA, **WIZARD,** FRESCA, POLYSAN, GERMINOL, PHOENIX and **DIAMOND.** Scientific evaluation of these must be done to assess their suitability for health care institutions.

Detergents germicides are evaluated for hospital use by scientific testing like the phenol coefficient test, use dilution confirmation test. Many corporate and other health care institutions are utilising the more effective Iodophor and Quatenary detergent germicide rater than phenolic ones. The cleaning properties of a disinfectant cleaner are evaluated by tests such as the Gardner straight time washability tests. Details of these tests have not been included in the present text.

5.12 LET US SUM UP

Housekeeping services in a hospital is entrusted with maintaining a hygienic and clean hospital environment conducive to patient care. The housekeeping related activities have a direct effect on the health, comfort and morale of the patient, staff and visitors and is an important public relations variable. It is an essential ingredient in the provision of Quality Assurance of hospital care.

Housekeeping is a vital facet of the 'image'that the hospital presents to the public. Studies conducted on patient satisfaction by various authorities have clearly established the lack of sanitation and cleanliness as important dissatisfaction attributes for patients. As Eugene aptly points out 'Housekeeping — or rather the lack of it— strikes the first lasting blow to the concerned'.

Your have also been apprised of the fact that with the advent of privatisation of medical care and applicability of Consumer Protection Act of 1986 to hospitals, and the recent Bio-medical Waste Management and Handling Rules enunciated by the Ministry of Environment and Forests it has become our legal, economic and moral obligation to react positively to the demands of the consumers. The endeavor should be to achieve optimal quality in health care in terms of professional quality and also medical quality as perceived by consumers. Failure to accomplish this may affect the image and viability of the hospital. A good housekeeping service is an asset which no hospital can afford to negtect.

Scientific hospital housekeeping is still in its infancy but its identity and importance has begun to be recognised. Tradition should not be the only criteria on which to base current procedures. Housekeeping routines should be constantly reviewed in light of new scientific findings. The unit also elaborated on the functions, components, essentials of cleaning agents, organisation structure, staffing, training, control, evaluation , quality assurance, costing and recent trends in housekeeping. The contents will enable you to plan, monitor, control, evaluate and achieve TQM in the various facets of housekeeping services in health care institutions.

5.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) a)

2) a)

Check **Your** Progress 2

1) a)

2) a)

Check Your Progress 3

1) d)

2) d)

Check Your Progress 4

1) a)

2) a)

3) a)

Check Your Progress 5

— Has good bacteriocidal properties and a wide micro-biological specturm

– Has good cleaning properties

— Must not be highly toxic or irritating to the users

— Has some degree of odour control (not simply mask control)

— Must not be corrosive to floor

Check Your Progress 6

a)

5.14 FURTHER READINGS

Brown Re, Johnson Rl., *Hospitals Visualized—A Test for Use in Teaching Hospital Administration*, Chicago: American College of Hospital Administration, 1957.

Brason Jc, Lennox M., *Hotel, Hostel and Hospital Housekeeping*, London: Edward Arnold Publishers Ltd., 1982.

Bella Aml, Barton J., *Administrative Housekeeping*, New York: G.P. Putnam's Sons, 1968.

Connslly Vm.. "Potential Cost Savings in the Housekeeping Department", *Hospital Progress*, March 1971, 46-49.

Eugene J., "Good Housekeeping", *Hospitals*, 1983, 70-72.

Franchettd Tm, Juzwish Dw., "Integrating Quality Assurance into Housekeeping Service Operator", *Dimensions—Health Services*, Feb., 1989, 17-19

Hail L.N., "Housekeeping's Pr Potential", *Hospital Progress*, Jan., 1966, 47-49.

Hard R., "Hospital Look to Hospitality Service Firms to Meet Tqm Goals, *Hospital*, May 20,1992, 56-58.

Dr Kant.S, *A Study of Costing of Housekeeping Services at AIIMS*: Unpublished Thesis 1997.

Manual of Hospital Housekeeping, Chicago: American Hospital Association, 1959.

NCERT Department of Vocationalisation of Education: *Minimum Vocation Competencies based Curriculum of Hospital Housekeeping*, Publication No. 15, New Delhi : NCERT, 1988.

Rowland, H.S., Rowland B. L., *Hospital Management—A Guide to Departments, New* York: Aspen Publications, 1984.

Roemer Mi, Anguilar C. M. *Quality Assessment and Assurance in Primary Health* Cure, Geneva: WHO Publication, 1988.

Richard Am. Reader, Glenn, "Rescheduling to Save Housekeeping Man *Hours*", *Hospitals*, Chicago : *American* Hospital Publishing Inc. 1992, 68-71.

Solworth Mh, "Six Factors that can increase Housekeeping Productivity", *Hospital*. Dec. 16, 1966, 82.

UNIT 1 MORTUARY SERVICES

Structure

1 . OBJECTIVES

After studying this unit, you should be able to:

- know the role and significance of mortuary services in a hospital;
- understand the planning considerations of mortuary services;
- learn about physical facilities required for a mortuary;
- plan for the equipment needed in a mortuary;
- describe the staffing pattern and responsibilities of medical staff and technicians etc;
- understand the policies and procedures involved in mortuary; and
- develop a checklist for proper maintenance of a mortuary,

1.2 INTRODUCTION

This unit focuses mainly on mortuary services and facilities in a hospital. While studying the support and utility services of a hospital the role and importance of mortuary services cannot be under emphasised. The subject of disposal off the dead is hedged around by religious, social, and cultural beliefs and practices. Whatever these may be, however, it is necessary to provide within the hospital or its precincts, a place to which a dead body can be moved quietly and discretely, in order that other patients are not upset. It is also necessary to see that the body can later be removed from the hospital, for burial or cremation, by some exit screened from the view of patients and others in the hospital. Therefore, facilities for safe custody of dead bodies before and after postmortem are to be provided accordingly.

1.3 ROLE AND FUNCTIONS

It is the duty of the hospital to provide mortuary facilities for the dead bodies. When death occurs in Wards, the body is immediately shifted to mortuary until other formalities of the hospital are completed.

In a big teaching hospital, mortuary is used for the following purposes:

- To keep the bodies of the patients dying in the hospital, until the relatives claim them and arrange for their disposal.
- To keep the unclaimed dead bodies until their disposal is arranged by the hospital authorities. This is done by arranging either for their burial or cremation;
  i) through hospital funds, or
  ii) through religious and charitable organisations. Sometimes the dead bodies may be handed over to Anatomy Department of Institutions requiring for teaching purposes.

  To receive dead bodies requiring pathological postmortems pending final disposal.
- To receive dead bodies brought to the hospital for medico legal postmortem and store in the mortuary pending further disposal.
- The mortuary wing of a teaching hospital is also utilised for demonstration of autopsies to medical students.

The responsibility cf hospital to preserve the bodies, until handing over to relatives needs to be stressed. Thus, a need for a proper cold storage is important. The added responsibility of hospital authorities is to see that no mix up occurs and the particular body is handed over to its rightful heir/relatives for the last rites. In Govt. hospital, medico legal cases are admitted and in the event of death of such cases, the bodies are handed over to the police personnel for postmortem if required and bodies are never directly handed over to relatives.

1.4 PLANNING CONSIDERATIONS

Let us examine in brief the location, layout and physical facilities of the mortuary services.

1.4.1 Location

The mortuary should be located in a separate building near the pathology laboratoiy on the ground floor, easily accessible from the wards, emergency department and operation theatres. It should be located in one wing of the hospital preferably away from the general traffic routes used by the public. It must have a separate entrance and exit for relatives and for heirs I heiress.

1.4.2 Size

According to John R. McGibony, for a hospital of 50-100 beds, mortuary refrigerator should have a capacity to hold two bodies. For a 200 bedded hospital, at least three body capacity should be provided. Teaching and research hospitals require larger capacity refrigerators according to their need.

1.4.3 Number of Rooms and Layout

Covered access or portico: A covered access or portico for vehicles should be provided at the entrance, which leads to mortuary complex as a protection in wet weather, and as a screen from adjoining areas. The exit to a subsidiary road nearby car parking place is also desirable.

Autopsy room or postmortem room: The autopsy room should be constructed with spacious windows of frosted glass, adequate water supply, fluorescent lighting built in cupboards and fans. Autopsy room should provide accommodation for:

- Autopsy table of stainless steel
- Sink with running water
- Built in cupboards for keeping instruments and equipment
- Room should have a water impervious floors sloping to a drain
- Tiled walls so that whole room can be easily washed down
- Junction between walls and floors should be suitably covered,

Good natural ventilation by windows at high level is essential. Impermeable and easily washable floor and wall surfaces should be provided.

Body store: Room where the bodies can be kept should be close to postmortem room. It can be combined with the autopsy room. If resources permit, refrigerated body storage is essential. In addition, there should be a provision of a deep freezer with capacity of two bodies for decomposed bodies and where tlie body is to be kept for a longer period. The most practical arrangement is to provide chambers averaging about 6 ft.- 8 ft. high in which six bodies may be stored in two sets of three tiers. Cabinet doors should open through 180 degrees to allow the attendant to approach either side of the trolley. Depending upon the layout, a depth of 5.4 m. for the body store is usually satisfactory. A body on a loose tray or stretcher may require the space of about $3m^2$ in the cold chamber.

Trolley bay: A bay is required for two mortuary trolleys.

Office cum pathologists room: Where the doctor and police can sit and fulfil prerequisite formalities and where reports can be written. It may also be used for discussions with members of clinical staff.

Changing room: There should be separate lockers for personal clothes and for postmortem room gowns, aprons and boots.

Lavatory: Two toilets one for the staff and other for the relations of the deceased, wash basin and a shower are needed. Space required is 80 sq. ft.

Stores: Three small stores may be required.

i) **Clean store:** This is for clean gowns, aprons, rubber gloves, gumboots, towels etc. Linen items like shrouds, drapes, towels and other linen items can be stored here. It should be adjacent to the doctor's room and outside postmortem room.

ii) ***Instruments* and equipment store:** This should open directly into the post mortem room. In this area all the instruments, equipment and reserve stock instruments, electric reciprocating saw, portable trolley mounted spot light etc. are kept.

iii) **Chemical store:** Where chemical solutions for preserving tlie viscera and specimen jars and packing material are kept.

Relatives waiting area: It may be in the form of verandahs–should be pleasantly and soberly furnished and decorated so that last impression tlie relatives receive of the deceased is one of quite dignity in death. This area can also be used as a prayer area where relatives and friends of all religious denominations may like to offer prayer. A spacious hall well ventilated to accommodate about 50 persons at times will serve the purpose. Size can be of $20\ m^2$.

Room for mortuary technician and attendant: An area of $10\ m^2$ shall he required for the staff who is on duty, to arrange viewing and to assist in autopsy. Room should be readily accessible from the visitor's waiting room.

1.4.4 Space Required

Space requirement varies from hospital to hospital depending upon the workload, level of care it provides and jurisdiction of medical autopsies. For a district liospital with 200 – 300 beds, it is expected to undertake 300 autopsies per yew. As a general guideline, committee on plan project **(COPP)** has recommended an area of 6-8 sq. It. per bed.

Check Your Progress 1

1) List the purposes of mortuary in a big te aching hospital.

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2) List the three types of stores which are required in a mortuary.

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3) Describe the space requirement for a mortuary.

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1.5 PHYSICAL FACILITIES

Floors: The floors should be hard and durable. It should be of material, which can be easily cleaned and moisture resistant.

Walls: The walls of mortuary should be of permanent, durable construction and there should be scope for future expansion in view of increase in workload. Finish of the walls must be impermeable and washable.

Ceilings: The ceilings should be made of materials that are easily cleaned. The height of ceilings should not be less than 10 feet in principal rooms where height of most ancillary rooms need not exceed 8 ft. The junctions between the walls and floors should be suitably covered.

Doors: Sliding or double doors of adequate width should be provided between the principal rooms to allow easy passage to trolleys, portable X-ray etc. in the postmortem room.

Windows: Natural day lighting by windows should be provided wherever possible and it is preferable for windows of principal rooms to be on the northern side. Windows generally should have opaque glass and opening side should be fitted with external fly proof screens. Windowsills should not be placed below height of 5 ft, from floor.

Corridors: Should be wide enough to allow passage of trolleys. Width should not be less than 8 ft.

Lighting: Either tungsten or fluorescent lighting may be used. In the postmortem room, special lighting should be provided to ensure adequate illumination of postinortern tables and dissecting benches. Fluorescent lighting fittings have an advantage in that they can be arranged centrally above and parallel to the axis of the table but care must be taken to ensure that the lighting is satisfactory for colour identification. Moreover, the light fittings should be so designed to avoid glare, easy to clean and maintain, Switches in wet areas such as postmortem rooms and body store where walls and floors are hosed down should be of the hose proof type. Special consideration should be given to lighting in viewing rooms. Sufficient hose proof 15 amp socket outlets mounted on the walls at a height of 5 ft, are desirable in damp areas such as PM room and body store.

Illumination: Recommended level of illumination for various rooms of mortuary are:

Rooms	Average Lumen/ Sq. Ft.
Postmortem room	25
Postmortem tables and benches	150
Pathologist/Forensic specialist room	15
Body store	10
Staff change room/waiting rooms, trolley bay, stores, corridors etc.	7-10
Value of illumination is taken at **3 ft.** above **floor** level.	

Heating and ventilation: Heating requirements can be met by conventional heat radiators / convectors which can be mounted on walls but special precaution to be taken that pipes carrying wires should be well concealed with easy access for maintenance. The recommended temperature for heating purpose required in various areas of the mortuary is 50 °F - 65 °F. Natural ventilation by fly screened windows and fresh air inlet grills should be adequate except in postmortem rooms where mechanical exhaust system is necessary. The fans should be of the variable speed type designed to produce upto 10 air changes per hour. Care must be taken to ensure that the air discharged from the mortuary does not reach adjacent areas, buildings. As a further safeguard, the rooms in the mortuary should not be in direct communication with a lift shaft or any service ducts, which have openings on other floors. If possible, deodorizing equipment may be provided in the postmortem room.

Hot and cold water supply: Arrangement should be made to provide hot and cold water supply to mortuary. Postmortem tables should be fitted with individual water hoses. All taps in the working area should be elbow-operated type.

Drinking water facility: There should be provision of drinking water in the mortuary complex itself,

Communication: As the mortuary functions under overall co-administrative control of Forensic expert, communication is always required between the department and mortuary, hospital administration and mortuary as well as police and other public agencies. There should be provision of both internal as well as external telephone line.

Air-conditioning: In view of financial constraints, a district hospital may not afford air-conditioning of the mortuary. A system that does not recirculate air is recommended.

Fire alarms and fire fighting equipment: Fire alarm system should be installed. Fire fighting equipment should be provided and fire exit routes to be clearly identified and earmarked with red paint and well illuminated.

Refrigeration: The temperature of cold room is to be maintained between 5.5 °C to 6.5 °C, thermostat control will be required for each cold chamber. Facilities to be provided to enable the chambers not in use to be switched off,

1.6 EQUIPMENT

Cold Chamber (refrigerator) to preserve the dead bodies and the temperature to be maintained between 2°C to 5°C.

Postmortem table (autopsy table): The tables are of porcelain, fire clay or stainless steel. Stainless steel is favoured. Up to 400 beds require two tables, each additional 200 beds another table. A two-tabled room needs about 40 sq, m. About 15 sq.m. of space will be needed for each additional table.

Doctor's room should have a writing table, chair, telephone, file cabinet, workman's lockers for staff working in the mortuary,

Sterilizer: A small sterilizer for instrument sterilization.

Glass cupboard to keep instruments.

X-ray machine: 30 MA portable X-ray machine with dark room.

Thin layer chromatography kit

Gas liquid chromatography

High pressure liquid chromatography

Spectrophotometer

Fume chamber

Weighing machine

Stainless steel bowl and meat cutting saw

Two large sinks with hot and cold water should be adjacent to the workplace-one for clean and other for unclean work. A flushing service and wash basin are needed.

Check Your Progress 2

1) What are the recognised level of illumination for various rooms of a mortuary?

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2) List the important equipment required in a mortuary.

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1.7 STAFFING

The staffing depends on the size of the hospital and the complexity of its operations. Mortuary services are to be carried out round the clock.

As a general rule two pathologists or forensic experts for 150 autopsies/postmortems. Additional one doctor for every 100 postmortems.

There is a need for five morgue attendants who can be posted round the clock. They should be at least matriculates who can read and write in English and local language. This is important to ensure that wrong bodies are not delivered and to differentiate between MLC and non-MLC bodies.

There should be at least two mortuary technicians in each mortuary. At least three workers for cleaning andmaintaining the mortuary.

There should be X-ray technicians to take X-rays in case of medico-legal cases, To maintain records, a record assistant may be posted.

1.8 POLICIES AND PROCEDURES

Medico-legal postmortems should be done only during day time before sun set. Natural light and ample time is essential for apostrnortem to arrive at consensus.

Non medico-legal autopsies can be done at any time.

Protocol of Medico-legalBodies Packing

In a hospital when a death of a medico-legal case takes place it has to be informed to the concerned police station and the dead body has to be properly packed and sent to mortuary for storage. In cases where an inquest is to be done by a magistrate, the dead body should not be handed over to police even upon the written instructions of a magistrate.

Protocols for inquest

In cases of inquest, where the investigating officer feels that postmortem is essential to arrive at the cause and manner of death, he forwards the dead body, duly sealed under police escort to the authorised Medical Officer for conducting postmortem. In cases of death after natural disease process where the exact nature and process is not clear, the teaching physician can request the relative for postmortem/autopsy. After getting due permission from next of kin available on the death form/case sheet, permission of Medical Superintendent or his nominee is to be sought. Only after this, pathologist is approached to carry postmortem/autopsy. Consent for autopsy taken from deceased during his lifetime is invalid.

Identification of Bodies

Wrist *Band*: Proper identity wrist bands of all dead bodies including neonates in any hospital mortuary is mandatoiy, so that no mix up occurs during handing over the bodies to the relativeslauthorized personnel. Such mix-ups are a great embarrassment for the hospital authorities. In fact, it may lead to legal complicationsfor the hospital. Clear instructions to all the concerned to be issued. While packing the dead bodies in Wards before sending to mortuary, proper identity wrist bands to be applied, where name, age, hospital registration number, etc. are clearly mentioned as given in death certificate.

Documentation: It is essential for the mortuary staff to verify and compare the name on the wrist band before entering the case in "mortuary record book" and keeping the body in cold storage.

Hand and footprints of neonates: Fox neonates it is advisable that in addition to wrist band having the particulars of the child, mother's particulars should also be mentioned. In Wards, it is necessary to take hand and foot prints on the case sheets. This is helpful in identification in a mix up situation,

Protocols for Unclaimed Bodies

Unclaimed body to be preserved for a minimum period of 72 hours after which it could be disposed. Normally unclaimed dead bodies are handed over to either Municipal Corporation

or certain religious organisations to conduct the last rites.

In unidentified medico-legal cases, the responsibility of establishing identity of the deceased is totally that of the investigating officer conducting inquest, usually in such cases photographs and finger prints are taken, which help in identity establishment even' at a later stage,

Clothing and belongings are preserved as they also help in identification of deceased in many situations. In medico-legal cases they are preserved by the investigating officer, while in non-medico-legal cases they are preserved by the hospital authorities.

An unclaimed dead body can be handed over to a medical college/Anatomy Department. for teaching purposes, under the Anatomy Act. by the hospital authorities.

Protective clothing for staff: Mortuary staff to be provided with protective clothing like gloves, gowns, boots, etc., while handling dead bodies, universal precautions and maintaining cleanliness are the two important aspects to be followed.

Medical check up of staff: In addition to universal precautions while handling dead bodies, all the mortuary workers should be screened for pulmonary tuberculosis periodically. The workers should be vaccinated against rabies and hepatitis B.

1.9 MONITORING

Check list of things to be verified daily and monthly and half-yearly.

Daily **Check**

a) Temperature checks of cold storage: Cooling system of mortuary to be checked daily so that temperature is maintained and the bodies are not decomposed.

b) To check the cleanliness and hygiene of the mortuary.

c) Coinpressor check

d) Cold storage: Thermal graph of the cold storageis-to be checked every day.

e) Gas pressure

f) Temperature

g) Water level

Monthly Cheek

a) Oil fan motors

b) Wiring

c) Tests for leaks

Half-yearly Check

a) Grease compressor motors

b) Replace compressor oil

In addition to the above checklist, the following points are also taken consideration.

Occupancy Rate

Occupancy rate of the bodies in mortuary to be noted. If the present facilities axe not enough, hospital authorities can plan for extra facilities in the same area if there is ample space or plan in a different location.

Maintenance of **Negative** Pressure

The pressure need to be monitored regularly and maintained within prescribed limits.

Identification system of dead bodies is done properly or not. The wrist band on the left side with the name, IP number etc, to be checked with the death certificate before keeping the body in the cold storage.

Proper Record Keeping

Preventive maintenance of the equipment to be done. For this proper recording is necessary.

Check Your Progress 3

1) List the categories of staff requirement in a mortuary.

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2) .List three ways of identifying the bodies in a mortuary.

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3) Describe in brief the protocols for unclaimed bodies.

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4) List the things which need to be varified on managerial basis in a mortuary.

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1.10 LET US SUM UP

In this unit you have learnt that a Mortuary is an important place in a hospital, which has been neglected for a long time. It is a common experience in our hospitals to find mortuary located in far off isolated corner of the hospital with primitive facilities for body preservation and autopsy performance. Instead of a pulsating enquiry centre of modern medicine, it remains a dead house. In the concept of a modern hospital, it is recorded as an important speciality. It is also a sensitive area in terms of public relations of the hospital. Sanctity of the 'Dead' is a universal concept and is intimately related to the cultural background of the community. Therefore, recent trend is to remodel the mortuary with modem facilities.

1.11 ANSWERS TO CHECKYOUR PROGRESS

Check Your Progress 1

1) ● To keep the bodies of the patients dying in the hospital, until the relatives claim them and arrange for their disposal.

To keep the unclaimed dead bodies until their disposal is arranged by the hospital authorities, This is done by arranging either for their burial or cremation;

i) through hospital funds, or

ii) through religious and charitable organisations. Sometimes the dead bodies may be handed over to Anatomy Department of Institutions requiring for teaching purposes.'

- To rpceive dead bodies requiring pathological postmortems pending final disposal,
- To receive dead bodies brought to the hospital for medico-legal postmortem and store in the mortuary pending further disposal.

- The mortuary wing of a teaching hospital is also utilised for demonstration of autopsies to medical students.

2) i) Clean Store

ii) Instruments and equipment store

iii) Chemical store

3) Space requirement varies from hospital to hospital depending upon the workload, level of care it provides and jurisdiction of medical autopsies. For a district hospital wit11 200-300 beds, it is expected to undertake 300 autopsies per year. As a general guideline, committee on plan project (COPP) has recommended an area of 6-8 sq. ft. per bed.

Check Your Progress 2

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Gas liquid chromatography

High pressure liquid chromatography

Spectrophotometer

Fumechamber

Weighing machine

Stainless steel bowl and meat cutting saw

Two large sinks with hot and cold water should be adjacent to the work place-one for clean and .other for unclean work. A flushing service and wash basin are needed.

Check Your Progress 3

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There should be X-ray technicians to take X-rays in case of medico-legal cases. To maintain records, a record assistant may be posted.

2) i) Wrist Band
   ii) Documentation
   iii) Hand and foot prints of neonates

3) Unclaimed body to be preserved for a minimum period of 72 hours after which it could be disposed. Normally unclaimed dead bodies are handed over to either Municipal Corporation or certain religious organisations to conduct the last rites.

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An unclaimed dead body can be handed over to a medical college/Anatomy Department for teaching purposes, under the Anatomy Act. by the hospital authorities.

4) Daily Check

a) Temperature checks of cold storage: Cooling system of mortuary to be checked daily so that temperature is maintained and the bodies are not decomposed.
b) To check the cleanliness and hygiene of the mortuary.
c) Compressor check
d) Cold storage: Thermal graph of the cold storage is to be checked every clay.
e) Gas pressure
f) Temperature
g) Water level

Monthly Check

a) Oil fan motors
b) Wiring
c) Tests for leaks

Half-yearly Check

a) Grease compressor motors
b) Replace compressor oil

In addition to the above checklist, the following points are also taken into consideration.

- Occupancy rate:
- Identification of bodies:
- Proper record keeping:

1 12 FURTHER READINGS

John R Mc Gibony, 1969, ***Principles of Hospital Administration.***

H.M.C. Macaulay and R.Llewelyn Davies, 1966, *Hospital **Planning and** Administration.*

Ervin Futsep, *Modern Hospital*, 1979.

Bhardwaj.D.N., *Future **Planning** of **Mortuaries in Delhi,*** Journal of Hospital Association, July 1992

Kenneth L.M.C. Coy, ***Pathology*** and ***Morgue Services, Modem Concept of Hospital*** Administration

Shakti Gupta, *Planning and **Designing** of Mortuary **Complex** for a **District Hospital,** JFMT* Vol. XII, No. 3 and 4.

Hospital Utility Services, 1996, National Institute of Health and Family Welfare.

UNIT 2 TRANSPORTATION SYSTEM – AMBULANCE SERVICES

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the patient transportatian system in general and its development;
- enumerate the authorisation of an ambulance, its design, staffing pattern and essential equipment of an ambulance;

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- describe the patient transportation system in general and its development;
- enumerate the authorisation of an ambulance, its design, staffing pattern and essential equipment of an ambulance;

- understood the various physical facilities of ambulance service department; and
- understood the organisation of ambulance and emergency care service of few developed countries.

2.1 INTRODUCTION

There is need to bring awareness by inclusion in the academic curriculum of doctors and paramedical staffs of emergency care management techniques and vital role played by transportation system in over all emergency services management and day to day patient care management.

All citizens of the country have moral and legal duty to attend to the needs of emergency cases and road site accident victims. Life and limb saving measures are basic principles of emergency care, All over the world concept of Critical Care Medicine (CCM) has already taken deep roots in the health care system. In addition carrying of sick patients for seeking opinion of doctors, specialists, laboratory investigations, day care surgery, hospital admissions, inter ward patient transfer, post surgery transfer and delivery has become a routine task of Ambulance Services Department. Hence, operation of ambulance services has become a specialised activity and needs detailed knowledge and constant monitoring by health professionals and civic service administrators. This unit devoted in detail regarding operation of Ambulances.

Illness creates social, economic and medical dependency. The sick whether emergency or less serious but requiring medical care, need not only medical treatment, but also personal and psychological support, safe transportation system, humanized care, empathy and at times hospitalisation.

Throughout history, societies have accepted such need, as a responsibility of community and have created various facilities to provide the necessary services. Hospitals of present era are not symbols of ivory tower considered earlier but supposed to the community institutions meeting the need and demand of community consisting of urban, rural poor and rich alike. In view of changing ethos, hospitals and health services have undertaken complex noted and multipurpose roles including transportation services. The transportation system consists of two types viz. intramural and extra mural.

Ambulance services for emergencies in hospital and outside in the street form very important segment of this transportation system. All hospital administrators need to know various types ofintramural i.e. internal transportation system and extra mural i.e. external transportation system in health care delivery system. Transportation system encompasses not only ambulance services but also for transportation of personnel, material, equipment, linen and food articles, system like lifts, dumb waiters, trolleys, escalators, lorries and trucks and aircraft etc. This is one of the very important supportive services, which if not well planned, will, create perpetual problem in patient care in community and in hospitals.

Trauma has become one of the biggest killers in both developed and developing countries. Ambulance plays a major role in care and saving precious lives of trauma victims. In USA more than 100000 persons die due to accident and 100000 are disabled every year. In a study carried out in USA it was reported that 18.0 percent deaths were salvageable if expert emergency aid was available. In another study it was found that in 163 high way death cases 23.0 percent of death could have been prevented if adequate and prompt treatment was given. This is the finding of a study in a developed country where emergency services are highly well established and advanced. The mortality and morbidity figures are going to be much higher in underdeveloped and developing countries. University of Michigan (1971) in a study of 159 autopsy cases who died of motor vehicle accident, reported that at least 18.0 percent victims could have been salvaged, had they received adequate treatment at the site, enroute and immediately at arrival in hospital as per National Safety Council of United States. It is estimated that 20,000 lives would be saved annually with better attention at the site of accident during transportation and on arrival at the hospital.

In India the magnitude of problem of motor vehicle accidents or other accidents and emergencies is difficult to assess accurately due to lack of authentic data and also lack of any nodal agency monitoring these figures statistically. However, fatality rate of 60 per 10000 motor vehicles is very high in India compared to 5-15 per 10000 in developed countries.

India has got only 1.0 percent of global vehicle fleet with share of road deaths as 6.0 percent. One state reported more than 4526 deaths in first five months in highway accidents in 1997 and 4637 seriously injured. People die daily in highway accidents. In 1996 total 9021 people were killed aiid 5387 people were seriously injured on 10 national highways in Maharashtra as per published reports. If figures all compiled for all states, the figures would be more than a lakh. Srntistics indicated that, on an average 24 deaths occurred in 2212 road accidents. Main reasons for the accidents was phenomenal growth in number of vehicle. 'Country has to accordingly make provision for management of tliese increasing number of accident trauma cases.

In this course we shall study the fundamental concepts and need of early patient evacuation, various modes of patient transportation system and all aspects of ambulance vehicles commonly used for patient treatment and evacuation for emergency cases and during natural calamities. The knowledge about immediate medical attention at the site, life saving measures, continued treatment during transpostation and early evacuation at the centre of excellence, CAT centre, or tertiary treatment centre in patient transportation system, is essential for hospital and a health administrators and planners.

2.2 PATIENT TRANSPORTATION SYSTEM – GENERAL

Patient transportation system encompasses not only Ambulances but nlso wide range of mechanical systems and transports in and outside hospital used to carry or shift patients. However, ambulance is most widely used transportation system.

Ambulance, lift, escalator, trolley, stretcher, train, ambulance train, car, truck, rickshaw, bicycle, bullock cart, helicopter, ambulance-helicopter, aircraft and animals lilce horses and mules are used for transportation of patients depending upon location, type of patient, economic status, social strata, terrain, physical facilities and degree of illness. But in day to day life in urban area particularly, conventional ambulances transport patients as we see being used in hospitals. Inside hospitals aiid from local area to hospitals ambulances ore normally being used. During last two decades one has noticed sea change in types and design of ambulances being used. One sees highly modern, equipped and mobile hospital in ambulances. There are ambulance vehicles, which are mobile Corollary Care vans capable of dealing with all types of cardiac emergencies at any peripheral or remote place. There are number of institutions and private organisations which have mobile Intensive Care Unit (ICU) used for tackling critically ill patients requiring resuscitation and continued critical care. In last few years mobile operation theatre which is ambulance based called OT on wheels has also been built for carrying out surgery in remote areas.

In this unit we will mainly focus on Ambulance services only which is main patient transportation system all over the world.

2.3 DEVELOPMENT OF AMBULANCE SERVICES

Early historical record are very scanty and do not mention much about transportation system of patients. In fact, historical records give little evidence of any vehicle specifically designed to transport the sick and injured. Bullock carts and horses have been used for lifting the sick and injured from battlefields. Sick were often left to die at home or those wounded in battle were left on the battlefield to die. It is only after 17th century that there are some records of any form of organised transportation system of the sick and wounded, In

France during 1762 for the first time organised transport was provided which was named as "Hospital Ambulant" which literally meant was as mobile hospital. Wheeled trolleys were brought in use in France during 1880. Its origin for military purpose is mainly credited to Dominique Joan Lary (1792) a French Military Surgeon. At the beginning of 20th century horse drawn vehicle were commonly used in England. In 1903, motorized ambulance transport was introduced in civil practice. That was the beginning of ambulance services in transportation system of patients. First World War and Second World War contributed towards further development of patient transportation system. However, maximum development occurred after Second World War and during last two decades due rapid developments in the field of science and technology and particularly in the field of automobile industry and automated data processing technology.

Check Your Progress **1**

1) What are various types of patient transportation system used in India'?

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2) Where was ambulance used first in the world?

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3) Who is credited with use of the ambulance services fust for military purpose'?

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2.4 AIM AND OBJECTIVE OF AMBULANCE SERVICES AND DEFINITION OF AMBULANCE

Major objective is to transport the sick and injured as quickly and comfortable to hospital as possible where effective medical care can be rendered by qualified compctcnt medical, nursing and paramedical staff.

Objective of ambulances service is to provide prompt emergency treatment, safe transportation with continued treatment to hospital for further treatment.

Definition of Ambulance

One would wonder that Ambulance can also have a definition. But it is so. Though there is no single accepted definition of Ambulance but various attempts have been made to define an Ambulance. An ambulance as defined in Webster's dictionary is an "Organisation for rendering first aid". From this the word has come to be used for "a vehicle equipped for transporting those who are wounded injured or sick".

Hospital O and M Services Report No 8 (1964) has defined ambulauce as: "Ambulance transport includes all ambulances, sitting case cars, hospital car service vehicle and railways accommodation provided at the expense of local health authority.

Check Your Progress **2**

1) Aim of Ambulance services is

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2) Objective of Ambulance services is

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3) What is criteria to call a vehicle as an Ambulance

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2.5 ROLE AND FUNCTION OF AMBULANCE SERVICES

Ambulance is an out reaching limb of the hospital based emergency medical services. An efficient, promptly responding, well-equipped ambulance service staffed with competent personnel is considered one of the essentials of well-organised emergency department. Whether an injured patient survives after reaching the hospital depends not only on the nature of the injuries sustained but also on the adequacy of first aid and efficiency of the transportation from the accident site.

Mackay (1969) brought out in the study report that in 43.0 percent of deaths in Motorcycle riders and vehicle occupants, they might have had a greater chance of survival, if some medical treatment had been available at the scene of accidents within 10 minutes.

According to the special accident prevention committee, it is the third biggest country in the world contributing the maximum number of road accidents. As against national standard of 352 vehicles for a population of 10,000 there are 3500 vehicles fora population 10,000. Seventy three percent of these are two wheelers. It is distressing to learn that state estimated in 1997 number of road accidents deaths as a whole in the range of 30,000 to 40,000 per year. In India it has been estimated that one person dies on road every 12 minutes,

Death Rate: India – 5011000 Vehicles and Sweden –411000 Vehicles

The above statistical data on road deaths due to motor vehicle accidents compels hospital administrators to plan for efficient emergency treatment at site, safe transportation and continued treatment during evacuation and in hospital on admission. Many deaths and disabilities are preventable if efficient ambulance services are available to deal with such situation. Well-equipped and staffed Ambulance forms an integral element of accident and emergency service department in any district.

Role of Accident and Emergency department in saving many salvageable lives and reducing morbidity has been well realised in last two decades all over the world by hospital and health administrators. Concept of on the spot, during transportation and in Intensive Care Unit care by intensivists and traumatologist and Critical Care Medicine experts has completely revolutionised the principles of planning, designing, staffing and equipping of Accident and Emergency Services Department, Community and health administrators have become quite conscious of the necessity of having a efficient well designed state of art emergency and Trauma treatment centre in each district. There can be no efficient Accident and Emergency Services Department or Modem Centralised Accident Trauma Treatment (CAT) centre without fully equipped and staffed Ambulance Services.

Not only for accident and trauma emergencies but other emergencies like Myocardial infarction, cerebral haemorrhage, foreign body throat, bum, gun shot wound, fracture and injuries etc., immediate treatment on the spot by expert medical staff and proper evacuation by a trauma or Critical Care Medicine (CCM) trained staff of Ambulance, is a vjtal factor in

saving life. Hence, the role of ambulance is not only carriage of patient but infact, it is highly mobile hospital to provide prompt comprehensive medical, surgical and resuscitative cover till the patient is institutionalised.

Utilisation of Ambulances

Requests for the use of ambulance services arise from the following individuals, organisations and services:

a) General practitioners, police and members of the community calling ambulance to the scene of accident or other emergencies.

b) General practitioners nursing homes arranging out-patient booking of ambulance by telephone.

c) Hospitals requesting transport on long and short notice for:

   i) Patients to be admitted

   ii) Out-patient or accident or emergency cases to go home

   iii) Out-patients attending by appointment

   iv) Discharged inpatients to go home

   v) Patients to be transferred from one hospital to another

   vi) Transfer to patients for special investigations like Cardiac Catheterisation, Cardio-thoracic Centre, NMR Centre end Radio Isotope Centre etc.

d) Local health education authorities for the conveyance of children or handicapped persons to and from establishments.

e) For conveyance of children and staff for immunization programmes.

2.6 TRANSPORTATION OF PATIENTS, STAFF AND VISITORS

Ambulances are mainly meant for patients and emergency care medical staff and if used for any other purpose, will loose patient time and also become unserviceable early due to premature wear and tear. Ambulances should have only essential staff consisting critical care medicine trained Doctors, Nurses and paramedical staff. Ifrequired it should have stretcher-bearer who are well-trained in carriage of various types of serious patients and accidents victims.

Visitors and relatives should preferably use other types of vehi[illegible] one or two relatives may be permitted to accompany very critical patient mainly to hel[illegible] paramedical staff in caring of patients. No dead bodies should ever be carried by Ambulance. This has psychological effect on other patients. Ambulances are likely to get heavily infected if dead body was having gas gangrene or any communicable and infectious diseases. It is not a hearse van. There is need to educate public on this subject through various public information media.

No stores should be carried by ambulances and during war time also only patients are to be evacuated and no arms or ammunition as per Geneva convention. Ambulances should not be converted into Ioad carrier vehicle.

Priority for Utilisation Ambulance

The quality of service given to out-patients must be considered in the light of the four

traditional priorities applied within the ambulance service. These arc :

a) Accidents and emergency call.

b) Conveying patients and out-patients to hospitals and clinics etc.

c) Returning out-patients to the homes from hospitals etc.

d) Carrying patients being discharged from hospitals or transferred between hospitals.

c) Whenever there is insufficient transport to meet all requests arising simultaneously, the above priorities should operate as accepted principle,

2.7 CLASSIFICATION AND TYPES OF AMBULANCE

Ambulance can be of following types:

2.7.1 Surface Ambulance

These arc Ambulance, playing on roads, the make and body varies depending upon the manufacturer, Some are on heavy chassis. In the present era light body ambulances designed and built, as ambulances arc available. In many makes of ambulances arc available depending upon which make of vehicle has been used e.g. maruti van, gypsy, swnraj mazda, eicher and so on. These can go on congested roads and narrow streets in cities, being smaller in lengths, width and short in height.

2.7.2 Helicopter Ambulance

Most of the developed countries have helicopter ambulances for Ferrying sick and wounded patients. These are well equipped with trained staff in rescue and resuscitation task, Their response time is too short required for lifting emergencies.

2.7.3 Plying Ambulance (Ambulance Aircraft)

Many developed countries have airplanes converted or modified into ambulance. These are suited and ideal for mass casualties, disaster medical relief and such rescue missions. France, Russia and Australia have these ambulance services since long and well recognized all over the world for their efficient and prompt emergency care services,

2.7.4 Ambulance Trains

For rushing the medical relief team to accident or disaster site and evacuation of mass casualties, Railways have Accident Medical Relief Van and Armed Farces, ambulance trains. These have specially designed and suitably modified coaches for lying and sitting patients with all necessary fitments for medical and surgical treatment during transportation. Ambulance trains are supposed be having trained and dedicated staff for move at short notice.

2.7.5 Centralised Accident and Trauma Services

In last two decades due to many fold increase two wheeled and four wheeled transportation system like cars, motorcycles, trucks. buses the number of accident trauma cases on roads in India and all over the world has gone up by more than 200%. It has also been proved in number of studies that 30% to 40% case are salvageable and need not die provided immediate expert medical aid is provided. Over a period of time role of an efficient Emergency Services Department providing critical care to accident and trauma cases due to various reasons, has been well realised. Since percentage of trauma cases is more than two third of the critical emergencies, it has been found to be one of the major killers, the organisation and development of Trauma services has evinced significant interest over last two decades. A plan was envisaged to have a well-organized Centralised Accident Trauma (CAT) centre, which would be linked to all hospitals in the city and all emergency ambulances would also linked by telemetry. Object of any CAT Services or Emergency Medical Services System (EMSS), is to deliver medical aid to the accident victim as quickly as possible and rapidly

transport the injured to specialised centre or specialised care facility, so as to give him the needed immediate critical care and subsequent life support system till fully recovered.

2.8 DESIGN, STAFFING PATTERN AND EQUIPMENT OF AN AMBULANCE

2.8.1 Design

Committee on Ambulance Design Criteria (1973) has stated that a vehicle should not be termed an ambulance, unless it is designed, built, equipped and staffed to cope with medical emergencies outside the hospital. Ambulance "is defined as a vehicle for emergency care, which provides a driver compartment and patient compartment, which can accommodate two emergency medical technicians and two lying patients, so positioned, that at least one patient can be given intensive life support during transit, which carries equipment and supplied for optimal emergency care at the scene as well as during transport, for two way radio communication, for safeguarding personnel and patients under hazardous conditions and for light rescue procedures and which is designed and constructed to afford maximum safety and comfort and to avoid aggravation of the patient's conditions, exposure to complication and threat to survival".

2.8.2 Scale of Authorisation of Ambulance

Holding of ambulances by hospitals is on adhoc basis and not related to workload, responsibility of providing first aid or critical care at site and during transportation. Broadly, it is not scientifically related, strictly to nature and quantity of workload.

Authorization can be scientifically laid down only when the patient caseload in a district or on dependent area of responsibility is worked out and norm is evolved keeping all variables in view. However Report of the Hospital Review Committee on Delhi Hospital (KN Rao Committee 1968) recommended following scale of authorisation and state that "nuinber of ambulance should be sufficient to meet the requirement:

a) 100-200 beds – 3 ambulances

b) 200-300 beds – 4 ambulances

c) 300 beds and above – 6 ambulances

In each section one ambulance besides those provided by Municipal Corporation should be ear-marked for conveying the cases of infectious diseases. However, it is evident that scale recommended can meet hardly only intra mural requirement and not the requirement outside hospital on regular basis for Accident and Emergency Cases, One or two ambulance will always be off road for preventive maintenance or breakdown maintenance and while planning for number of ambulances, this also has to be kept in view. Scales recommended in 1968 requires review in view of population explosion, many fold increase in number of vehicles and consequent increase in number ofaccident, trauma and emergency cases. Number of ambulances authorised will have direct effect on manpower authorisation and planning for facilities and training.

2.8.3 Staffing Pattern of Ambulance

Each ambulance should carry with it always two-trained stretcher-bearers for lifting and carrying patients to ambulance. Hence, normally ambulance will have two team consisting of ane ambulance driver and two stretcher-bearers. It would be preferable to have nursing orderlies who have higher educational qualification and better knowledge of patient care. They should be trained how to lift cardiac patients, spinal cord injury patients and a case of fracture femur. The ambulance service like the casualty department is required to work 24 hours of the day, and works on all holidays and Sundays. It should run in all three shifts. Hence, staffing pattern should cater for three shift duty, relief duty and Sunday and holidays.

A suggested scales of the staff is as under:

Ambulance	Drivers	Stretcher Bearer/Nursing-Orderlies @ 4 per Ambulance + leave reserve + staff for three shifts system.
02	07	10
03	12	15
04	16	20
05	20	24

Doctors: So far doctors are concerned, they may go with the team depending upon the type of emergency, accident or disaster.

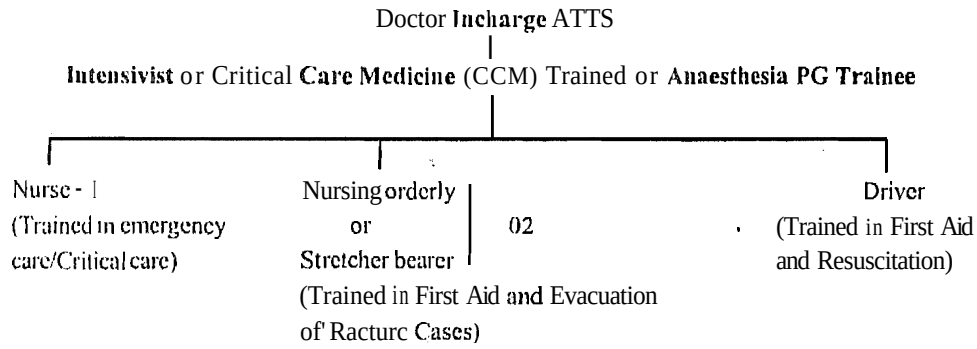
CCRI Trained Nurse: A Critical care medicine (CCM) trained nurse in each ambulance would be ideal for better management and supervision of emergency case.

Nursing Orderly and Stretcher Bearer: Each ambulance is required to have minimum 4 Nursing Orderlies or Stretcher-bearers all the time for lifting the accident victims and serious or comatose patients to ambulance. All these paraniedical staff are to be trained in first aid, resuscitation procedures and lifting of various types of serious accident cases without causing further damage or pain to the patient.

Call Response Time: Ambulance along with team should be in a position to move in less than two to three minutes once call is received.

Summary of Ambulance Staffing Pattern

For efficient Ambulance Transportation and Treatment System (ATTS) following dedicated medical nursing and paramedical staff should be available with cacli anibulance and located near ambulance bay or parking area, as in case of a fighter crew who jumps in fighter aircraft in case of any air warning system being sounded.



Shift System : The above staff should bc available in all three shifts round the clock. Staff should be particularly alert and checked randomly for their alertness in the night since ambulance, public vehicles and medical Facilities are not easily available and emergencies need to be attended promptly.

Rehearsals : Periodic rehearsals and practices should bc carried out to keep/staff, equipment and vehicle in a state of readiness and also to train new staffjoining the team on account of leave relief, hospitalisation and superannuating.

2.8.4 Equipping of Ambulances

It is not necessary that all ambulances should have only one scale and kind of equipment. Ambulances meant for different roles e.g. Mobile Emergency, Bums Unit. Coronary Care Unit, mobile dialyses unit and Mobile Operation Theatre will have some very specialised equipment. But few essential equipment must be present in all ambulances as laid down by bulletin of American College of Surgeons (1970), and these are:

- Portable suction apparatus with wide base tubing and rigid pharyngeal suction tip.
- Hand operated bag mask ventilation unit with mask of all sizes.

- Oropharyngeal airways – all sizes
- Mouth of mouth artificial ventilation airways – adult and children
- Portable oxygen equipment
- Mouth gags
- Sterile intravenous infectious (plastic bags with administration kit)
- Universal dressings, sterile gauze packs
- Bandages of all types
- Sterile burn sheets (two)
- Traction splints (lower limbs)
- Padded splints assorted
- Spine boards
- Safety pins
- Sterile obstetrical kit
- Anti poison kit
- BP instrument and stethoscope
- Two way communication system

In addition some of the ambulances should have equipment like, instant X-ray film processing equipment, operating fools, Operation Theatre (OT) Table and OT lights etc. for carrying out surgical procedures. Mobile QT vans can play a major role in delivery of primary arid expert health care to health starved population in most of rural and urban slum population,

In addition to the above items, the following items are also needed in most of emergency ambulances:

- ECG Monitoring equipment
- Defibrillator

  Respirator – portable small
- Ambu Bag with facility for attachment of all size of tubes
- Suction appara tus (paddle and battery operated)
- Drinking water storage containers
- Blood bottles of common blood groups
- Facility for doing cross matching of blood
- Generator on wheel to be towed by Ambulance to keep the equipment functional (OT light, X-ray machine, monitoring equipment etc.).

Check Your Progress 3

1) How many types'of Ambulances you know o f ?

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2) What does CATs stand for?

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3) Describe important criteria for design of an ambulance?

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4) What should be staffing pattern for an ambulance?

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5) List important items and equipment for emergency ambulance?

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2.9 ADMINISTRATION OF AMBULANCE SERVICES: POLICIES AND PROCEDURES

Administration: Ambulance services should be under a department. Either it may be A and E Department or better where a Transport department is established for coordination and supervision of services.

Transport **Manager:** There should be an Officer Incharge known as Transport Manager for over all coordination, control, maintenance and administration of ambulance and other transport of hospital. He should act as a nodal point for inquiries by doctors, nurses and patients on all aspects of ambulance facilities.

Vehicle Supervision: **A** vehicle supervisor is required for day to day supervision and administration to organise and oversee reports.

Transport Clerk: A clerk is required for necessary secretarial work of transport department.

Store-keeper (Transports): A store-keeper is required on full time basis for keeping record of vehicles and ambulances going out for repairs, accounting, payment for repairs and mileage recording. Issue ofpetrol, diesel oil and lubricant, leave record of drivers, stretcher-bearer and other connected correspondences. Unless transport section or Ambulance Transport Section depending on type of organisation has got separate store-keeper with proper accounting and filing procedure, chances of pilferage and misuse of vehicles cannot be ruled out. Meticulous record keeping is essentially required for auditing purposes.

2.10 AMBULANCE SERVICES DEPARTMENT

2.10.1 Physical Facilities

a) **Parking**

Most important point to see is that it should be easily accessible by patients and public, Ambulances should have well known fixed covered parking places, so that these special 'Vehicles do not deteriorate due to extremes of weather and also from early locating point of view. Ambulances parking should have adequate space for easy and early turning around of

ambulances. It should be well sign posted and illuminated. In Accident and Emergency Service Department or Centralised Accident Trauma Service (CATS) Cantre, it should be able to go right at the entrance gate of the department. The parking should be at prominent place and in such a way that patients can easily be loaded and unloaded.

b) **Location**

Ambulance should be located at a central place near to Accident and Emergency Services Department under one roof for easy access, better utilisation and coordination. It should be easily approachable by other general public vehicles.

c) **Space**

Should be adequate for parking number of ambulances at a time depending upon size of hospital or organisation and its holding of ambulances. There should be nearby large space for parking ofprivate cars, vans, taxis of civil public and relatives coming to hospital for treatment at OPD, hospital admission, laboratory investigations or to see admitted relatives and friends.

d) **Floor**

There should be cemented non-slippery flooring easily washable with sloping surface,

e) **Design**

For running a 24 hrs prompt and efficient ambulance services both for intramural and emergency call duty at emergency or accident site, it is ideal to have an Emergency Ambulance Services Department well sited and properly planned and constructed under one building near the A and E department, Following additional facilities should be planned:

i) Ambulance Control Room : For receiving calls, fixing appointment for ambulances etc.

ii) Each Ainbulance garage of rhe size of 200 sq ft each

iii) Patient loading and unloading area.

iv) Relatives and visitor's lobby with male and female toilet facilities

v) Doctor's duty room

vi) Nurse's duty and rest room with toilet facilities

vii) Paramedical staff duty and rest room with toilets

viii) Drivers and stretcher bearer's duty and rest room with toilet facilities

ix) Ambulance communication robm

x) Ambulance repair and washing area with facilities for water supply system

xi) Ambulance clerk and store keeper's office

xii) Spare parts store room

xiii) Trolley bay

f) Illumination

Area should be well lighted during day and night. Illuinination of 400 lux can be considered as basic light level in most of the areas. There should be provision for emergency lighting system to overcome problems of power failure.

g) **Public Toilets**

Large number of visitors, relatives, Police and Staffpersonnel would be visiting ambulance services department Male and female urinals, toilets for public and patients including wheel chair patients are required at a convenient place.

h) **Janitor Closet**

Janitor closet of the size of 40 sq feet for house-keeping and cleaning material is essential.

2.10.2 Training of Staff

Training of all categories of ambulance staff is extremely essenrial. There should be laid down syllabus with laid down periods for the basic capsule course for orientation of doctors, nurses, and nursing orderly, nursing technicians, stretcher-bearer and drivers. Subsequently for updating the knowledge and skills, refresher course should be planned and held through-out the year. Minimum every three months there should he mock rehearsal or exercise to know the preparedness of staff in case of air strike or bombing etc. Each ambulance crew member should be fully trained in emergency medical and surgical procedures, resuscitation techniques, ECG recording, wireless communication system and tele medicine relay system.

To meet the requirement each medical college, big and small hospitals should have a laid down critical care medicine and resuscitation training programme running under Accident and Emergency Services Department. Doctors and paramedical staff from peripheral hospitals, PHC and general practitioner should also be encouraged and given due opportunity to attend such courses.

The training of staff of ambulance team is of paramount importance. Patients must be lifted and loaded by trained and experienced staff. It is important that trained team handles the patient depending upon the nature of urgency, fbr example, a case of fracture T-3-4-5 vertebra or fracture femur would require expert and delicate handling than a case of fracture rib or ulna. Cases of asphyxia or mine blast, poisonous gas poisoning, crush injury leg or eighty percent burns due to explosion, need special handling.

Prompt removal of foreign body, objects causing penetrating injury, positioning of patient to avoid further injury to tissues, nerves and vessels causing pain and likely gangrene is immediate task of ambulance crew. Immediate simple first aid measures like tying of tourniquet and packing by gauze piece if bleeding wounds, preventing further blood loss and consequent shock and death are immediate concern and responsibility of ambulance staff. Subsequently maintenance of treatment, iv drip, tackling of any cardiac arrest or fall of BP, etc. while transporting patient to hospital for treatment is the responsibility of ambulance staff. Hence education and practical training of ambulance crew is essential which will save number of salvageable deaths and preventable complications and disabilities.

2.10.3 Communication System in Ambulances

Efficiency and effectiveness of ambulance-based emergency medical care system and emergency call response, totally depends on online efficient dedicated and assured two-way communication system, All ambulances should have wire less communication system and linked with concerned hospital or ambulance control organisation. An electronic keyboard with memory system that can convey the patient related call and information system to a similar display panel in the receiving hospital emergency department might be installed. In the present era of satellite communication system, computers global cord less telephone and e-mail, no difficulty is visualized in providing communication system in ambulance, and hospital receiving the emergency patients, The system should be on 24 hours so that any emergency call can be received by Hospital or ambulance control organisation or centralised Accident Trauma Centre and ambulance staff is directed to proceed at the site of emergency or accident,

The drivers should be made familiar with the various areas and roads of city or concerned area of operation before hand. Ambulance should have detailed map of city-roads so that if required they can be asked to refer to the map.

French Ambulances have detailed map of city on electronic date board including names of street and house numbers so that they have no difficulty in reaching the exact location in 3-5 minutes. It should be done by our hospital also. All doctors, nurses, paramedical and driver staff of ambulance transportation system arc required to be trained in operating communication system with ease and for this training in handling of communication system needs to be given to staff. To check efficiency and call response time, during day and night exercises needs to be carried out at periodic intervals. This will enable organisation to maintain state of alertness,

2.11 AMBULANCE AND EMERGENCY CARE SERVICES OF DEVELOPED COUNTRIES

2.11.1 France

France has got fully developed, extremely efficient unique organisation of Accident and Emergency services. The system established during last three decade is called 'SAMU' (Service D' Aide Medical Urgente). It practically covers the whole country. Service is run by medical personnel manning central control and by a number of specially equipped ambulance called SMURS (Service Mobile D' Urgence etude Reanimation). Ambulances carry resuscitation and monitoring equipment, an ambulance team, consisting of one emergency first aid trained driver and one stretcher bearer and the medical team (a senior doctor and a medical student). These ambulances reach any spot within 3-7 minutes after receiving the call.

SAMU cover the whole country. The secret of efficiency of SAMU is a permanently manned control centre comprising a manned switch board, Radio communication network and a medical secretariat consisting of a controlling doctor and other senior medical staff with a specially equipped and designed ambulances called SMURS.

2.11.2 Soviet System of Emergency Transportation

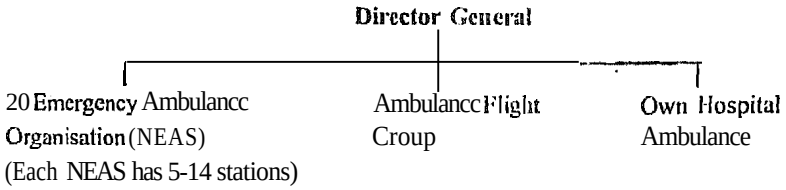
Basic principle of the Soviet System of emergency medical care is known as the SICORAYA. Attached to each polly clinics is a minor emergency care facility called "Neotlozhnay" for giving 24 hour and weekend services to patient. In erstwhile USSR, there were 35 doctors/ 10,000 population compared to 10 Doctors/10,000 in UK. SKORAYA Services of Moscow is highly efficient organisation having 200 Ambulances for day time and 100 Ambulances for night time with specially trained para-medical staff and medical officer.

2.11.3 Japan

Most emergency services are rendered by private clinics and private hospitals. The organisation and availability of EMS is influenced by Japan's compulsory Health Insurance scheme. Public and private carriers provide emergency service transportation and few hospitals have their own ambulances. The major fleet of ambulance is with the Tokyo Fire Service Department. They also have few helicopter ambulances. The fire department ambulances strive to achieve the goal of service within three minutes. There are special telephone booths with no payment for call for emergency medical services.

2.11.4 Israel

In Tel Aviv with more than 10 lakh population Emergency Services arc provided by fire emergency stations. The organisation which maintains the emergency care services is a society similar to Red Cross and is called "Magen David Adom" Ambulances both for primary transportation from scene of accident to emergency care station and for secondary transportation from station to hospital. These arc:



2.11.5 Australia

Ambulance services are centrally controlled by each state with locally organised operating units. The size of operating units varies between states. The range is from one vehicle volunteer service to about 100 vehicles. Ambulance officersare specially trained officers for the job, Ambulancc services receive call on emergency telephone number or on wireless with special frequency. They are also in contact with casualty department through Radio Control. In early 1970's fixed wing Air Craft and helicopter ambulance services bavc also been added to the fleet for emergency treatment and transportation.

2.11.6 United Kingdom

UK has high developed and efficient Accident and Emergency Services called British Accident and Emergency Services also known as – "Flying Squads".

2.11.7 *West* Germany

West Germany has A and E Services similar to France. In addition the country has very wide and comprehensive stand-by Helicopter cover.

2.12 STATE OF AMBULANCE SERVICES IN THE COUNTRY

Much needs to be done to improve the condition of present ambulance fleet. Number of committees appointed by government of India from time to time have commented on tlie state of ambulance services and recommended measures to improve tlie services. Improvement in Ambulance services has to be taken up as one key result area (KRA) by Hospital and Health Administrators of the country. Extract of some of the important Committee reports and tlacir recommendations are enumerated below for better understanding of the problems.

2.12.1 Report of the Health Survey and Planning Committee, 1961 (Mudaliar Committee)

While commenting upon Employees State Insurance Corporation report stated that – "It was obvious that ambulance facilities were not available to the extent they ought to be. There was a need for hospital authorities to rcvicw their arrangements for authorisation of ambulance transport. Committee observed that clinical procedures for requisitioning transport and controlling ambulance operations tend to be unnecessarily complicated and there was scope for closer cooperation between hospital and ambulance authorities.

2.12.2 *Report* of the Hospital Review Committee on Delhi Hospitals, 1968 (M.N. Rao Committee)

In none of the hospitals supporting ambulance service can be said to be satisfactory. Each hospital had one or at the most two vehicles. even those were old. Most of the time these were off the road. Sanctioned ambulance staff was not adequate to provice 24 hours cover. It was generally found to be inadequate for the needs of a vast area, and particularly in areas where public transport was poor anti difficulties were very great. In addition, tlie type of ambulance used were only a transport vehicle and had no resuscitation equipment as there was neither a nurse, doctor nor materials for this service. As a part of civic amenity the corporation should liave a fleet of ambulance. It recommended that all ambulance vans should at least have a trained nurse.

Although reports of these committees' are quite old yet state of ambulances liave not much changed.

2.12.3 Primary Health Care and Integration *of* Ambulance Services

There is no means of transportation of critically sick and injured patients from rural areas. Patients have to be transported by first available vehicle likes tractor trolleys, trucks or buses. Many precious lives are lost daily due to lack of this vital service. There is need to create a pool of ambulances or speedy general vehicles modified into critical care vans and locate them in Primary Health Centres (PHC) or Taluka hospitals or tehsil headquarter from where these can be easily mobilized.

These Ambulances can also be used for patient care logistics also. Returning empty ambulances can carry essential medical supplies, special laboratory investigation results and also autoclaved dressing and equipment For use in Primary Health Centres from District Hospital.

The ways and means of transportation of the sick and injured are important factors in reducing death, disabilities and other serious effects of injury and illness. The first purpose of an ambulance service is to reduce mortality and morbidity for emergency patients and the second purpose is transportation. The aim can be achieved, provided ambulances are designed, equipped and staffed properly on scientific basis. As man behind machine matters, similarly it is the trained ambulance staff which is very important factor for operational efficiency. For achieving the ultimate objective, efficient response communication system should be reliable, on line, and state of art. Most ambulances are poorly constructed, equipped and manned for managing emergencies which needs to be improved and made as one of the key result areas by Hospital Administrators.

2.13 LET US SUM UP

In this unit yon have learnt as to what is meant by an Ambulance,~!hatis real definition of an ideal Ambulance, and its role in life, limb and disability saving. Aim of Ambulance services has been clearly brought out including role in Primary Health Care and related logistics. Very important aspect of equipping of ambulances with various instruments and emergency drugs and equipment has been brought out. You have also learnt regarding important aspects of administration, policies and procedures of Ambulances Services. After having studied this unit you should be able to organise an efficient and effective ambulance services 'in any Hospital or Organisation you serve.

2.14 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Ambulance, lift, escalator, stretcher, trolley, train, car, cycle, bullock cart, helicopter, and animals.

2) France

3) Dominique Joan Larry (1392)--a French Military Surgeon

Check Your ***Progress*** 2

1) Transfer sick and injured promptly and provide life saving treatment at the site of emergency and during transportation.

2) Provide prompt emergency treatment, safe transportation with continued treatment,

3) Ambulance should be designed, built, equipped and staffed to cope with emergencies.

Check Your ***Progress*** 3

1)
- Surface Ambulance
- Helicopter Ambulance
- Flying Amblance (Ambulance Aircraft)
- Ambulance Trains

2) Centralised Accident and Tauma.

3) For design criteria, refer to sub-section **2.8.1** of this unit.

4) For staffpattern for ambulance, refer to sub-section 2.8.3.

5) For important items and equipment, refer to sub-section 2.8.4.

UNIT 3 SANITATION AND WASTE MANAGEMENT

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- describe'the history of hospital waste management;
- understand the various processes involved like, Generation, Segregation, Transportation, Collection, Storage, Treatment and Disposal;
- enumerate the different modalities of treatment of hospital waste; and
- list out the harmful effect hospital wastes pose to the community.

3.1 INTRODUCTION

In this unit you will learn about the concepts of hospital waste management (HWM) as well as the Bio Medical Waste Management and Handling Rules, 1998.

Hospitals have been existing in one form or the other since time immemorial but there never has been so much concern about the waste generated by them.

The environmentalists have been up in arms against the casual manlier in which hospital waste is treated in our country.

The last few decades have seen a rapid mushrooming of hospitals, both in Govt. and corporate sector to cater to the needs and demands of the increased population. Correspondingly there has been an increase in the quantum of waste generated by them. It is ironical that the very hospital that brings relief to the sick can created health hazards due to improper management to the waste generated by it, Unlike in the developed countries, the concept of HWM has not really cauglit up in India. It is time we realise the importance of HWM and the need of sensitizing the top level managers orienting them with various types of waste, their generation. segregation, collection and transportation and final disposal. The

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owners should be on the generators of hospital waste, and proper segregation of the waste at source is the "sine quanos" of a successful waste management programme. It is the factor, which has led the Ministry of Environment and Forest to prepare the Bio Medical Handling and Management Rules, 1998. We have to preserve the earth for the future generation. We shall study in detail how we can do so.

3.2 IMPORTANCE OF HOSPITAL WASTE MANAGEMENT

A modem hospital is a complex multidisciplinary system, which consumes lots of items for the proper delivery of medical care. All these consumable leave some amount of unusable leftovers which are called as hospital wastes.

These wastes are generated as a result of patient care activities like diagnosis, treatment, immunisation or research. These wastes have the potential to transmit various viral, bacterial or parasitic diseases to the staff, patients and general population at large.

The fast recovery and health of the staff of the hospital directly depends on a clean and hygienic environment. Hence it is very important that all the hospital waste is managed in a proper and scientific fashion. It is also vital that the whole hospital be kept clean and in a satisfactory state of hygiene.

Health hazards associated with poor hospital waste management are:

a) Injuries from sharps to all categories of hospital personnel and waste handlers

b) Nosocomial infections to patients from poor infection control and poor waste management

c) Risks of infections outside hospitals for waste handlers, scavengers, and (eventually) the general public and some times change in microbial ecology resulting in antibiotic resistance.

Therefore, it is imperative to have a scientific system approach towards handling and ,managing hospital wastes.

3.3 TYPES OF HOSPITAL WASTE

By now it is amply clear to you that hospitals of today are over crowded with patients, their relatives and visitors as well as the hospital staff, In urban areas due to the shortage of space the hospitals are of a vertical structure with improper aeration.

The quantum technological jump has also resulted in state of the art diagnostic and therapeutic activities there by generating lot of waste material,

W.H.O. has classified wastes generated in hospitals into the following types:

a) ***General Waste:*** These wastes are by and large generated from offices, administration areas, stores, kitchen, laundry etc.

b) ***Sharps:*** Hypodermic Needles

Needles attached to tubings

Scalpel blades, razors, nails etc.

Broken glass pieces

c) ***Infected Waste:*** Equipment and instruments used in various diagnostic and therapeutic procedures.

Laboratory waste e.g. Cultures, stocks and samples

Wastes from surgeries (tissues and organs removed during surgery) and autopsy.

d) Chemical ***Waste:*** Formaldehyde used for preserving tissues

Fixer and developer used in radiology department

Solvents used in laboratories e.g. xylene, acetone, ethanol, methanol chloroform, ethylene etc.

e) Radioactive ***Waste:*** Generated from

i) Research activities

ii) Clinical laboratories

iii) Nuclear Medicine labs.

f) Cytotoxic ***Drugs:*** Various anti cancerous drugs used for treating malignant conditions are very corrosive to human skin and tissue.

Quantity of hospital waste generated

Various studies carried out by different groups have revealed that the quantity of wastes generated from hospitals in our country ranges from 1-2 kg/bed/day. I-Iowever this figure is higher in developing countries like USA, UK etc. where the figures are 5-6 kg/bed/day.

3.4 IMPLICATION OF HOSPITAL WASTE

The implication of hospital wastes are manifold. Since hospital is an established social organisation the wastes from hospitals have effects on the hospitals staff, the environment, general public etc.

3.4.1 On Hospital Employee

The staff working in hospital is exposed to various wastes and as such it would be worthwhile to mention some important points related to the problems.

Primarily the hospital staff are the ones who are involved in generating, collecting, storing and treating the wastes. All the personnel are exposed and are totally at risk of getting an infection, which could be transmitted through air, blood, faeces, oral routes etc.

In day to day activities all personnel are used to working with needles, blades, glass etc. which are usually sharp objects. An injury due to these sharps is very common. This is the most common route of entry of any kind of infection. Air borne infections find their entry through the nose. Hospital employees having tuberculosis is another common phenomena. Dreaded infections like AIDS, Hepatitis are not uncommon lo be transmitted to the staff handling infected patients.

The practice of universal precautions is, therefore, mandatoiy. The idea is to consider each patient to be a potential reservoir of infections. The hospital authority should provide adequate numbers of gloves, footwear, protective eye, head gears, masks and gowns. The staff working in high risk areas should also be immunised against tetanus, Hepatitis elc.

3.4.2 On Public

As envisaged earlier the fact that hospitals are social organisation, the general public as regards hospitals are attendants and visitors patients, people staying close to the hospitals, vendors and suppliers and above all the masses.

Hospital waste do have some impact on the health of the masses but this fact has been blown out of proportion by the media. More over the public today is becoming more and more aware of the possible harmful effects of hospital wastes.

The very fact that heaps of wastes dumped on a particular site in or outside the hospital or emission of incinerator fumes gives an impression in the citizen minds that they could be harmful to the society. Adding to this is the activity of rag pickers who pose a threat to the society.

However various studies carried out have revealed that the chance of getting infection from sharps on other wastes are very minimal.

3.4.3 On Environment

The air inside the hospital could be contaminated and contain bacteria or viruses from a grossly infected patient of Tuberculosis, Chicken Pox, Rabies etc. which could pose a threat to the community. Many a times excreta or other body fluids from laboratories, autopsyroom or mortuary could give rise to a foul smell around the premises. Liquid and other chemical wastes flowing out of the hospital is another potential hazard. Radioactive wastes are another serious threat to the environment if adequate measures of protection are not taken in to account according to the laid down procedures.

Many a times even treatment technologies like incinerators or microwaves could give out poisonous gases like furan, dioxene etc. or high amount of particulate matter or other chemicals.

General wastes accumulated for a greater period of time might be a breeding ground for many organisms.

3.4.4 On Hospital Acquired Infection

We shall in this section discuss in detail about the hospital acquired infection and the implication of hospital wastes on the same. The various modes of transmission are:

a) Aerial route

b) Oral route

c) Contact route

d) Parenteral route

e) Through equipments and materials used

The sources and reservoir of infection could be:

i) Patients own flora

ii) The flora of another patient (Cross infection)

iii) Environmental sources

iv) Contamination by patients, attendants and hospital staff.

A host of micro-organisms could be responsible as;

- Enterococci
- Non hemolytic streptococci
- Anaerobic coccs
- Claustridium Tetani
- Flavo Bacterium
- Klebsilla
- HIV
- HBV

Therefore, the role of hospital waste in hospital acquired infection is of paramount importance.

Measures to minimise health risk due to medical waste:

a) Select safe or less hazardous substitute for chemical agents

b) Use closed storage for volatile agents

c) Use proper ventilation and exhaust fans as per norms

d) Use appropriate protective clothing with arrangements of disinfection and disposal.

e) Popularise use of colour and emblem code on container bags.

f) Introduce monitoring and surveillance for problem areas on high risk situation

g) Proper disinfection and sterilisation practices to be followed

h) Universal precaution measures to be followed

i) Hospital infection control committee to be formed with a microbiologist as its chairman and adequate delegated nurses, supervisors and paramedical personnel as members to monitor infection in the hospital.

Check Your Progress 1

1) List the various types of wastes generated in a hospital,

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.....

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2) What are the health hazards associated to hospital management?

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3) List the measures to be taken for minimizing the health risks due to medical wastes.

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4) According to which rules the following need to be handled:

a) Setting up of bio-medical based facility

b) Segregation, packaging and transportation of storage

c) Maintenance of records

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3.5 LEGAL AND ETHICAL ASPECTS OF WASTE MANAGEMENT

The notification served by the Ministry of Environment and Forests, Govt. of India on 27th—July, 1998 called as Bio-medical Waste (Management and Handling) Rules. These rules have been made by the Central Government, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act 1986.

Any violation to these rules are punishable by 5 years rigorous imprisonment or a fine or Rupees five thousand. The main rules are as under:

Bio-medical Wastes are to be handled only according **to these rules.**

Rule 6 pertains to:

Setting up of Bio-medical waste facility

Rule 6 (1) "Every hospital, nursing home, clinic by whatever name called, generating bio-medical wastes, shall install an incinerator or any other facility in the premises or shall set up a common facility in accordance with the directions given by the appropriate authority within a period of nine months from the date of commencement of these rules".

Rule 12 emphasizes:

Responsibility of generators and operators of bio-medical waste facility.

Rule 12 (1): "a generator or operator of bio-medical wastes facility shall take all measures as the Central Government may, with a view to preventing damage or adverse effect to the environment and the life sustained in it, notify in the official gazette from time to time in this behalf."

Rule 12 (2): "A generator or operator of a bio-medical waste facility shall house in the month of January every year a detailed information about the types and quantities of bio-medical wastes collected or handled by him during the preceding year to the appropriate authority.

Rule 13 deals with:

Segregation, packaging, transportation and storage.

Rule 13 (1): "An authorized person handling any bio-medical waste shall segregate all categories of such wastes prior to its storage, transportation, treatment and disposal."

Rule 13 (2): "All segregated wastes shall be subject to specific treatment and disposal methods as given in Schedule IV."

Treatment and disposal

Rule 14 (1) : "All bio-medical wastes shall be treated and disposed off strictly in accordance with the treatment options specified in Schedule IV."

Rule 14 (2): "All such wastes which are required to be destroyed by incineration or any other treatment and disposal option specified in Schedule IV and duly approved by the appropriate authority shall be heated and disposed off only in a facility authorized under these rules."

Rule 14 (3): "All such wastes which are not incinerable shall be prc-treated, disinfected and shall be disposed off in an environmentally sound manner by the authorised person in such sites identified by the appropriate authority for this purpose."

Rule 14 (4): "All sdch wastes arising from handling of living or non-living pathogens and genetically engineered organism or products therefrom shall be treated and disposed off by such methods as the Central Government may, notify in the official Gazette."

Rule 14 (5):" "No person shall dump, discharge or dispose or cause to be dumped, buried, discharged or disposed any such waste in any place other than a site identified for the said purpose by the appropriate authority."

Rule 14 *(6):* "Every authorised person shall take all precautions and safety measures including the provision of protective clothing, masks, gloves, gum boots and such other protective aids as may be necessary for affording protection, to all the persons engaged in handling bio-medical wastes or exposed to such wastes, against infections due to handling or exposure to bio-medical waste. Washing and bathing facilities shall be provided in such premises."

Rule 14 **(7):** "All treatment and disposal facilities shall be located at the specified area away from general services area of the hospitals, nursing homes, veterinary institutions and other organisations. For the common facility, suitable sites shall be identified by the appropriate authority and shall be located in areas away from public places and residential areas."

Rule 14 **(8):** "All plastics shall be disinfected and shredded and shall be disposed off in an environmentally sound manner or shall be recycled by reprocessing the shredded wastes."

Rule 14 **(9):** "The treatment and disposal of all such wastes shall be in accordance with the standards prescribed in Schedule V."

Rule 14 (10): "Every hospital, nursing home, clinic, laboratory, by whatever name called, generating bio-medical wastes shall not dispose off such wastes on open land, municipal dustbin and let the untreated liquid into the sewers."

Rule 14 (11): "No person shall recycle or reuse or cause to be recycled or reused any such waste except glassware. Provided that such glassware are disinfected and reused for in house purpose only."

Rule 15 declares the necessity of:

Maintenance of Records.

These records, as the rule notifies, shall be subject to inspection and verification by the appropriate authority from time to time.

3.6 WASTE CLASSIFICATION, COLLECTION, SEGREGATION AND STORAGE, TREATMENT AND DISPOSAL

Collection of the garbage and its segregation at source in the first step of management, it is the key to whole process,

For streamlining the process, waste has been classified and is stored in different coloured bag, receptacle and the staff should be able to recognise the appropriate container for each particular type of waste:

Classification used in developing countries:

a) General Non hazardous wastes – **Black** colour

b) Sharp (whether infected or not) – Yellow

c) Infected wastes (not containing sharp) – Yellow colour

d) Chemical and pharmaceutical other than cytotoxic drug, rodioactive wastes, high pressure container – Red **bag**

e) Clinical waste that required autoclaving – Blue bag.

Container and colour coding for disposal of bio-medical wastes
(As per proposed MOEF guidelines)

Waste Category	Waste Class	Types of Container	Colour Code
Category 1	Human anatomical Waste, blood and body fluids	Single use containers/ plastic holding bags	Red/Yellow
Category 2	Animal and slaughter house waste.	Single use containers/ plastic holding bags	Orange
Category 3	Microbiological and Biotechnologics wastc	Single use containers/ plastic holding bags	Yellow
Category 4	Waste sharps sturdy containers of	Reusable/single use plastic glass or metal	Yellow/Blue
Category 5	Discarded medicines	Reusable/sturdy cardboard/glass/plastic holding bags	Yellow/Blue
Category 6	Solid wastes	Plastic bags/Sac	Yellow/Black
Category 7	Disposables	Reusable/sturdy containers/plastic holding bags	Yellow/Black
Category 8	Liquid waste	NA	NA
Category 9	Incineration ash	Plastic bags/Sac	Black
Category 10	Chemical waste	Plastic holding bag	Black

Labelling

Use of label/symbol is useful in identifying type of waste, which will be helpful in taking further steps for treatment and disposal. Some of the important labels/symbols are mentioned below:

Recommended colour coding by Sulabh International Institute of Health and Hygiene

Use of minimum number of colours which is quite in agreement with the suggestions by the team from A.I.I.P.H. Calcutta.

As per present practice since no segregation of solid waste is carried out at source, it would be not practical to introduce segregation of solid waste in 10-12 category containers at the source. Rather it is considered to be appropriate in our country to introduce immediately three container system in each point of generation of solid waste (wards/laboratories etc.) in hospitals. Sulahh Institute of Health and Hygiene team of study also share the same view.

It is recommended to introduce following containers in each ward, laboratory etc. for segregating solid waste at the source of generation.

The colour coding varies from nation to nation. It is essential that this should be standardised at national level.

Category		Type	Waste Category
A	Green Container	Covcrcd	General waste (food waste, kitchen waste i.e. Putrescible part)
B	Red Container	Covered	Microbiological;Surgical, Human Anatomical organs, Tissues, blood and body fluids etc.; Pathological infectious waste contaminated with blood, secretion etc.; Soiled Cotton Dressing, bedding; Animal Waste; Research laboratory waste etc. (incinerable)
C	Yellow	Covered	Disposables, plastics, PVC, Polythene, sharps e.g. needles, blades, scalpels etc.; Cardboard, Thermocoals, discarded Glasswares etc.

The container for storage may be:

A) ***Dustbin with lid:*** The dustbin should be used to collect garbage with cover. It should be made ofplastic or metal and be fitted with cover to limit problems with flies or insects, small enough to be carried. It should not be easily destroyed by rats, cats or dogs.

B) ***Plastic bag:*** *It* may be suspended inside a frame that has a lid to cover the opening of the bag at the top or inside. A rigid ring with the top fold over the rim of the bin will entail extra expenditure.

C) ***Plastic bins***

D) Metal birrs

E) ***String paper sacks*** (made of craft paper, which retains its strength even when wet.)

The extra expenditure in buying plastic bags is insignificant and recommended on the grounds of improved hygiene and convenience

The reusable containers should oe smooth and well rounded and should be cleaned and disinfected regularly, tailing which there may be chances of developing unpleasant odour and problem with flies.

The size and number of receptacles should be decided keeping in view the expected amount of waste produced in different unit which should be collected twice a day or more often from operation theatres or intensive care rooms.

The containers should be:

Not too heavy, smooth and rounded, and maximum size of 100 litres for dry waste and 50 litres of waste water. It can be then easily handled by one man.

Each receptacle should be closely labeled to show the ward or room where it is kept. The plastic bags should be marked with room number before use. This precaution detects and avoids incident or accident caused by waste.

Plastic bags should not be filled completely so that it should be possible to seal and tie it without difficulty.

Sharp Objects

Sharp objects pose dangers due to following reasons:

- Needles act as reservoir of pathogen in which the pathogen may survive for a long time due to presence of blood.
- Sharps enter directly into blood stream by puncturing the skin.

- Due to great demand of syringes there is great rush to procure syringes and needles in hospital wastes.

Containers/Bags for sharp

Sharp should be collected in separate container. Criteria of special bag should be:

Firmly closed, it should have minimal dangers of contents spilling or falling out, strong enough not to bc punctured and leaked out.

It should be provided with handle, which is not part of any close device.

A special system should be used which encapsulates the sharp in polymer, which is formed when water is added to powder that is kept at bottom of the sharps container. Encapsulation prevents scattering of needles if the containers get damaged.

Other types of containers may be used like discarded tins and milk powder tins.

It should have a horizontal line to indicate when the container is ¾ full.

It should be preferably made of materials, which can be incinerated.

It shouldcomply with the specification given in British Standard 7320 : 1990.

Sharp used at home by nurses visit or self treatment, as in diabetic cases, should never be deposited with domestic soiled waste. They should be stored in hard plastic or metal. Awareness and public programme can tackle this problem.

Garbage **collection** centres

Covered and protected garbage collection centres should be used for collection of general waste.

Central storage area

Prior to-incineration on site or prior to transport for disposal of site, clinical waste is required to be stored, treated separately from general waste storage area and should be clearly identified with clear warning sign.

This area should be kept locked with key available to staff throughout 24 hours.

Only authorised persons are allowed to enter. It should be easily accessible to internal transport and office transport.

Location

It should be constructed away from hospital building, food preparation and storage area, and public places.

Construction

It should be covered, situated on wide drain with innpervious hard standing, well lit, well ventilated, and protected from entry by animals and insects.

Capacity

It should contain a minimum capacity of two day storage.

Removal

It should be removed daily for disposal.

Refrigerated storage

It is required for hospital where wastes have to be stored in bulk for up to 48 hours prior to collection for disposal.

Freezer unit will serve the purpose where water is less frequent than once every day.

Storage for Smaller Units

Since half life of most radioactive materials used in hospitals is in the range of hours or days or storage is needed for a month or so before disposal, and radioactive waste should be kept in suitable containers which prevent any dispersion of contents.

A plastic bag or large container can or drum is appropriate container, it should be closely labeled to show:

The radio nuclides (S) name, and activity on a given date and period of storage required and the containers should have radioactive symbol and marked Radioactive *Waste*.

Container with radioactive waste should be stored either in a specifically marked a general store for radioactive substance or in a store reserved for radioactive waste.

Handling and Transfer

Handling and transfer leads to closer contact with wastes, leading to high hazards. Attention should be focused on following points:

The transportation of clinical waste off site should be carried out in specially designed vehicles, with a fully enclosed body and a bulk head separating the drivers compartment from the local compartment.

Safety Precautions

It is responsibility of management to ensure safety. The measures are:

- Employee should be provided with approvedprotective clothing and footwear,
- Training should be imparted to drivers, collectors and other handlers on risks of the waste, other instructions, precautions taken in the event of spillage by accidents.
- Services of emergency telephone should be made available.
- They should be protected by immunisation.

VehicleTrolley for Transport

Various types of vehicles are being used for transfer of waste:

A) Wheel Barrow

Small transport vehicles, like wheel barrow can be used for small quantity of garbage, which can be made of different sizes. With certain modification it can be given the shape of covered vehicle,

B) Cycle rickshaw garbage carrier

For smaller medical units and even in bigger units it can be uscd as transfer vehicle to carry waste, it can be divided in two compartments, one for biodegradable and another for non biodegradable waste, .

C) Garbage lorry

Garbage should preferably be carried by covered lorry. Waste cardboard, waste paper, etc. can be carried by open trolly.

A vehicle uscd for the transport of bags of clinical waste should be fitted with a fully enclosed body, lined internally with stainless steel or aluminium to provide a smooth impervious finish for easy and effective cleaning, all corners and angles should be covered to prevent lodgements of waste matter. A bulkhead should separate the drivers compartment from the load compartment. The load compartment should be refrigerated particularly for transporting clinical waste over long distances in hot climates. The load compartment of an

unrefrigerated vehicle for transporting waste over short distances should be provided with the ventilation system, e.g. root vents.

Clinical waste collecting van should not be used for any other purpose. The load identification sign using the biological hazards label and the name and address of the haulier, together wit11 his telephone number, must be shown on the sides and rear of the vehicle when collecting and transporting clinical waste.

The following points must be kept in mind:

- They should not have sharp edge, which could tear open waste bag during loading and unloading.
- It is properly and carefully designed.
- It should be technically and manufacturally strong so that minimum effort and inconvenience is experienced.
- Waste in categories BCDE (i.e. except all non-hazardous waste) should never be transported with general municipal waste.
- Special vehicle should be used for hazardous waste to prevent access to direct contact with wastes by transport operator, the scavengers and the public.
- Open topped skips should never be used for the transportation of clinical waste.

Waste Duct in the **Hospital**

In some modern hospitals pneumatic pipe line transport system is used for waste movement. While such system reduces the need for manual handling of waste, they can give rise to hygienic and technical problems. The disadvantages are:

- It ends to scatter waste.
- It emits foul odour.
- It generates insects.

Cleaning and Disinfection of Transport Vehicles

Vehicles used for clinical waste collection shall be thoroughly cleaned and disinfected immediately following any internal spillage. The cleaning should be carried out on a proper surfaced area with the drainage running to the foul sewer. They should carry at all times supply of plastic bags, protective clothing, cleaning tools and disinfectant to cleanse and disinfect any matter or thing which has been contaminated by any spillage of waste during loading, transport or unloading.

Documentation of Consignment

Correct documentation and recording of clinical waste is necessary to comply with the Environmental Quality (Scheduled Wastes) Regulations, 1989, which require a consignment note stems to be implemented for the transport of waste from the hospital to the incinerator (as practiced in Malaysia vide Environmental Quality Regulation Act, 1989).

Example: **Consignment** note for transport of waste **from** hospital **to** the incinerator

For the carriage and disposal of clinical and related wastes:

- Name of the hospital,
- Name of officer incharge wastes, in hospital,
- Quality of waste collected,
- Name of collection driver and his signature, and
- Operator at disposal site.

Treatment

Treatment is a process by which waste is modified before it is finally disposed off, so that it can no more act as source of pathogen.

The reasons for treatment are:

- To make waste free from microorganism.
- To reduce in volume for better transport and storage.
- To make part unrecognizable to become more acceptable, and
- To convert it more unusable like syringes and needles.

Disinfection

It is a process of distribution or removal of pathogen which gives rise to infection. I-Iospital waste in category of infectious waste should be disinfected before final disposal as it contains pathological micro-organism responsible for diseases.

Disinfection should not be used if sterilization facilities are available.

Indication for use of disinfection

Disinfection is required in following situation.

Instruments and equipment that come in contact with skin mucous membrane before use of any skin piercing instrument or equipment.

Contaminated instruments and equipment, and contaminated floor, surface like that of trolley tops, table tops, trays, cloths, beddings, beds, crockcry, enamel, stainless steel utensils and other articles like bed pan, milk bottles ctc. and wards and O.T. from time to time.

Methods of disinfection/sterilisation

a) Thermal

   Dry

   Wet

b) Chemical (Formaldelyde, ethylene oxide, etc.)

c) Physical methods

   Irradiation

   Microwaves

   Ultraviolet

Test of Disinfection

It is preferable to carry out an independent test to determine and confirm the desired dilution necessary for particular purpose.

Capacity test (Kalsey and Sykes, 1969) (Source: HAI Guidelines, Health Deptt., Govt. of India)

The capacity tests are designed to simulate the natural conditions under which the disinfectants are used in hospitals. The main features of the test is that instead of one addition of a large inoculum of the test organism, the additions arc made in increments with or without organic matter. This gives a measure of the capacity of the disinfectant to cope with successive bacterial invasions.

Procedure

1) Prepare the disinfectant dilutions in water of 300 ppm hardness. Any number of concentrations may be tested, however, the critical ones are the recommended dilution, and dilutions 25 per cent stronger and 25 per cent weaker than the recommended dilution.

2) The inoculum is prepared in clean or dirty condition. The clean inoculum is prepared by suspension of the test bacteria in broth to concentration of 10^{0}C.F.U./ml. The dirty inoculum is prepared by suspending test bacteria to a concentration of 10" C.F.U./ml. in 20 per cent in activated horse serum or 2 per cent yeast suspension.

3) Disbibute the disinfectant dilutions in 2 ml. Aliquots in two rows of tubes. Add 1 ml. of the clean bacterial suspension to the first row and 1 ml. of dirty bacterial suspension to the other.

4) Remove a sample after eight minutes and transfer tive drops on the surface of a nutrient agar plate by a dropper pipette (50 drops/ml. capacity).

5) Two minutes later, i.e. 10 mt., after the first addition add a second increment ofbacterial suspension. Sample after 8 minutes as before.

9 Repeat the process after 8 minutes, thus giving a total of three increments.

The plates are incubated at 30 to 32°C for 48 hours before reading the number of colonies in each drop are counted. The disinfectant is regarded satisfactory at the said dilution, if the number of colonies from the five drops collected after the second increment is not more than five.

The in-use tests of Kelsey and Maurer (1966) are performed to check the end results of disinfection. Samples are taken from disinfectant dilutions in use in the hospitals for any purpose such as the thermometer, cheatle forceps, laboratory fluids, mopfluid etc.

Procedure

Transfer one ml. of the disinfectant fluid into a tube containing 9 ml. of the diluent. The diluents used for different groups of disinfectants are listed below:

1) Nutrient broth for alcohols, aldehydes, hypochlorites and phenolics.

2) Nutrient broth containing twin 80 (3 per cent) for disguanides hypochlorite detergent mixtures, lodiophores, phenolic detergent mixtures and quartemary ammonium compounds.

Withdraw a small dilquot with a 50 ml. dropper pipette and place 10 drops separately on the surface of nutrient agar in duplicate, incubate both the plates for 72 hours one at room temperature and the other at 37°C Growth from more than five of the ten drops in either of the plates indicates a failure of disinfection,

Disinfectants can be used at a concentration/dilution indicated against them for clean and contaminated situation.

Chemicals

Disinfection by use of chemical by ethylene oxide gas, it is used commonly for sterilisation of plastic disposable materials, live syringes and needles transform sets, etc. it is inferior to heat and radiation.

Disinfectants

Concentration/dilutions of the different disinfectants to be used in clean contaminated and grossly contaminated conditions.

(*Source:* HAI Guidelines for Control, Health Deptt., Govt. of India.)

Recommended Concentration/Dilution		
Disinfectants	**Clean Contaminated**	**Grossly Dirty**
1. **Chlorine releasing compounds**	0.1%	1.0%
- Sodium Hypochlorite	1 g/l (100 p.p.m.)	10g/l (10.000)
- Liquid bleaches usually 5% available Chlorine.	200 ml/l	200 ml/l
- Calcium hypochlorite (Usually 70% available chlorine)	1.2g/l	14.0g/l
- Sodium-dichlorisoisocyanurate (NaDCO) (Usually 60% available chlorine) (More stable, available as tablet!; of 1.5 g available chlorine)	17.0/g/l	1.7 g/l
- Chloramine Slow chlorine release (More stable than 1.2) (25% available chlorine)	20g/l	20g/l
2. **Iodine compounds**		
- Tincture of iodine (Iodine 0.5% + alcohols 70%)	2.5%	2.5%
- Polyvidone iodine (PVI) (Usually 10% Sol. (1% iodine) Polyvidone iodine (Betadine)	2.5%	2.5%
3. **Aldehydes**		
- Glutaraldehyde (Activated) (Cidex: 2% Glutaraldehyde)	2.0%	2.0%
- Formaldehyde-formaline (40% Sol. of Formaldehyde end 10% Methanol in water.	5% 2% formaldehyde	10% 4% formaldehyde
4. **Alcohols**		
- Ethylalcohol	70%	70%
- Isopropylalcohol	70%	70%
- Methylated Spirit (Denatured alcohol)	70%	0%
5. **Hydrogen Peroxide** (30% stabilised sol.)	6% (freshly prepared)	not recommended
6. Phenolic **compounds**		
- Phenol (Carbolic acid)	5.0%	10%
- Cresol	2.5%	5.0%
- Lysol (Saponified crcsol)	2.5%	2%
7. **Chloroxylenols**		
- (4.8% V/V is marketed as Dettol)	4.0%	10.0%
- 1 + 0.1% EDTA	3.0%	6.0%
8. **Diguanides**		
- Chlorohexidine (1.5% V/V) (Habitant)	5.0%	10.0%
- Chlorohexidine + Cetrimide (Savlon)		
9. Ethylene **Oxide gas**	450-800 mg/l	

The choice of disinfectants depends on number of factors such as effectiveness, stability, availability and price.

Proposed Method for disinfection of commonly used articles/materials/surface in order of preference

All articles and surfaces to be disinfected, must first be cleaned and washed with warm water preferably containing detergent.

Materials	Methods
Ampoules	Disinfect with alcohol/Methylated spirit/PVI before cutting
Skin	Tr. Iodine/alcohol
Thermometer	Keep in gluteraldehyde/PVI/Hexachlorophenes/Chlorthexidine + cetramide (savlon) for at least 10 minutes before next use.
Articles/Ware/Stainless steel/Enamel plated/ Plastic, **e.g. Bottles/Bowls**	Wash with warm detergent, disinfect with carbolic acid/chlorine releasing compound/PVI/Formaldehyde/Phenolic compounds, chloroxylenols/Hexachloro phenes/Chlorhexidine
Surface	
Floor/Walls/Trolleys/ Furniture/Sinks/Wash basins	Wash with detergent, disinfect with chlorine releasing compound/carbolic acid/PVI/Hexachlorophene
Humidifiers and Incubators	Fill daily humidifiers with sterile distilled water containing 0.1% silver nitrate. Clean and disinfect with chlorine releasing compounds/ activated glutaraldehyde/alcohol or carbolic acid.
Crockery/Cutlery	Wash with warm detergent solution, keep boiling water for 10 minutes, expose to steam. No chemical disinfectant should be used.
Laboratory	Phenolic compounds, (carbolic acid) chlorine releasing compounds/ chlosoxylenolsand hexachlorophene
Syringes and needles	Chemical disinfectant must not be used for needles and syringes.
Instruments	Keeping concentration recommended for grossly oneatle forced contaminated articles, or PVI/chloroxylenols, glitter aldehyde. Change the disinfectant daily.
Equipment	
Catheters/Cystoscope/ Endoscope/Laproscope	Chemical disinfection only as last resort, if sterilisation by heat is riot possible. Immerse in activated solution of Gluteraldehyde/ carbolic acid for 4 to 10 hours or more.

Only vegetative bacteria, fungi and viruses are killed by immersing in surface disinfectants for 30 minutes.

Other Methods of sterilisation and high level disinfection in health care settings.
(*Source:* I-IAI Guidelines for Control, Govt. of India, 1992)

Heat

1) ***Moist***

A) ***Above*** 1000°C

Autoclave; steam under pressure usually 15 p.s.i., (LBS/sq/in) equivalent to 121°C for 20-30 minutes. A pressure of 30 psi equivalent to 140°C for 5 minutes can be used rarely.

i) Simple autoclave.

ii) Steam jacketed autoclave is most suitable for hospital practice.

iii) Pressure cooker achieves 15 p.s.i. equivalent to 121 °C for 20-30 minutes, can be used for sterilisation.

There are two types of pressure cookers i.e. Household pressure cooker, WHO/UNICEF modification of pressure cooker.

B) *At 100 °C*

Boiling for 20-30 minutes, is used for instruments and equipment when autoclaving is not possible, achieve high level of disinfecting.

C) *Below 100 °C*

Low temperature steam formaldehyde (LTSF) sterilizer; steam at subatmospheric pressure at a temperature of about 75 °C. With formaldehyde vapours holding time usually 1 hour.

2) ***Wet Heat***

Sterilisation by moist heat steam under pressure is done by various types of autoclaves. It is achieved through autoclaving at 160° C under high pressure.

In 1978 the first commercial steam steriliser was set up in California to process medical infectious waste.

It practically reduces waste volumes, plastic materials meet and get disfigures.

The waste in biogas is placed in sealed pressurised chamber and heated up to 250° C for approximately 30-60 minutes.

There is emission of offensive and toxic substance with odour.

Hydroclaving whose steam is produced by providing thermal energy through steam of jacketed chamber (Conadian technology) The pressure and temperature consideration is shown below in the chart:

Gauge Pressure	Temperature in	Degrees	Centlgrnde
Pressure above atmospheric (I B./sq.in.) (p.s.i.)	Complete alr discharge	Half air discharge	No air discharge
10	115	105	100
15	121	112	100
20	126	118	109
30	135	128	121

3) ***Dry Hent***

Hot air oven: 160 °C-180 °C for 60-120 minutes.

A method of choice for sterilisation of glass ware, including all glass syringes, blunt instruments and materials impervious to steam or water like waxes, petroleumjelly, oil and powders.

High Level of Disinfection

It is a process of destroying all microorganism. However some spores may survive particularly if initially present in large number.

By exposing to vapour of ethylene oxide (ethylene oxide steriliser) and formaldehyde (formaldehyde disinfector) and low temperature steam formaldehyde steriliser.

By soaking in chemical disinfectant and like activated solution of glutaraldehyde and carbolic acid for prolonged period.

Indicated in sterilisation of

- Instrument and equipment like vaginal speculam, proctoscope, laryngoscope, flexible fibroelastic endoscope, etc., which come in contact with membranes.
- Chemical disinfectants must never be used for syringes and needles.

Microwave

It is being used in the *USA*.

Microwave heats the material by energising water molecule and the substances get heat from inside to outside the mass.

The technology started in early 1980s in Germany. It has been approved in 40 states of the *US*, including Canada, European and Brazil, the first being installed in West in Salem North Carolina in 1990. It is also approved by CPCB of India.

The method consists of placing the sealed bags on a bucker hoist. See details in technology description.

There are two types

A) Small microwave ovens of small quantity of wastes in laboratories.

B) Large microwave systems for treatment of large quantities.

Pressure (p.s.p.)	Temperature	Holding time (Minutes)
10	115-118	30
15	121-124	15
20	126-130	6
30	134-138	3

Satisfactory sterilisation can be achieved at 15 p.s.i./(IBS/sq. inch) pressure and a temperature of 121°C in 15-20 minutes (holding time). Household pressure cookers can achieve a pressure of 15 p.s.i. of steam and can be used with caution for sterilisation.

An inexpensive substitute for an autoclave has been developed by WHO and UNICEF by modifying pressure cooker.

An electric or gas oven can be used for sterilisation of instruments (blunt instruments, all glass syringes, glass ware) and material (wax, oils, powder, etc.) which are impermeable and can be used for this purpose the holding for 60 minutes to 120 minutes depends on the contamination of the materials to be sterilised and temperature achieved.

a) By boiling : At least 20-30 minute boiling is essential.

b) An electrical gas oven can be used for sterilisation of instruments (blunt instruments, all glass syringes, glass ware, etc.) and materials (wax, oil, powder etc.)

c) Use of solar energy for heating process should be considered for use where facility is available.

Irradiation

It is a new technology process which is difficult to operate and maintain X-rays or gamma rays have been used. Shredding or milling Is done for aesthetic reasons, it is used for sterilisation of plastic and other materials that can be damaged by heal.

It is more expensive than chemical and thermal methods.

Mechanical/Chemical Technologies

This method was introduced in mid 1980s. It consists of shredding waste using shredder or hammer and will include Pulverization. Waste is treated with liquid disinfectant (Sodium Hypochlorite). Further improvement has been made to include recirculation/recycling of liquid and counter current operation so that discharges are free from disinfectants.

There are chances of occupational exposure hazards.

Filtration

Liquid and solution of heat liable substances can be sterilised of filteration.

Types of filters used for bacteriological purposes are:

- Earthen Ware
- Asbestos
- Sintered glass
- Members of cellulose and other polymers.

The first three work satisfactorily. They retain bacteria but not viruses.

Disinfection of Linen, Blanket, Mattresses

Staff dealing with medical waste should also know important aspects of this problem.

Linen

The linen used by patients, doctors and paramedical staff may get contaminated when soiled with blood, pus, faeces or any other body fluids. These can be reused after disinfection. Though it is not waste, still it is proper to mention some important aspects.

The contaminated linen should be disinfected before going to Dhobis (Washerman).

Disinfection of linen is done by:

- Boiling
- Autoclaving with low pressure steam, and
- Chemical disinfectants.

Blankets

They are handled by:

- Exposing to Formaldelyde vapour, and
- Autoclaving,
- Liquid disinfectant can damage woollen blankets
- Dry cleaning it does not kill HIV.

Mattresses should preferably be covered with water proof material like rexin or plastic. It is done by autoclaving (big size) working in Delhi at some places.

Check Your Progress 2

1) Describe in brief the classification used in developing countries for collection and segregation of garbage.

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2) What are the measures of safety programmes to be taken for handling hospital wastes'?

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3) What are the reasons for treatment of hospital waste?

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4) List the methods of disinfection/sterilisation.

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5) How the disinfection of linen, mattresses and blankets are done'?

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3.7 MANAGEMENT ISSUES

Now you will learn about some of the important managerial issues involved in the management of hospital waste. These include:

i) The human element is more important than the technology. Almost any system of treatment and disposal that is operated by well trained and well motivated staff can provide more protection for staff, patients and the community than an expensive or sophisticated system that is managed by staff who do not understand the risks and the importance of their contribution,

ii) The management of medical waste requires diligence and care from a chain of people, starting with the nurse or doctor who use the equipment and supplies that become waste, continuing through to the hospital attendant or ancillary staff who provides clean bags or containers and carriers away the waste, on to the mechanics and technicians who keep the vehicles and equipments in good condition, and finishing with the person responsible for ensuring that waste is disposed off in the correct way. If any of these are careless in their work, or allow scavengers access to the waste, the chain is broken and dangers follow.

iii) The education of the general public is also important. For every patient in the hospital there may be a number of visitors, and in many hospitals families need to stay with the patient and provide food. The visitors have to be explained the behavioural requirements of the hospital with regard to hygiene and this should be done by the nursing staff and auxiliaries. Posters and leaflets should be used to bring about awareness. The general public outside the hospital gates are also affected because of the likelihood of waste being recycled; both children and adults should be aware of the

risks posed by medical waste, so that they keep away from risks themselves and warm the authorities if they see unacceptable practices.

iv) All staff, including those in waste disposal, should have regular medical check-up, and information generated by these check-ups used to evaluate procedures and precautions. Information on disposal practices and facilities should be disseminated and used, for the guidance of others and where there is a possibility of co-ordination or sharing facilities.

Issues for effective management of hospital waste:

1) Basic: water supply, cleanliness, sanitation.
2) Switch to recyclable – minimize waste.
3) Tighten security to avoid illegal trading of waste.
4) Consider legal, controlled recycling.
5) Education and awareness for proper segregation.
6) Chemical disinfection of waste at source.
7) Explore non-burn treatment/disposal strategies.

Formation of Hospital Waste Management Committee/Team

The head of the Health Care Facility (hospital, nursing home, and clinic) shall form a Waste Management Committee consisting of the following personnel:

Head of the Hospital: Chairman

Waste Disposal Officer: Secretary

Infection Control Officer

Heads of Departments

Chief Pharmacist

Additional Hospital Superintendent/Hospital Supervisor

Nursing superintendent

Hospital Engineer

Radiation Protection Officer

Stores Officer

Additional members may be appointed to this team whenever the need arises.

Wherever possible the Waste Disposal Officer may be formally appointed with overall responsibilities for the development of a Waste Disposal Plan and subsequent day to day operation and monitoring of the waste disposal system. The head of HCF may nominate another suitable officer who may be assigned the Waste Disposal Officer's responsibilities if no separate post is available,

Smaller hospitals may vary the number of members according to their need. A Waste Management Team can be formed with 3-4 members: Medical Superintendent, Waste Disposal Officer, Infection control officer, Nursing superintendent. The waste management committee shall meet once in every four weeks during the initial period of the formulation and implementation of the Waste Disposal Plan and thereafter every three months to review the system's performance. The waste disposal team should meet every week.

Functions and Responsibilities of the Members of the Waste Management Committee/Team

Head of the Institution

i) Shall apply for authorisation for the handling of biomedical waste,

ii) Shall be responsible for the implementation of the Government's policiesldirectives on hospital waste management.

iii) Shall be responsible for the segregation, treatment, collection, transportation and storage of waste within the hospital and the disposal by incineration or other means.

iv) Shall be responsible for the submission of annual detailed information about types and quantities of waste collected or handled in his institution, and for the reporting of accident.

v) Has a duty to inform the Ministry of Environment/Ministry of Health of any incorrect practices and procedures that may come to his notice in the final disposal of waste.

vi) Shall form a Waste Management Committee/Team to formulate a Waste Disposal Policy or Plan for the Hospital. Within this Plan, the duties and responsibilities of all members of staff both clinical and non-clinical shall be clearly defined and accountability indicated in the management of waste.

vii) Shall appoint a Waste Disposal Officer to coordinate and supervise the Waste Management Plan.

viii) Shall allocate adequate manpower and resources in terms of assigning hospital attendants, safai karamccharis and other ancillary workers for waste disposal and allocation of sufficient financial resources to ensure the efficient operation of waste disposal plan.

ix) Shall ensure that adequate training is given to key members both clinical and non clinical staff. He shall designate staff responsible for coordinating and implementing training courses.

Waste Disposal Officer

i) Shall have the day to day control of internal collection of waste containers and transport to the central hospital storage and then final disposal by incineration or other methods.

ii) Will be directly responsible to the Head of the Institution.

iii) The hospital supervisors, attendants and other workers assigned to collect and transport clinical waste shall be directly under the Waste Disposal Officer's line of management.

iv) The Waste Disposal Officer shall ensure that new waste bags and containers are ordered on a regular basis to maintain a continuous supply. He should liaise with the Stores Officer in the regard.

v) Shall ensure that hospital attendants and ancillary staff immediately replace used bags and containers with the correct new bag or container.

vi) Shall ensure that hospital attendants and ancillary staff immediately replace used hags and containers with the correct manner.

vii) The Waste Disposal Officer shall liaise with the Nursing Superintendent and Medical Superintendent and Heads of Departments to ensure that nursing staff and medical and paramedical staff are familiar with their responsibilities for segregation and storage.

viii) Shall liaise with Infection Control Officer, Pharmacist and Radiation Pi otection Officer (depending upon type of HCF) to familiarize himself with the correct procedures for handling and disposal of pathological, microbiological, pharmaceutical, chemical and radioactive wastes.

ix) Shall be responsible for the proper rise of the central storage facility for waste in the hospital, which shall be fenced with a lock at the entrance and caretaker.

x) Shall monitor methods of pretreatment/treatment of wastes, transportation of wastes on site and off-site.

xi) Shall be responsible for preparing statistics on the waste generated, maintaining the records and docuinentatiun.

xii) Shall ensure that the waste is not stored for more than 48 hours as per BMW Rules, 98.

xiii) Shall ensure that emergency procedures in case of accidents and spillages are available.

xiv) Shall ensure that alternative methods for disposal are available in the event of breakdown of incinerator.

xv) Shall investigate and review incidents reported during the handling of clinical waste. Shall report the accident.

Department Heads

i) Department Heads shall be responsible for the segregation, storage and disposal of waste generated in their departments.

ii) Shall ensure that all medical, technical and nursing staff in their departments are aware of the segregation and storage procedures.

iii) Shall liaise with Waste Disposal Officer to monitor working practices for failures or mistakes.

iv) Shall ensure that staff members are given training in waste segregation, treatment and disposal procedures.

Nursing Superintendent and Medical Superintendent

i) Shall be responsible for continuous monitoring of the waste segregation, treatment and storage systems at the site of generation.

ii) Shall liaise with Departmental Heads, Infection Control Officer, Pharmacist, Radiation Protection Officer to ensure that high standards of waste disposal procedures are maintained.

The Infection Control Officer

i) Shall advise and liaise with the Waste Disposal Officer on control of infection and maintaining the standards of waste disposal.

ii) Shall identify needs of all grades of staff. Shall organise training programmes for hospital staff on infection control connected with waste disposal.

Chief Pharmacist

i) Shall be responsible for liaising with other members of the Waste Disposal Committee/ Team to give advice according to the policy and guidelines on the safe disposal of pharmaceutical waste.

ii) Shall be responsible for the continuous monitoring of procedures for the disposal of pharmaceutical waste.

iii) Shall ensure that adequate training is given to personnel involved in pharmaceutical waste handling and disposal.

Radiation Protection Officer.

Have the same responsibilities as Chief Pharmacist but in regard to radioactive waste.

Hospital Engineer

i) Shall ensure that all waste storage facilities and equipment in the hospital for waste management are installed and maintained according to standards.

ii) Shall ensure that his staff are trained in principal of waste disposal.

iii) Shall ensure that his staff are trained in principles of waste incineration/autoclave/ microwave wherever the onsitc facility is installed.

Stores Officer

Shall liaise with Waste Disposal Officer and other members of the team to ensure a continuous procurement of materials and equipment according to the specifications laid down in Waste Disposal Policy and Plan.

Training and Teaching

Training is an essential component of Hospital waste Management and should involve all categories of staff, patients as well as visitors in the hospital.

Teaching of hospital waste management should be included in the medical and nursing curriculum.

Check Your Progresss 3

1) Name the members of the Hospital Waste Management Committee.

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2) List the issues for effective management of hospital wastes.

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3) What are the functions and responsibilities of Department Heads?

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3.8 LET US SUM UP

In this unit you have learnt that hospital waste management is more than a social issue or a social responsibility by the medical personnel, it is a law of the land.

All health care delivery centres e.g. clinics, dispensaries, laboratories, hospitals of all categories, Nursing homes etc. have to follow the rule and devise their own way of waste management, It is not very difficult creating an awareness and motivating them amongst fellow colleagues discouraging plastic disposable and using more and more of glass items, providing universal precautions and other supplies regularly and monitoring the waste management programme continuously will go a long way in making this a success.

3.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Porgress 1

1) a) General waste

b) Sharps

c) Infected waste

d) Chemical waste

e) Radioactive waste

f) Cytotoxic drugs

2) a) Injuries from sharps to all categories of hospital personnel and waste handlers

b) Nosocomial infections to patients from poor infection control and poor waste management

c) Risks of infections outside hospitals for waste handlers, scavengers, and (eventually) the general public and some times change in microbial ecology resulting in antibiotic resistance.

3) a) Select safe or less hazardous substitute for chemical agents

b) Use closed storage for volatile agents

c) Use proper ventilation and exhaust fans as per norms

d) Use appropriate protective clothing with arrangements of disinfection and disposal.

e) Popularise use of colour and emblem code on container bags,

f) Introduce monitoring and surveillance for problem areas on high risk situation

g) Proper disinfection and sterilisation practices to be followed

h) Universal precaution measures to be followed

i) Hospital infection control committee to be formed with a microbiologist as its chairman and adequate delegated nurses, supervisors and paramedical personnel as members to monitor infection in the hospital,

4) a) Rule 6

b) Rule 13

c) Rule 15

Check Your Porgress 2

1) a) General Non hazardous wastes – Black colour

b) Sharp (whether'infectedor not) – Yellow

c) Infected wastes (not containing sharp) – Yellow colour

d) Chemical and pharmaceutical other than cytotoxic drug, rodioactive wastes, high pressure container – Red bag

e) Clinical waste that required autoclaving – Blue bag,

2) ● Employee should be provided with approved protective clothing and footwear.

● Training should be imparted to drivers, collectors and other handlers on risks of the waste, other instructions, precautions taken in the event of spillage by accidents.

● Services of emergency telephone should be made available.

● They should be protected by immunisation.

3) ● To make waste free from microorganism.

● To reduce in volume for better transport and storage.

● To make part unrecognizable to become more acceptable, and

● To convert it more unusable like syringes and needles.

4) a) Thermal

● Dry

● Wet

b) Chemical (Formaldelyde, ethylene oxide, etc.)

c) Physical methods

● Irradiation

● Microwaves

● Ultraviolet

5) Disinfection of linen is done by:

- Boiling
- Autoclaving with low pressure steam, and
- Chemical disinfectants.

Blankets are handled by:

- Exposing to Formaldelyde vapour, and
- Autoclaving,
- Liquid disinfectant can damage woollen blankets
- Dry cleaning it does not kill HIV.

Mattresses should preferably be covered with water proof material like rexin or plastic. It is done by autoclaving (big size) working in Delhi at some places.

Check Your **Porgress 3**

1) a) Head of the Hospital: Chairman
   b) Waste Disposal Officer: Secretary
   c) Infection Control Officer
   d) Heads of Departments
   e) Chief Pharmacist
   f) Additional Hospital Superintendent/Hospital Supervisor
   g) Nursing Superintendent
   h) Hospital Engineer
   i) Radiation Protection Officer
   j) Stores Officer
   k) Additional members may be appointed to this team whenever the need arises.

2) a) Basic: water supply, cleanliness, sanitation.
   b) Switch to recyclable–minimize waste.
   c) Tighten security to avoid illegal trading of waste.
   d) Consider legal, controlled recycling.
   e) Education and awareness for proper segregation.
   f) Chemical disinfection of waste at source.
   g) Explore non-burn treatment/disposal strategies.

3) a) Department Heads shall be responsible for the segregation, storage and disposal of waste generated in their departments,
   b) Shall ensure that all medical, technical and nursing staff in their departments are aware of the segregation and storage procedures.
   c) Shall liaise with Waste Disposal Officer ta monitor working practices for failures or mistakes,
   d) Shall ensure that staff members are given training in woste segregation, treatment and disposal procedures,

3.10 FURTHER READINGS

Management of Waste from Hospitals and other Health Care Establishments, **EURO** Reports and Studies, 97, WHO, Regional Office for Europe, 1985.

Guide to Pollution Prevention; Select Hospital Waste Streams, EPA/625/7-90/009, Cincinnati, Ohio, June 1990.

Model Guidelines for State Medical Waste Management: The Council of State Governments, Kentucky, USA; 1992.

Training Package in Clinical Waste Management, Ministry of Health, Govt, of Malaysia, D.C.BSaw, 1993.

Survey of Hospital Waste Management in South East Asia Region, WHO, SEA/EH/493, 1993.

Managing Medical Waste in Developing Countries, WHOIPEPIRUDI94.1 *WHO* 1994.

Hospital Waste in India, University College, London Medical School and Emmanuel Hospital Association, India, M. Kerac, London; 1994,

Hand-book of Hospital Waste Disposal, Sanitation Division and Environmental Health Centres, Thailand, 1995.

Urban Solid Waste Management India: Report of the Hight Power Committee, Planning Commission, Govt. of India, 1995.

Guiding Principles and Practices for the Sound Management of Hazardous Hospital Wastes: WHO, Regional Consultation on Sound Management of Hospital Waste, Chiang Mai, Thailand, 1996.

Hospital Waste, A Dangerous Infusion, Iqbal Malik, *A* Vatavaran Report, New Delhi; 1996,

Final Report on Hospital Waste Management, West Bengal Pollution Control Board; All India Institute of Hygiene and Public Health, Calcutta; 1997.

Health Care Waste Disposal: An Exploration, M.S Ramaiah Medical College. Bangalore, 1997.

Managing Hospital Waste: A Guide for Health Care Facilities, Shristi, Sept., 1998,

Hospital Waste Management: An Integrated Approach: Sulabh International Institute of Health and Hygiene, New Delhi; 1998.

Internal Medical Waste Management (Draft). A Basic Guide for Central and Eastern Europe, E.C. Cole, Dyncorp, North Carolina, USA.

Annexure 1

MINISTRY OF ENVIRONMENT AND FOREST NOTIFICATION

New Delhi, 20th July 1998

S.O. 630 (E). Whereas a notification in exercise of the powers conferred by Sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986) was published in the Gazette vide S.O. 746 (E) dated 16 October, 1997 inviting objections from the public within 60 days from the date of the publication of the said notification on the Bio-medical Waste (Management and Handling) Rules, 1998 and whereas all objections received were duly considered.

1) Short Title and Commencement

1) These rules may be called the Bio Medical Waste (Management and Handling) Rules, 1998.

2) They shall come into force on the date of their publication in the official Gazette.

2) Application

These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio-medical waste in any form.

3) Definitions: In these rules unless the context otherwise requires:

1) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);

2) "Animal House" means a place where animals are reared/kept for experiments or testing purposes;

3) "Authorisation" means permission granted by the prescribed authority for the generation, collection, reception, storage, transportation, treatment, disposal and/or any other form of handling of bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;

4) "Authorised person" means an occupier or operator authoriscd by the prescribed authority to generate, collect, receive, store, transport, treat, dispose and/or handle bio-medical waste in accordance with these rules and any guidelines issued by the Central Government;

5) "Bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in the production or testing of biological, and including categories mentioned in Schedule 1;

6) "Biological" means any preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in the diagnosis, irnmunisation or the treatment of human beings or animals or in research activities pertaining thereto;

7) "Bio-medical waste treatment facility" means any facility wherein treatment, disposal of bio-medical waste or processes incidental to such treatment or disposal is carried out;

8) 'Occupier" in relation to any institution generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called, means a person who has control over that institution and/or its premises;

9) "Operator of a bio-medical waste facility" means a person who owns or controls or operates a facility for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste;

10) "Schedule" means schedule appended to these rules.

4) **Duty of Occupier**

It shall be the duty of every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

5) **Treatmentand Disposal**

1) Bio-medical waste shall be treated and disposed off in accordance with Schedule I, and in compliance with the standards prescribed in Schedule V.

2) Every occupier, where required, shall set up in accordance with the time schedule in Schedule VI, requisite, bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatrnent of waste, or, ensure requisite treatment of waste at a common waste treatment facility or any other waste treahnent facility.

6) **Segregation, Packaging, Transportationand Storage**

1) Bio-medical waste shall not be mixed with other waste.

2) Bio-medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II prior to its storage, transportation. treatment and disposal. The containers shall be labeled according to Schedule III.

3) If a container is transported from the premises where bio-medical waste is generated to any waste treatment facility outside the premises, the container shall, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV.

4) Notwithstanding anything contained in the Motor Vehicles Act, 1988 or rules thereunder, untreated bio-medical waste shall be transported only in such vehicle as may be authorized for the purpose by the competent authority as specified by the government.

5) No untreated bio-medical waste shall be kept stored beyond a period of 48 hours: Provided that if for any reason it becomes necessary to store tlie waste beyond such period, tlie authorized person must take permission of the prescribed authority and take measures to ensure that tlie waste does not adversely affect huinan health and the environment.

7) **Yrcscribcd Authority**

1) The government of every State and Union Territory shall establish a prescribed authority with such members as may be specified for granting authorisation and implementing these rules. IS the prescribed authority comprises of more than one member, a chairperson for tlie authority shall be designated.

2) The prescribed authority for the State or Union Territory shall be appointed within one month of the coming into force of these rules.

3) The prescribed authority shall function under the supervision and control of the respective Government of the State or Union Territory.

4) The prescribed authority shall on receipt of Form I make such enquiry as it deems fit and if it is satisfied that the applicant possesses the necessary capacity to handle bio-medical waste in accordance with these rules, grant or renew an authorisation as the case may be.

5) An authorisation shall be granted for a period of three years, including an initial trial period of one year from the date of issue. Thereafter, an application shall be made by the occupier/operator for renewal. All such subsequent authorisation shall be for a period of three years. A provisional authorisation will be granted for

the trial period, to enable the occupier/operator to demonstrate the capacity of the facility.

6) The prescribed authority may after giving reasonable opportunity of being heard to the applicant and for reasons thereof to be recorded in writing, refuse to grant or renew authorisation.

7) Every application for authorisation shall be disposed off by the prescribed authority within ninety days from the date of receipt of the application.

8) The prescribed authority may cancel or suspend an authorisation, if for reasons, to be recorded in writing, the occupier/operator has failed to comply with any provision of the Act or these rules;

Provided that no authorisation shall be cancelled or suspended without giving a reasonable opportunity to the occupier/operator of being heard.

8) **Authorisation**

1) Every occupier of an institution generating, collecting, receiving, storing; transporting, treating, disposing, and/or handling bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/services to less than 1000 (one thousand) patients per month, shall make an application in Form I to the prescribed authority for grant of authorisation.

2) Every operator of a bio-medical waste facility shall make an application in Form I to the prescribed authority for grant of authorisation.

3) Every application in Form I for grant of authorisation shall be accompanied by a fee as may be prescribed by the Government of the State of Union Territory.

9) Advisory **Committee**

The Government of every State/Union Territory shall constitute an advisory committee. The committee will include experts in the field of medical and health, animal husbandry and veterinary sciences, environmental management, municipal administration, and any other related department or organisation including non-governmental organisation. The State Pollution Control Board/Pollution Control Conunittee shall be represented. As and when required, the committee shall advise the Government of the State/Union Territory and the prescribed authority about matters related to the implementation of these rules.

10) **Annual Report**

Every occupier/operator shall subniit an annual report to the prescribed authority in Form II by 31 January every year, to include information about the categories and quantities ofbio-medical waste handled during the preceding year. The prescribed authority shall send this information in a compiled form to the Central Pollution Control Board by 31 March every year.

11) **Maintenance** of **Records**

1) Every authorised person shall maintain records related to the generation, collection, reception, storage, transportation, treatment, disposal and/or any form of handling of bio-medical waste in accordance with these rules and any guidelines issued.

2) All records shall be subject to inspection and verification by the prescribed authority at any time.

12) Accident Reporting

When any accident occurs at any institution or facility or any other site where bio-medical waste is handled or during transportation of such waste, the authorised person shall report the accident in Form III to the prescribed authority forthwith.

13) **Appeal**

Any person aggrieved by an order made by the prescribed authority under these rules may, within thirty days from the date on which the order is communicated to him prefer an appeal to such authority as the Government of State/Union Territory may think fit to constitute:

Provided that the authority may entertain the appeal after the expiry of the said period of thirty days if it is satisfied that the appellant was prevented by sufficient cause from filling the appeal in time.

SCHEDULE I
(See Rule 5)

Categories of Blo-medical Waste

Option	Waste Category Waste Class	Treatment and Disposal
Category 1	Human Anatomical Wastes (human tissues, organs, body parts)	incineration @deep burial*
Category 2	Animal Wastes (animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and cxpcrimental animals used in research, waste generated by veterinary hospitals, discharge from hospitals, animal houses)	incineration@deep burial*
Category 3	Microbiology and Blotechnology Waste (wastes from laboratory cultures, stocks or spccinicns of microorganisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclavinglmicrowavingl incineration@
Cntcgory 4	Waste Sharps (nccdlcs, syringes, scalpels, blades, glass ctc, that may cause puncture and cuts. This includes both used and unused-sharps)	disinfection (chemical treatment @@/autoclaving/ micro waving and mutilation1 shredding ##
Category 5	Discarded Medicines and Cytotoxic Drug (wastes comprising of outdated, contaminated and discarded medicines)	incineration @/destruction and drugs disposal in secured landfills.
Category 6	Solid Waste (items contaminated with blood, and body fluids including cotton, dressing, soiled plaster casts, lines beddings, other material contaminated with blood)	incineration@ autoclaving/microwaving.
Category 7	Solid Waste (wastes gcncratcd from disposable items other than thc waste sharps such as tubings, catheters, intravenous sets etc.)	disinfection by chemical treatment@@autoclaving/ microwaving and mutilation1 shredding ##.
Category 8	Liquid Waste (waste gencruted from laboratory and washing, clconing, housckccping and disinfecting activities)	disinfection by chemical treatment @@ and discharge into drains.
Category 9	Incineration Ash (ash from incineration of any bio-niedicnl waste)	disposal in municipal landfil

Option	Waste Category Waste Class	Treatment and Disposal
Category 10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.)	chemical treatment @@ and discharge into drain for liquids and secured landfill for solids,

@@ Chemical treatment using at least 1% hypochlorite solution or any equivalent chemical reagent. It must be ensured that chemical treatment ensures disinfection.

Mutilation/shredding must be such so as to prevent unauthorised reuse.

@ There will be no chemical pretreatment before Incineration. Chlorinated plastics shall nor be incinerated.

* Deep burial shall be available only in towns with population less than five lakhs and in rural areas.

SCHEDULE II

(See Rule 6)

Coiour Coding and Type of Container for Disposal of Bio-medical Wastes

Colour Coding	Type of Container	Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat. 1, Cat, 2, Cat.3, Cat. 6	Incincrationldeep burial
Red	Disinfected container1 Plastic bag.	Cat. 3, Cat. 6, Cat. 7,	Autoclaving/ Microwaving1 Chemical Treatment,
Blue/White/ Translucent	Plastic/puncture proof container	Cat. 4, Cat, 7, Destruction/shredding	Autoclaving/ Microwaving/ Chemical Treatment and
Black	Plastic bag	Cat.5 and Cat.9 and Cat. 10 (Solid)	Disposal in secured landfill

Notcn:

1) Colour coding of waste cetegories with multiple treatment options as defined in Schedule I, shall be selected depending on treatment option chosen, which shall be as specified in Schedule I.

2) Waste collection bags or waste types needing Incineration shall not be made of chlorinated plastics.

3) Categories 8 and 10 (liquid) do not require containers/bags.

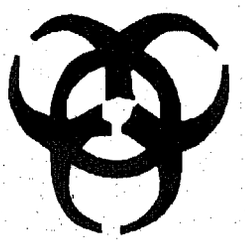
4) Catcgory 3 if disinfected locally need not be put In containers/bags.

SCHEDULE III

(See Rule 6)

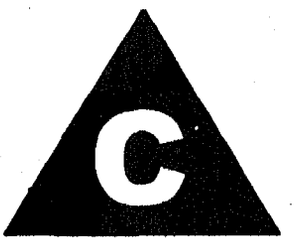
Label for Blo-medical Waste Containers/Bags

Biohazard Symbol



Biohazards

Cytotoxlc Hazard Symbol



Cytotoxlc

Handle with Care

Note: Lable shall be non-washable and prominently visible,

SCHEDULE IV
(See Rule 6)

Label for Transport of Bio-Medical Waste Containers/Bags.

Day ..... Month .....
Year .....
Date of Generation .....

Waste category No. .....
Waste Class
Waste description

Sender's Name and Address
Phone No .....
Telex No. .....
Fax No. .....
Contact Person .....

Receiver's Name and Address
Phone No. .....
Telex No. .....
Fax No. .....
Contact Person .....

In case of emergency please contact:

Name and Address.

Phone No,

Note: Label shall bc non-washablc and prominently visible.

SCHEDULE V
(See Rule 5 and Schedule I)

Standards for Treatment and Disposal of Bio-medical Wastes

Standards for Incinerators:

All incinerators shall meet the following operating and emission standards:

A) **Operating Standards**

1) Combustion efficiency (CE) shall be at least 99.00%

2) The combustion efficiency is computed as follows:

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO}$$

3) The temperature of the primary chamber shall be 800 # 50°C

4) The secondary chamber gas residence time shall be at least I (one) second at 1050 # 50C, with minimum 3% in the stack gas,

B) Emission Standards

Parameters	Concentration mg/Nm³ at (12% CO_2 correction)
1) Particulate matter	150
2) Nitrogen Oxides	450
3) HCl	50

4) Minimum stack height shall be 30 meters above ground

5) Volatile organic compound in ash shall not be more than 0.01%

Note: Suitably designed pollution control devices should be installed/retrofitted with the incinerator to achieve the above emission limits, if necessary.

Waste to be incinerated shall not be chemically treated with any chlorinated disinfectants.

Chlorinated plastics shall not be incinerated.

Toxic metals in incineration ash shall be limited within the regulatory quantities as defined under the Hazardous Waste (Management and Handling) Rules, 1989.

Only low sulphur fuel like L.D.O./L.S.H.S./Diesel shall be used as fuel in the incinerator.

Standards for Waste Autoclaving

The autoclave should be dedicated for the purposes of disinfecting and treating bio-medical waste.

I) When operating a gravity flow autoclave, medical waste shall be subjected to

i) A temperature of not less than 121° C and pressure of 15 pound per square inch (PSI) for an autoclave residence time of not less than 60 minutes; or

ii) A temperature of not less than 135° C and a pressure of 31 psi for an autoclave residence time of not less than 45 minutes; or

iii) A temperature of not less than 149° C and a pressure of 52 psi for an autoclave residence time of not less than 30 minutes.

II) When operating a vacuum autoclave. medical waste shall be subjected to a minimum of one pre-vacuum pulse to purge the autoclave of all air. The waste shall be subjected to the following:

i) A temperature of not less than 121° C and pressure of 15 psi for an autoclave residence time of not less than 45 minutes; or

ii) A temperature of not less than 135° C and a pressure of 31 psi for an autoclave residence time of not less than *30* minutes;

iii) Medical waste shall not be considered properly treated unless the time, temperature and pressure indicators indicate that the required time, temperature and pressure were reached during the autoclave process. If for any reasons, time temperature or pressure indicator indicates that the required temperature, pressure or residence time was not reached, the entire load of medical waste must be autoclaved again until the proper temperature, pressure and residence time were achieved.

III) **Recording of operational** parameters: Each autoclave shall have graphic or computer recording devices which will automatically and continuously monitor and record dates, time of day, load identification number and operating parameters throughout the entire length of the autoclave cycle.

IV) Validation Test

Spore Testing

The autoclave should completely and consistently kill the approved biological indicator at the maximum design capacity of each autoclave unit, Biological indicator for autoclave shall be Bacillus stearothermophilus spores using vials or spore strips. with at least 1 ×10" sporesper mililitre. Under no circumstances will an autoclave have minimum operating parameters less than a residence time of *30* minutes, regardless of temperature and pressure, a temperature less than 121° C or a pressure less than 15 psi.

V) **Routine Test**

A chemical indicator strip/tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste package at different location to ensure that the inner content of the package has been adequately autoclaved.

Standards for Liquid Waste:

The effluent generated from the hospital should conform to the following limits:

Parameters	Permissible Limits
pH	6.5-9.0
Suspended solids	100 mg/1
Oil and grease	10 mg/1
BOD	30 mg/1
COD	250 mg/1
Bio-assay test	90% survival of fish after 96 hours in 100% Effluent.

These limits are applicable to those hospitals which are either connected with sewers without terminal sewage treatment plant or not connected to public sewers. For discharge into public sewers with terminal facilities, the general standards as notified under the Environment (Protection) Act, 1986 shall be applicable.

Standards of Microwaving

1) Microwave treatment shall not be used for cytotoxic, hazardous or radioactive wastes, contaminated animal carcasses, body parts and largo metal items.

2) The microwave system shall comply with the efficacy test/routine tests and a performance guarantee may be provided by the supplier before operation of the unit.

3) The microwave should completely and consistently kill the bacteria and other pathogenic organisms that is ensured by approved biological indicator at the maximum design capacity of each microwave unit. Biological indicators for microwave shall be Bacillus Subtitles spores using vials or spree strips with at least 1 × 104 spores per mililiter.

Standards for Deep Burial

1) A pit or trench should be dug about 2 meters deep. It should be half filled with waste, then covered with lime within 50 cm. of the surface, before filling the lest of the pit with soil.

2) It must be ensured that animals do not have any access to burial sites. Covers of galvanised iron/wire meshes may be used.

3) On each occasion, when wastes are added to the pit, a layer of 10 cm. of soil shall be added to cover the wastes.

4) Burial must be performed under close and dedicated supervision.

5) The deep burial site should bc relatively impermeable and no shallow well should be close to the site.

6) The pits should be distant from habitation, and sited so as to ensure that no contamination occurs of any surface water or ground water. The area should not be prone to flooding or erosion.

7) The location of the deep burial site will be authorised by the prescribed authority.

8) The institution shall maintain a record of all pits for deep burial.

SCHEDULE VI
(See Rule 5)

Schedule for Waste Treatment Facilities Like Incinerator/Autoclave/Microwave

A) Hospital and nursing homes in town with population of 30 lakhs
by 31st Dec., 1999 or earlier.

B) Hospitals and-nursing homes in towns with population of below 30 lakhs

a) with 500 beds and above — by 31st Dec., 2000 or earlier

b)	with 200 beds and above but less than 500 beds	by 31st Dec., 2000 or earlier
c)	with 50 beds and above but less than 200 beds	by 31st Dec. 2001 or earlier
d)	with less than 50 beds	by 31st Dec., 2002 or earlier
e)	All other institutions generating bio-medical waste not included in A and B above.	by 31st Dec., 2002 or earlier

UNIT 1 HOSPITAL ACQUIRED INFECTION

Structure

1.0 OBJECTIVES

After studying this unit, the student shall be able to:

- describe the implications and impact of Hospital Acquired Infection (HAI);
- discuss the epidemiology of HAI;
- discuss the routes of spread of HAI;
- discuss the methods of controlling HAI;
- discuss the composition of Hospital Infection Control Committee; and
- describe the method of active and passive surveillance.

1.1 INTRODUCTION

Hospital infection occurs in every hospital beyond doubt, but on many occasions it is .overlooked. It becomes glaring only wlien damage has been done out of proportion in magnitude to a relatively minor therapeutic procedure carried out on the patient.

Johnbell, in 1801, remarked that hospital infection exists in cvcry type of liospital. Louis Pasteur in his celebrated lecture to academic De Medicine on 30 April, 1873 said "If I had the honour of being a Surgeon, not only would I use absolutely clean instruments, but after cleaning my hands with greatest care would still have lo fear germs suspended in air and surrounding the bed of the patient."

Hospital Infection is perhaps the single most important factor that adversely affects the performance and image of the hospitals. Besides morbidity and mortality, it prolongs the hospital stay of patients, increase bed occupancy rate and thereby puts undue pressure on already strained resources of the hospital, patients, community and the country.

The magnitude of the problem is difficult to assess in our liospitals due lo paucity of available literature and data on the subject. I-Iowever, overall reported incidence of post operative wound infection in various hospitals in India range from 10-25%.

Florence Nightingle, more than 100 years ago, said "No stronger condemnation of any hospital or ward could be pronounced than the single fact that zymotic (infectious) disease has originated in it, or that such a disease has attacked other patients than those brought in with them."

No hospital can continue to perpetuate such condemnation, however, hospital acquired infections remains a problem world over. In a recent survey conducted by WIIO on 28,861 patients in 47 hospitals of 14 countries located in 4 continents, the prevalence rate of HAI of different hospitals varied from 3-21% with mean of 8.4%. The results of the survey reported in 1988 indicated that the HAI is a considerable problem, even in hospitals with means and interest in control of I-IAI. Further it is possible to reduce the incidence of infection. The authors concluded that there is a need mid opportunity for international cooperation in finding and applying effective means of prevention and control.

The problem of hospital infection has received the attention of Government of India and two high powered committees, one in 1968 headed by Dr. K.N. Rao, the then Director General of Health Services and other in 1976 headed by Dr. Sharad Kumar, Deputy Director General of Health Services, investigated in detail the problem of hospital infection in Delhi hospitals. Dr. Rao Committee suggested a multipronged attack for control of hospital acquired infections occurring not infrequently and emphasized that "The reservoirs of infections in the hospitals must be attacked, carriers must be dealt with, and rigorous asepsis in the wards and theaters introduced. Clean air, clean beddings and hygienic methods of dust removal must be recognized as basic requirements, and the use of hospitals must be strictly controlled and dictated by essential needs." Sharad Kumar Committee in 1976 recommended formulation of Hospital Infection Control Committee, maintenance of proper medical records, and medical audit (death committee), training of staff, control of overcrowding, improvement of sanitation, kitchen and laundry services.

It is necessary to strengthen/introduce the following activities in each hospital with bed strength of more than 250:

- Management of HAI control activities.
- Surveillance of HAI.
- Operational manuals for different high risk procedurcs,
- Sterilization and disinfection procedures.
- Discarding and disposal procedures.
- Manpower development in service training.
- Publication of informalion.

1.2 DEFINITION

Hospital infection can be 'liospital associated' or 'liospital acquired'. Hospital associated infections are those, that are acquired during hospitalization as well as those that are present upon admission, having been acquired prior to hospitalization.

The present topic is restricted in scope to 'liospital acquired' infection which is also known as 'Nosocomial infection' and can be defined as "Infection acquired by the person in the hospital, manifestation of which may occur during hospitalization or after discharge from hospital." The person may be a patient, members of the hospital staff and/or visitors.

1.3 EPIDEMIOLOGY

Like any other disease process hospital acquired infection has also got "epidemiological triad" i.e. the agent, host and environment. *Soundness of surveillance and control programme depends on sound epidemiological knowledge.*

a) **The Agent**

The Agent possibly includes entire spectrum of microbes e.g. staphylococci, gram -ve bacilli, occasional streptococci, viral, rickettsial, fungal and protozoal infections. It is staled that:

- Large number of all liospital infections are due lo gram -ve organisms.
- Some of infections are contributed by staphylococci (coagulase +ve phage typeable).
- Proteus, E. coli, Salmonella, Shingella, Klebsiella, Ps. aeruginosa are increasing in their involvement as causative agent of liospital acquired infection.
- Carrier stale of organism and their colonization and increased resistance of antimicrobial agents are important factors of consideration.

b) **The Host**

Decreased resistance of patients due to under mentioned factor contribute lo a great length on susccplibilities to hospital acquired infection. The factors are:

- Extremes of ayes
- Primary ailments with concomitant disease like diabetes mellitus, chronic nephritis and malignancies,
- The therapeutic p actices e.g. whole body irradiation, use of cytotoxic and immuno-suppressive drugs, indiscriminate use of antibiotics and steroids etc.
- Complicated diagnostic procedures e.g. venepuncture, types of aspirations, cardiac catheterization and length of operative procedures.
- Endogenous infections.

c) **. The Environnrent**

Everything that surround a patient in the hospital is his environment. These infection can, be acquired from:

- Other patients, hospital staff and visitors, food, water, dust and other contaminated inanimate articles;
- Durg resistance microorganism and change from non-pathogenic strain to pathogenic are found commonly.

Hospital acquired infections can be derived from:

1) **The patient's** own flora: Self infection **(auto-infection)**: The micro-organism concerned is not pathogenic under normal conditions, but underlying disease. invasive diagnostic and therapeutic procedures including immunosuppressive even antiobiotic therapy and the like, may enable it to reproducc, spread and implant itself at a site where it may produce an infection.

2) **The flora** of **another** patient: Cross-infection: In such cases, the micro-organism concerned is transmitted:

   a) ***By direct contact*** between patients (saliva droplets, patient's hands);

   b) ***By air*** (dust from fabrics carrying a patient's flora);

   c) ***By the staff***

   - who collect the micro-organisms directly on their hands or clothes and tramsinit them to another patient.
   - who harbour the micro-organisms on the mucosa of their own respiratory and intestinal tracts, where they reproduce auld are transmitted rarely by air, more often by contact (micro-organism carriers),

3) Environmental sources: **Environmental** Infection

   a) Hospital air usually harbours more bacteria which are more often pathogenic and multi-drug resistant.

   b) Surfaces contaminated by patient's secretions, excretions, blood and body fluids, animals and insects.

   c) Inanimate objects:

   - contaminated by the patients – hospital equipment (sanitary installation,, lights; tables, beds etc.), medical equipment (endoscopes, catheters, vesical probes, needles, lancets, spatula and oher instruments used for invasive and non-invasive procedure, aerosols etc.)
   - contaminated by the hands of any hospital staff in any part of the hospital (kitchen, laundry, treatment room, etc.)
   - contaminated by visitors
   - contaminated by staff who are ill or are carriers of micro-organisms
   - contaminated by food or infected water
   - contaminated by animals and insects.

In general, most of the infections caused by enterococci and other non-haemolytic streptococci, anaerobic cocci, gas gangrene producing clostridia and bacteroides are self infectious; that by S. aureus, group B streptococci, enterobacteria (E. coli, Klebsiella, proteus etc.) may be acquired either from person to person (dross infection). Infections with Clostridum tetani, Flavobacterium, P. aeruginosa and Klebsiella-Serratia-Enterobacter groups are often acquired from environmental sources. HIV and HVB in health care settings may be acquired from blood of the HIV and HBV positive patients by direct inoculation or through contact with broken skin or mucous membrane.

Man therefore occupies a central position:

1) as reservoir and source of micro-organisms;

2) as disseminator (communication routes);

3) as recipient or target, thus becoming a new reservoir,

1.4 ROUTES OF SPREAD

The organisms are transmitted by the following routes:

a) Direct **route**: Person to person carrier. hospital staff and visitors. air borne route which includes patient.

b) **Indirect** route: Through contaminated inanimate articles e.g. food and drink, dust, bed linen and equipment.

Important considerations in the mode of transmission of hospital acquired infections for instituting effective control measure are:

- Greater exposure of patients to infectious agents in hospital environment.
- Inadequate ventilation, faulty design of wards and departments.
- Non-availability of isolation rooms, dirty and clean utility room and janitor's closets in many wards.
- Over crowding in hospital wards.
- Spread of infection from undiagnosed infectious patients at the time of admission.
- Intimate contact between patients and staff and visitors.
- Inadequate and substandard aseptic procedures, including carelessness in hand washing.
- Poor kitchen service. laundry facilities and inadequate sterilization standards.
- Faulty house keeping.

Check Your Progress 1

1) Hospital Acquired Infection can be derived from :

.....

.....

.....

.....

.....

2) The organisms are transmitted by the following routes :

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1.5 CONTROL AND PREVENTION

1.5.1 House Keeping

i) Personal hygiene and environmental sanitation kept at high level in the hospital of any kind, is mandatory requirement towards control of hospital infection.

ii) Efficient house keeping including clean supply of bed linens and patients dress, proper bed arrangement;

iii) Frequent mopping and periodic washing of hospital wards and departments floors;

iv) Each ward must be provided with isolation facilities in separate rooms for infectious patients over and above the isolation wards.

1.5.2 Dietary Services

Ordering, procurement, preparation and distribution must be arranged through organised kitchen service. Minimum of handling must be ensured. Adequate water supply and washing facilities of food items and utensils to he made available. Where possible in larger hospitals mechanical cooking range and other facilities be provided. Sanitation of cook house and distribution centre, provision of food trollies etc. will help in reducing infection due to contamination by food. Periodic medical examination of cooks and food handlers must be done.

1.5.3 Linen and Laundry

The washing of linen can be manual by 'dliohics' or mechanical by washing machine. Special care is necessary when washing is done by 'dliohics'. The linen used by the patients, doctors and paramedical staff may be 'clean contaminated' ot 'contaminated' when soiled with blood/pus/urine/faeces or any other hotly fluids.

The contaminated linen must he disinfected before giving to 'dhobies' lor washing. The disinfection can be done by chemical disinfectant or by boiling or autoclaving at low pressure of steam. Hence the facilities for disinfection of contaminated soiled linen should be available in the hospital near the discarding of contaminated linen.

Both the 'clean contaminated' and 'contaminated' linen should be transported to laundry separately in thick polythene bags of different colours. The clean contaminated linen can he transported in thick cotton bags also.

Handling, separating and counting of even clean contaminated linen is hazardous, hence, there should bc minimum handling.

Drying of the linen in the sun after washing should be discouraged as it is usually spread on road side or other contaminated area.

Decontamination and Washing of Blankets

The cotton and acrylic/synthetic blankets are preferred to woolen blankets since they can be easily decontaminated when soiled and washing is also cheap and easy. They can be handled like linen. . Contaminated soiled woolen blankets can be decontaminated either by exposing lo formaldehyde vapours or autoclaving. Liquid disinfectant may damage woolen blankets. The only method of cleaning is by dry cleaning which does not inactivate/kill HIV.

Decontamination and Washing of Mattresses

It is advisable to cover all mattresses with water proof synthetic material like rexine or plastic. This makes the disinfection of the mattresses easier. Big autoclaves are available for disinfection of mattresses. One of the Delhi hospitals has such autoclaves. Washing is not easy and can be done manually.

1.5.4 Central Sterile Supply Department (CSSD)

Facilities of standard sterilization of all hospital supplies e.g. syringe, needles, surgical instruments, OT linen, sets of trays for diagnostic and therapeutic purpose, rubber good and other requriement will ensure economy and highest standard of asepsis and sterilization in the hospital and therby reduce the hospital acquired infection. In smaller hospitals optimum sterilization of equipment, instrument and linen to be ensured through autoclave and steam sterilizer. Frequent check to ensure standard to be carried out.

Sterilization

Sterilization is a process of freeing an article from all living organisms including bacterial and fungal spores and viruses.

All skin and mucous membrane piercing instruments (needles, lancets, scalpels, scissors etc.) other instruments and equipment coming in contact with organs and tissue during surgical procedures must be sterilized before use.

Sterilization can be achieved by Heat (dry and moist) Ionizing radiation (gamma

radiation, Ultraviolet) chemical (formaldehyde, ethylene oxide) and filtration.

However, the only practical and dependable method of sterilization in Health Care Settings is moist heat steam under pressure utilizing different types (simple, steam jacketed etc.) of autoclaves. It is important to note that temperature achieved in an autoclave depends on pressure of the steam and not pressure of the steam and air; 15 lbs. pressure of steam will correspond to 121°C whereas if 50% air is present, the temperature achieved will be only 112°C.

Satisfactory sterilization can be achieved at 15 lbs/sq inch pressure (15 p.s.i.) equivalent to one atmospheric pressure and a temperature of 121°C in 15-20 minutes (holding time). Household pressure cookers can achieve a pressure of 15 p.s.i. of steam and can be used with caution for sterilization.

An electric or gas oven can be used for sterilization of instruments (blunt instruments, all glass syringes?glassware etc.) and material (wax, oils, powders etc.) which are impermeable to steam and can withstand a temperature of 170°C. Household oven can be used for this purpose. The holding time ranges from 60 minutes to 120 minutes depending on the contamination of the material to be sterilized and temperature achieved.

Testing for Sterilizing Efficacy of Autoclave

In hospital settings where sterilization is done centrally (CSSD), it is necessary to monitor if each load has been properly sterilized. There are number of variables in sterilization by autoclave like pressure indicated by autoclave may not be only of steam due to inadequate removal of air resulting in achieving lower temperature at the same pressure, overloading of an autoclave thus inhibiting free passage of steam between the articles, breakdown of electricity during the process of autoclaving particularly during the holding time after the maximum temperature has been achieved. It may be noted that autoclave tapes on packs merely provide and indication that the process has been carried out at or more temperature at which colour of the tape changes but not that the contents are sterilized.

It is, therefore, necessary to carry out periodically biological test by putting disc or strips containing at least 106 spores of B. stearothermophilus (NCTC 10003, or ATCC 7953) in one or more packs in coolest and least accessible part of the autoclave chamber. After autoclaving, check if all the spores have been destroyed by culturing in suitable liquid medium (Tryptone soyabroth) at 56°C for 5 days.

1.5.5 Security

Large number of visitors are found visiting patients in the hospital and sometimes in prohibted areas like ICU, Post-operative areas etc. They bring along with them different body flura and leaving some of it in and around the patient which further may cause hospital acquired infection. Restricting the visitors with efficient security services decreases hospital acquired infection.

1.5.6 Engineering Aspects

Hospital designs and quality of construction goes a long way in reducing hospital acquired infection by providing better ventilation and light.

Air Conditioning

Positive pressure filtered air in hospital acquired infection prone areas reduces hospital acquired infection considerably and should be introduced ill areas viz. O.T. Complex, ICU, Nurseries, Labour Rooms etc. Good maintenance of building and 24 hours water supply further decreases chances of hospital acquired infection.

1.5.7 Nursing Care

A septic nursing care provided also reduces hospital acquired infection. This is more so in patients who are either very young or very old or suffering from chronic diseases like diebeties malitis, chronic nephritis or malignancies of those who are getting radiotherapy are immuno specific drugs. Special nursing medical care is needed whenever

complicated diagnostic and therapeutic procedures are carried out by the bed side. Above all, nursing staff must ensure strict, personal hyegene and hand washing, use of mark, due care for preparation of Seeds, sterilization of bottles and other accessories need Io be taken care of.

1.5.8 Waste Disposal

There is little awareness about the discarding and disposal of hospital waste in this country. More often than not all the hospital waste, i.e., both the household type and the 'infected' hospital waste are treated in the same manner. In many of the hospitals they are dumped at a place 'Garbage Collection Centre' from where this total waste is taken away by the Municipal Corporation's garbage collection vans. However, before it is collected by the van, a number of scavengers sort out this waste and take out everything of any value without knowing the harmfulness of the malerial.

The waste from a hospital should be divided into three parts:

a) **Household** non-infective waste: To be collected in Uiick polythene bags or plastic cans and discarded like household waste.

b) **'Infected'** sharp, liospital waste: 'Hospital waste' which is sharp and is likely to cut or pierce skin should be collected separately in puncture proof plastic container which can be closed or sealed.

c) 'Infected hospital' waste otlier **than 'sharp'** liospital waste: To be collected in thick polythene bags or plastic containers.

Both (b) and (c) above, i.e. 'infected' hospital waste should be incinerated. However, till incineration facilities are available, it is important to emphasise on the hospital authorities to take great care in discarding and final disposal of the 'hospital waste'

The only alternative to incineration is deep burial in controlled land fill sites. Needles and syringes must be destroyed mechanically before burial. The controlled till must be fenced off, and scavengers strictly prohibited.

Till the facilities for incineration or deep burial are available, all the 'infected' hospital waste must be disinfected before disposal. Thus, the authorities should give top priority to installation of incinerators in all the hospitals. Also, it must be ensured that these incinerators are in working order.

The plastic bags should be made freely available and each area must put all its waste in the plastic bags before transporting it for incineration or disposal.

Discarding and Disposal **of** Disposable Material

The awareness of the danger of acquiring HIV infection (the causative agent of AIDS) while handling blood and blood contaminated material has resulted in sudden increase in the use of presterilized disposable material. The use of disposable material has reached a stage when in a teaching hospital in Dellii, all the needles and syringes used for giving injections or collecting blood are pre-sterilized disposable, whereas in some other hospitals, only autoclaved needles and syringes. The hospitals in between these two extremes use a combination of presterilized disposable needles and autoclaved syringes in different situations, In most of the hospitals, disposable needles are reused after boiling. This practice must be discontinued immediately.

In this country, the plastic or the material with which these presterilized disposable equipments are made has got some value and are mostly removed by the scavengers and others between discarding and final disposal. Further, there is a high p ssibility that unscrupulous persons may start cycling the disposed disposable matcr d resulting in their reuse without even proper sterilization.

Therefore, the following procedure is recommended:

a) All the disposal material after use has lo be accounted for like any other reusable material,

This can be achieved by discarding the disposable material in a plastic/metal container and sealing this in the presence of a responsible person. The plastic container for piercing instruments like needles etc. should be puncture resistant. Plastic bread boxes are suitable for this purpose. Other lion-piercing material can be discarded in plastic bags.

b) The sealed or tied plastic containers containing the disposable material should be transported in closed wheel barrows to the incinerator.

c) The incineration area must be out of hounds for everyone except those working there.

The following procedure is recommended for disinfection of needles and syringes after use and before disposal, till the facility of incinerator or hot air oven becomes available:

- Do not detach the needles from the syringes after use.
- Aspirate disinfectant fluid into the syringe
- Immerse the syringe with attached needles in the disinfectant fluid horizontally in flat metal/glass tray or puncture proof plastic container.
- Keep them immersed in disinfectant fluid for at least 30 minutes.
- The needles and syringes can be removed from the disinfectant fluid and destroyed mechanically before disposal.
- Alternatively all the disposable material can be put in the hot air oven at a temperature of 160°C for 30-60 minutes. This will ensure that neither disposable material after use can go in the hands of scavengers nor there will be any possibility of its reuse.

1.5.9 Antibiotic Policy

Each hospital must have an antibiotic use policy so that indiscriminate use of antibiotics can be checked as indiscrimate use of antibiotics is known Io cause drug resistent bacterias. Hospital acquired infection due to this drug resistent bacterias are very difficult to treat and are major cause of septisemia.

1 . HOSPITAL INFECTION CONTROL COMMITTEE

To combat hospital infection, it is essential that hospitals according to its available resources and requriemcnt establish a Hospital Infection Control Committee (HICOM) and invest with authority to pursue:

- Investigation of all hospital infections.
- Establish surveillance programme.
- Provide guidance and leadership in the prevention and control of hospital infection.

1.6.1 Composition

MCOM in an institutional hospital or referral hospital should be broad based in composition with representatives of all major specialities as members i.e. Surgeon, Physician, Anaesthetist, Pediatrician, Microbiologist/Bacteriologist and Gynecologist, Nursing Matron, House Keeping staff, Engineer Service representative and Dietitian.

Microbiologist/Bacteriologist to be detailed as Hospital Infection Control Officer and should work as Member Secretary. Hospital Superintendent or his representative should be Chairman.

In a district hospital set up, the organisation should be composed of:

- Available professional specialists.

- Matron of the hospital or any other specialist officer as Infection Control Ofticer
- Medical Superintendent of Hospital as Chairman.

In a still smaller hospital situation the responsiblity can be given to one Medical Ofticer only.

1.6.2 Role and Functions

Hospital Infection Control Committee with the help of Surveillance staff ensures smooth surveillance and control of hospital infection by:

- Establishing reporting system through:
  a) Nursing Unit report daily/weekly.
  b) Individual patient report.
  c) Review of bacteriological sergicc record of the hospital
  d) Autopsy Report.
- Meet periodically to take decision.
- Lay down standards of aseptic procedures in hospitals.
- To distinguish between infection acquired in the hospital and those acquired outside
- To prepare manual for control of infection and lay down training programme of personnel.
- Take all decisions based on reports received through hospital infection control officer regarding investigation and control measures in the event of sudden rise of hospital infection rate.

1.7 SURVEILLANCE

The aim of the surveillance is to detect and record methodically all Hospital Acquired Infections (HAI). Hence the surveillance of HAI is indispensable in hospitals for infection control. Continuous surveillance allows the early detection of outbreaks. It is necessary to find out incidence and trends of HAI, causative organisms and their antimicrobial sensitivity, according to site of infection, speciality and ward/floor. This information can also be used for evaluating control measures and policies introduced from time to tune.

Patients in hospitals are more susceptible to infections than those in the community (general population). This is often related lo pre-existing disease, such as diabetes,. medical and surgical procedures, radiotherapy or immuno-suppressive treatment. Patients at extremes of age are especially susceptible to infection.

i) Community or non-hospital infection with which the patient enters the hospital.

ii) Hospital (nosocomfal) acquired infection, which is acquired in the hospital and makes its appearance either during hospitalization or after the patient is discharged.

There are predominantly four types of hospital acquired infections. They can be recorded on the basis of clinical and/or microbiological data.

1) **Urinary Tract** Infections

The urinary infections may be symptomatic (fever, dysuria, lumbar pain) or asymptomatic. Their recording depends partly on the microbiological tests performed (over 100,000 micro-organisms/ml midstream urine samples).

2) **Infections of the** Lower **Respiratory** Tract

The clinical signs of infection (coughing, pleural pain, fever and expectoration) are enough for these infections to be recorded, even if no chest X-ray or bacteriological tests have been performed.

3) **Post-operative** Infections

Any surgical wound which results in a purulent discharge must be regarded as a hospital acquired infection.

4) **Systemic Infections**

A positive blood culture revealing a known pathogen, or at least two blood cultures revealing a micro-organism rcputcd to bc non-pathogenic or opportunistic, must be taken into account and listed as hospital infection.

1.7.1 Processing of Information Collected

The information collected in this way is processed by the Infection Control Sister. A weekly, monthly and yearly report, makes it possible to compile statistics on infections by speciality or floor and for the hospital as a whole, for each type of infection.

Incidence rates and period prevalence rates should be worked out as follows:

- Tlic incidence rate corresponds Io the number of new patients developing HA1 in a given period in relation to the number of patients discharged during the same period.
- The period prevalence rate corresponds to the number of new and old patients developing HAI during a given period in relation to the number of patients discharged during the same perioa

Analysis of these various rates by the Hospital Infection Team will reveal the true dimensions of the hospital infection and make it possible to direct control operations and to develop the most effective possible strategies of action.

In order to contain specific outbreaks of infections, it is necessary to find out source/ reservoir of infection by detecting carriers, sampling the inanimate objects (equipment and material) used for patient care and air and likely mode of transmission.

1.7.2 Mode of Transmission

There are four main routes of infection that have to be watched in hospitals: (1) the aerial route, (2) the oral route, (3) the contact mute, especially the "hand borne" route, and (4) the parenteral route.

In the sequence of transmission the following factors must be taken into account; (1) the pathogen; (ii) the reservoir or source for the pathogen; (iii) the exit point; (iv) the transmission route; (v) the point of entry into the host; (vi) the susceptibility of the host.

1.7.3 Interruption of Transmission

Efforts must be made to break this sequence at its most vulnerable point, which differs from one case lo another.

It is possible therefore to:

i) destroy the pathogenic agents of the carrier staff or source patient by specific antibiotic and antiseptic therapy;

ii) control tlie source or reservoir by isolation of infectious patients and by freeing inanimate reservoir of micro-organisms by sterilization or disinfection;

iii) control the exist point by disinfection of excreta and infected material;

iv) control the transmission route by washing of hands, disinfection of equipment, change of working clothes;

v) protect the susceptible host by protective vaccination, e.g., tetanus, gas gangrene, etc.

1.7.4 High Risk Procedures

Certain activities/procedures can be said to be high risk procedures/activities. Special care is recommended for practising these procedures/activities. The following procedures need special attention:

- Injections
- Surgical procedures
- Dressing of wounds
- Management of Delivery (child birth)
- Investigative procedures
- Laboratory investigations
- Dialysis

Injections

One of the commonest procedure in any hospital is to give injections to the patients for treatment and prophylaxis, In most of the hospitals, there is a common area for giving injections to all OPD patients.

It must be remembered that intact skin and mucous membrane provide maximum protection to infection and barrier to invading organisms. Any type of injection breaks this continuity of the skin barrier, introduces material directly into the body which, if contaminated by micro-organism, will result in severe infections. Great care is necessary for the decontamination of skin area where the injection is to be given and ensuring sterility of the needle, syringe and injecting material. Needles and syringes get contaminated with the patient's blood which may be infective and cause serious diseases like Hepatitis and AIDS. Thus, it is necessary to ensure the proper disinfection of the needles and syringes after use. It should be ensured that no one gets a needle stick (piercing by the needles) either as part of their duties or accidentally.

Disinfection of the Skin

Before giving injection, the skin area should he cleaned and disinfcctcd, The ideal skin disinfection is Tincture of iodine, provided the patient is not allergic to iodine mid does not mind the colour; alternatively 70% alcohol, cidex, savlon or any other dependable disinfectant in proper concentration can be used.

Use of Needles and Syringes

The injection should only be given by autoclaved or prestcrilised disposable needle and syringe. Before giving injection, the needle must not be touched with spirit cotton wool swab, hand or any other material.

The needles and syringes should bc discarded in dependable disinfectant fluid. A common practice seen in almost all the hospitals in Delhi, is the use of plastic buckets without disinfectant fluid lor discarding disposable needles and syringes after use. This practice is dangerous and is likely to cause harm to those who subsequently handle the used needles and syringes.. Suitable disinfectant should be aspirated in the syringe. Disposable and reusableneedles and syringes containing disinfectant fluid should be kept in separate puncture-proof container (plastic or metal) by immersing them in disinfectant fluid in these containers. The reusable needles and syringes must be cleaned and washed after taking out of disinfectant fluid.

Disposal of Disposable Needles and Syringes

It is necessary to treat disposable needles and syringes like reusable material of value. It is also necessary that under the supervision of a person nominated by the Medical Superintendent, all the disposable needles and syringes should be destroyed by melting

the plastic material. The best method of disposal of disposable material is by incinceration. Disposable needles and syringes are great hazards since they are likely to be re-used and misused. The hospital policy should be to exchange needles and syringes and dispose them off centrally, preferably by incinceration or deep land fill.

Surgical **Procedures**

All the surgical procedures including dental procedures are invasive procedures and involve use of instruments, equipment and material. The duration of surgical procedures like operations is important. The longer the duration of an operation, the greater are the chances of infection. There is lot of handling of blood, tissues, organs and body fluids during these procedures. The micro-organisms get directly inoculated into the body and may enter the blood circulation if there is a lapse in aseptic precautions.

Therefore, it is absolutely essential to ensure that all the instruments, equipment and material used during surgery are sterile. Special attention is needed regarding the positive pressure of the operating area, environment of the operation theatre (low microbial counts), presence of number of persons in the theatre, anaesthesia and other activities.

Any surface which might have been contaminated with the blood or body fluid must be disinfected first by covering it with absorbent material. Disinfectant fluid should first be poured around the contaminated area and then over the absorbent material and left for more than 10 minutes. The disinfectant used should be of the concentration which is recommended for use in contaminated situations.

Tissue, organs and any part of the body removed during surgery should be incinerated/ burnt or buried deep with bleach or lime. Blood and body fluids removed during operation must be disinfected before disposal.

Dressing of Wounds

Wounds can be surgical after operations, accidental after injury or due to purulent infections (boils. abscess, carbuncles etc.) or due to underlying disease like fistula, piles etc.

The wounds can be divided into four groups: (a) clean, (b) clean contaminated, (c) contaminated, and (d) dirty. The dressing of these wounds should be clone in two separate areas; one for clean wounds and clean contaminated and the other for contaminated and dirty wounds. Thus, extreme care is necessary to use only sterile instruments, material (cotton wool and other dressing material), lotions, anti-septic and anti-bacterial creams etc.

The disposal of dressing material, disposable material and reusable instruments needs special attention. All material and instruments used and removed during the dressing should be taken as contaminated. Therefore, all the material should be disinfected, reusable instruments before sterilization and disposal instruments and contaminated dressing etc. before disposal, if incineration is not possible. Ideally, all the material should be discarded in three separate containers. Twn of the containers should be puncture proof and should contain disinfectant fluid for sharp instruments like needles, scissors, scalpel, blades etc. One for reusable instruments and other for disposable instruments including syringes and needles. Both the reusable and disposable instruments should be discarded in separate containers in which the used instruments could be put horizontally and immersed in the disinfectant fluid. The third container can be a polythene bag in the bucket. The polythene bag containing dressing material like used cotton, bandages etc. should be sealed or tied. All the material other than reusable material should be incinerated or burnt or disinfected before disposal. The reusable material after disinfection should be cleaned and sterilized by autoclaving.

Management of Delivery **(Child Birth)**

The delivery of a child is more or less crisis management. The sharp instruments are around and every one including the expectant mother in the delivery room is tense, Thus, at this time the persons conducting the delivery may get splashes of potentially infected blood and amniotic fluid and even cuts. In view of the short time available for delivery

and related procedures, the chances of exposure to HIV and other blood borne infections are much higher during deliveries than my other situation. In view of this, following guidelines may be useiul:

- The delivery of known or suspected case of I-IIV positive patient should be carried out in an area near the main area but separated from the main area.
- A HIV positive patient is more prone to infection, hence, she needs greater protection from infection from other patients.
- All instruments, equipment and material used for the delivery must be sterile and must be decontaminated after use.
- The surfaces including table tops and floors which have been contaminated by blood or amniotic fluid must be decontaminated.
- During the delivery, the team of Health Care Workers including Pediatrician and others must be exclusively involved with the delivery of I-IIV positive woman. Immediately after care of HIV positive woman and her newborn; they should change lo another set of footwear, gown etc. before handling the other patients, lo avoid person to person infection to other patients.
- Immediately aflcr care of HIV positive woman and her newborn, they should change to another set of footwear, gown etc. before handling the other patients, to avoid person infection to other patients.
- The placenta must be incinerated, burnt or buried deep with blenching powder all around placenta. The bleaching powder should be first spread in the pit made for burial and then on the placenta.

Protective barriers are recommended for all deliveries.

Investigative Procedures

The investigative procedures can be broadly divided into two categories: (a) invasive procedures, and (b) non-invasive procedures.

a) ***Invasive Procedures***

These include lumbar puncture, cut downs, tappings, aspirations, biopsy, laproscopy, endoscopy, cardiac-catheterisation, bronchoscopy and similar other procedures. During these procedures, tlic continuity of the skin or mucous membrane is lilcely to be broken and micro-organisms can gain free entry. Hence, all precautions recommended for surgical procedures should be followed for invasive procedures.

b) *Non-invasive Procedures*

These include vaginal, anal and rectal examinations, prostatic massage, measurement of intra-ocular pressure, ENT examinations; and different imaging processes like echo-cardiography, ultra-sound, X-ray and CAT scan. It is highly possible that during some of these non-invasive procedures, break in the continuity of the mucous membrane may be encountered which may result in contamination of instruments used for the examination.

The vaginal and rectal examinations are particularly hazardous. Since I-IIV and other organisms including those causing sexually transmitted diseases may be present in these situations. Therefore, only sterile instruments, equipment or material should be used for such non-invasive procedures. After use they must be regarded as 'contaminated' and must not bc used on other patients without proper disinfection and sterilization.

Disinfection of the Instruments used for Non-invasive Procedures

Immediately after use the instruments (like vaginal speculum, proctoscope etc. should be immersed in suitable disinfectant fluid for at least 20 minutes. After disinfection, they preferably be autoclaved or boiled for 20 minutes and then reused.

Laboratory Investigations

The clinical specimens are collected for different laboratory investigations. Most of these specimens are highly infective and on occasions, can cause diseases including Hepatitis and AIDS, Hence, great care must be taken in handling these spccimens. These specimens primarily fall in three categories:

a) Blood, tissue and blood contaminated material like pus and body fluids etc.

b) Body fluids like CSF, pleural and pericardial fluid, semen,. vaginal fluid and other such specimen.

c) Urine, sputum, bronchial washings and swabs from mucous membrane and skin.

The following recornmendations will bc useful for handling these clinical specimens:

a) ***Blood, Tissue and Blood Contaminated Material***

Use only autoclaved/presterilized disposable needles and syringes for collection of blood. All precautions described for giving injections should be followed strictly for collection of blood including disinfection of skin.

Use only autoclaved or presterilized disposable instruments lo remove the tissue or blood contaminated material like pus and body fluids.

b) ***Body Fluids like Pleural, Pericardial and Cerebro-spinal Fluid, Vaginal Secretions and Semen etc.***

Only autoclaved or presterilized disposable instruments should be used for collecting these material.

c) ***Urine, Sputum, Bronchial Secretions and Swabs from Mucous Membrane***

Most of these specimens arc excretions of the body and do not require use of any equipment or instrument for their collection, except bronchial secretions and rarely urine. Only autoclaved for presterilized disposable instruments or material should be used if the material to bc collected is not available as excretion.

Transportation of Clinical Specimen

All clinical specimens should bc regarded as infection risk and should bc transferred to the laboratory in spill proof screw capped bottles. Special precautions should be taken for the blood suspected to be from patients of Hepatitis or AIDS, which should bc transported in leak proof polythene bags.

Any accident, contamination or spill from the collection to disposal must bc reported and proper disinfection should be carried out.

Processing of Clinical Specimens

The blood, blood contaminated specimens and tissue must not spill on the table tops, floor, requisition forms, report forms or any other surfaces. In case of any such spilling, the surfaces must be disinfected.

Under no circumstances, mouth pipetting should be permitted for carrying out any test.

Discarding

All clinical specimens after carrying out necessary test must be discarded in discarding jar containing suitable disinfectant. Hazardous specimens like microbial culture must be autoclaved before disposal.

Disposal

All clinical specimens must bc disposed off by incinerating or flushing them. It must be

ensured that no one should come in contact with any clinical specimen without disinfection other than those who have to be associated as part of their duties.

Dialysis

Dialysis is a common procedure carried out in many hospitals. It is of two types — Peritoneal dialysis and Haemo dialysis. Infections often complicate hemo dialysis and personnel working in a dialysis unit may acquire infections during work if proper precautions are not taken, the commonest being Hepatitis B.

Attempts at complete segregation of HBsAg positive patients and their dialysis equipment proper disinfection and antisepsis, have substantially reduced the incidence of this infection. Seronegative to HBsAg staff should be fully immunize with hepatitis B vaccine.

The requirement for access to a patient's blood supply twice in each dialysis procedures makes the dialysis unit similar to a surgical unit. The dialysis unit is crowded, with,a lot of machines, wires, tubes, hoses and the cleaning is more difficult. Special instructions and training are necessary for the staff, especially regarding the cleaning of machine and equipment. Wastes from the unit should always be classified as 'infectious' because of the high incidence of hepatitis among patients.

Check Your Progress 2

The high risk procedure which needs special attention:

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1.8 TRAINING AND EDUCATION

It is very essential that knowledge, skills and behaviour of all categories of hospital staff is tuned to control and prevention of Hospital Acquired Infection. This can be achieved by holding lectures and demonstration session with them. Apart from it, training of few groups of functionaries specially section heads viz. Sister Incharge, OT Complex, ICUs, Labour rooms, post operative wards, sanitary inspectors, Incharge CSSD, Security, dietetics will go a long way in reducing Hospital Acquired Infection in the hospital.

1.9 UNIVERSAL PRECAUTIONS FOR HEALTH CARE WORKERS

1) All health care workers should routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when contact with blood or other body fluids of any patient is anticipated. Gloves should be worn for touching blood and body fluids, mucous membranes, or non-intact skin of all patients, for handling items or surfaces soiled with blood or body fluids, and for performing venepuncture and other vascular access procedures. Gloves should be changed after contact with each patient. Masks and protective eyewear or face shields should be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose and eyes. Gowns or aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids.

2) Hands and other skin surfaces should be washed immediately and throughly if contaminated with blood or other body fluids. Hands should be washed immediately after gloves are removed.

3) All health care workers should lake precautions to prevent injuries caused by needles, scalpels and other sharp instruments or devices during procedures; when handling sharp instruments alter procedures. To prevent needlestick injuries, needles sliould be recapped, while the cap is placed on any flat surface and not held in the other hand. This prevents accidental needle stick in the hand holding the needle cap, Also, needles should not be purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand. After they are used, disposable syringes and needles, scalpel blades, and other sharp items sliould be placed in puncture-resistant containers for disposal.

4) Although saliva has not been implicated in HIV transmission, lo minimize the need for emergency mouth to mouth resuscitation, mouth pieces, resuscitation bags, or other ventilation devices sliould be available for use in areas in which llie need for resuscitation is predictable. Although HIV has been recovered from saliva, there is no conclusive evidence that saliva is involved in HIV transmission. Nevertheless, to reduce occupational cxposurc lo HIV, mouth pieces, resuscitation bags, or other ventilation devices should bc used if available when resuscitation is necessary. Resuscitation equipment should be used once only and discarded, or be thoroughly cleansed and disinfected.

5) Health care workers who have exudative lesions or weeping dermatitis sliould refrain from all direct patient care and from handling patient care equipment until the condition resolved.

6) Pregnant health care workers arc not known lo bc at greater risk of contracting HIV infection thar health care workers who are not pregnant, however, if a health care worker develops HIV infection during pregnancy, the infant is at risk of infection resulting from perinatal transmission. Pregnant health care workers because of this risk, should be especially familiar with and strictly adhere lo precautions to minimize the risk of HIV transmission.

Implementation of universal blood and body fluid precautions for all patients eliminates the need for use of the isolation category of "Blood and Body Fluid Precautions" for patients known or suspected lo be infected with blood borne pathogens. .Isolation precautions (e.g. enteric, tuberculosis) should be used as necessary if associated conditions, such as infectious diarrhoea or lubcrculosis, are diagnosed or suspended.

1 . 1 LEGAL ASPECTS

Hospital Acquired Infection will increase average length of stay. Assuming that 10% of the admitted patients suffer from I-Iospilal Acquired Infection resulting into increased hospital stay, the country will lose on to major accounts, productivity and the treatment cost the patient and their relations will suffer from increased morbidity and may be occasionally mortality and loosen their daily earning clue to the increased hospital stay. Liligation on account of acquired hospital infection due lo the negligence of hospital authorities including doctors can bc potential litigation under Consumer Protection Act, It is in the interest of all of us that Hospital Acquired Infection will be eradicated,

1.11 LET US SUM UP

Hospital Acquired Infections are known to take place leading to large amount of morbidity and mortality and loss of square hospital resources. It also increases average length of stay in the hospitals. It is estimated that efficient hospital acquired infection measures when adopted can reduce average length of stay by 20% which when converted into gain and productivity and saving in hospital rhsources, will account very large volume, There is no way that we can eliminate hospital acquired infection altogether but our knowledge about hospital acquired infection and mesures innumunerate to control it will certainly go a long way in reducing hospital acquired infections in our health care centres.

1.12 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) – The patient own flora
   – Auto infection
   – The flora of other patient
   – Cross Infection
   – Environmental sources
   – Environmental infection

2) Direct route : Person to person carrier, hospital staff, visitor

   Air born route which includes patient

   Indirect route : Through contaminated articles viz. food, drink, dust, bed linen and equipment.

Check Your Progress 2

– Injection
– Surgical procedure
– Dressing of wounds
– Management of clelivery
– Investigative procedure
– Laboratory investigation
– Dialysis

UNIT 2 DISASTER MANAGEMENT

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- understand the concepts of disasters and its management;
- describe the principles of disaster planning and the objectives and purpose of disaster plan;
- describe the composition, functions and responsibilities of Disaster Committee;

UNIT 2 DISASTER MANAGEMENT

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- describe the composition, functions and responsibilities of Disaster Committee;

- outline the role and responsibilities of medical, nursing staff and departments;
- analyze the disaster facilities required; and
- develop the disaster plan and modalities for response action.

2.1 INTRODUCTION

In this unit you will learn basic concepts of disaster management and principles of disaster planning. You will learn about the objectives and purpose of disaster plan, role and responsibilities of staff and the basic facilities required to meet the challenge of disasters and emergency response.

Disasters have existed ever since the existence of mankind and no community is immune to the emergencies caused by natural and manmade disasters. The disaster events result in number of deaths, injuries amongst the community, wide spread destruction of property, economic losses etc. and community requires immediate assistance to overcome its effects. Globally the toll ot death and damages in natural disasters is increasing. The cost to the global economy is estimated to be 50,000 million US dollars per year, of which a third represents the cost of predicting, preventing and mitigating disasters and other two-third represents the direct cost of damages. Death toll may vary from year to year with global mean of 2,50,000 deaths of which major disaster kills on an average of 1,40,000 people per year. The study of United Nations Environment Programme (UNEP) indicates Mat India is one of the most disaster prone countries as far as natural disasters are concerned. In this unit you will learn their importance of scientific management of disaster events and emergency response for medical care. In this unit you will also learn to relate the disaster management at national, state and district level. You will learn about the disaster characteristics, need for disaster planning, key issues involved and basic principles of disaster management. You will learn the process of development of disaster plan, its components and purpose. Tlie basic purpose of this unit is focussed on learning development of plans, response actions and issues in disaster preparedness.

2.2 BASIC CONCEPTS

The first important aspects of disaster management are to understand the disasters. The disasters are a phenomenon in themselves and have various characteristics which are crucial for disaster management. A clear understanding of these basic concepts is necessary for scientific planning, preparedness and emergency response.

2.2.1 General

The concept and definition of a disaster has altered over times, in accordance with changing concepts concerning cause and effect. The infectious diseases *were* considered inevitable disasters prior to 1700 AD. In 1950s the concept of natural disasters changed from characteristics of physical forces and resultant damages to social issues. The definition of the disaster has reflected this change with increasing attention being given to the social aspects of disaster situation and collective ability to meet the requirements of these situations. How the word "Disaster" is defined gives meaning to such descriptive terms as Disaster Prevention, Disaster Preparedness and Disaster Response etc. The disasters have been defined in various ways on the basis of degree of physical impact of the event, magnitude, disruptions of public safety, disproportion of resources in terms of special efforts required and controllability of event.

WHO defined disaster as any occurrence that causes damage, ecological disruption, loss of human life and deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community. Pan American Health Organisation (PAHO) defined disaster as an overwhelming ecological disruption, which exceeds the capacity of a community to adjust and consequently requires assistance from the outside.

W. Nick Carter defined it as an event, natural or manmade, sudden or progressive, which impacts with such severity that the affected community has to respond by taking exceptional measures.

2.2.2 Disaster Classification

Disasters have been classified in various ways but the most convenient method used is the division of disasters into two distinct categories according lo their causes:

- Disasters caused by the natural phenomenon
- Manmade disasters

Natural Disasters

Meteorological Disasters: Storms (Cyclones, hailstorms, hurricanes, tornadoes, typhoons and snow storms), Cold spells. Heat Waves and Droughts

Typological Disasters: Avalanches, Landslides and Floods

Telluric and Teutonic Disasters: Earthquakes, Tsunamis and Volcanic Eruptions

Biological Disasters: Insect Swarms, (e.g. locust) and Epidemics of Communicable Diseases.

Manmade Disasters

Civil Disturbances: Riots and Demonstrations

Warfare: Conventional Warfare (bombardment, blockage and siege)

Non Conventional Warfare: Nuclear, Biological and Chemical warfare, Guerrilla Warfare including Terrorism

Refugees: Forced movement of large number of people usually across frontiers

Accidents: Transportation calamities (land, air and sea), Collapse of building, dams and other structures, mine disasters.

Technological failures (e.g. a mishap at a nuclear power station, a leak at a Chemical plant causing pollution of atmosphere or the break down of a public sanitation system)

This relatively simple classification has been overlaid by more complicated classification scheme of various researchers. The classifications are by no means fully comprehensive as these merely indicate the numerous causes or potential causes ol' some of the more serious disasters. Tlic division between natural and manmade is to some extent an oversimplification as many disasters can be caused by either. Some of the worst calamities are often caused by the cumulative effect of several of the above mentioned factors both natural and manmade.

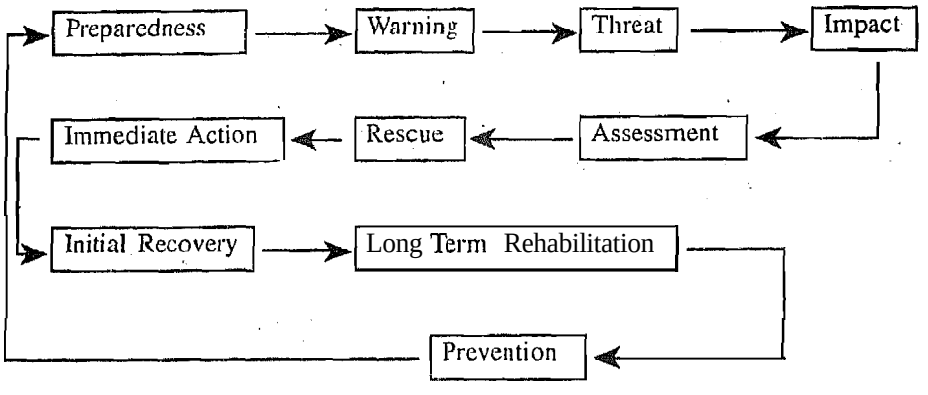
2.2.3 Disaster Process

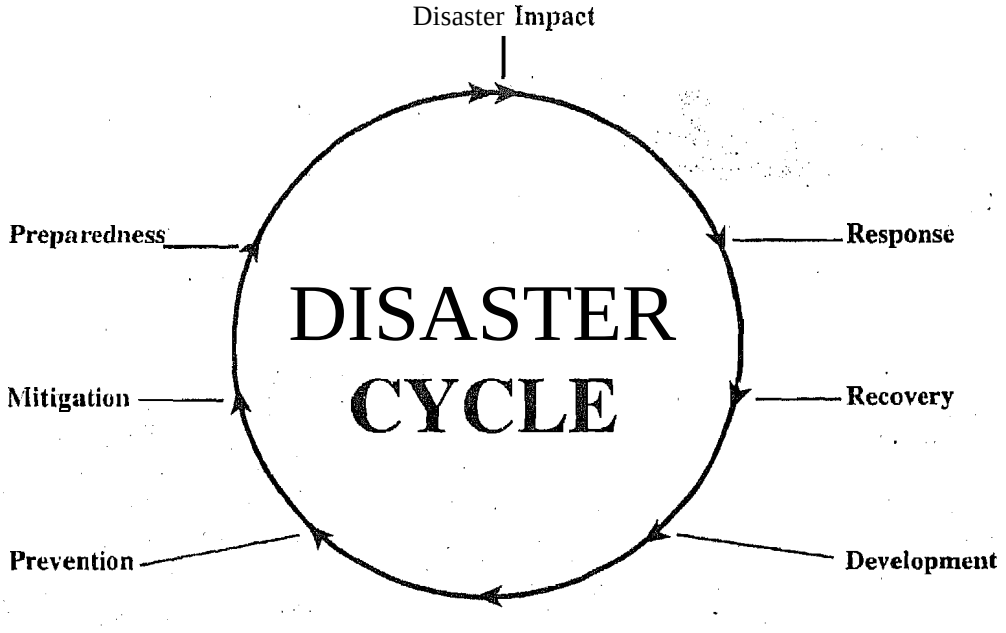
Disaster situation has been conceptualized as a process with differing phases. hi each different phase, the information, the action required, the problems encountered and people involved may be quite different. The interrelationship of these different phases and activities is important for its management. Various researchers like Powel and Rayner, Garb and Eng, Skeet, Dynes and Russell have divided disaster into various stages or phases. This artificial time division of disaster studies is an important base for planning.

Each type of phase will vary according to the type of disaster event with different time element like in an aircraft crash there may be no warning or very little warning as against floods, which may give sufficient warning for preparedness.

The disaster and its management has been considered as a continuum of interlinked activities in wliicli the cyclical nature ol various components of disaster management has been conceptualised as a disaster cycle by W. Nick Carter.

Disaster Process





2.2.4 Spectrum of Disaster Management

The spectrum of disaster management involves disaster prevention, mitigation, preparedness, response and recovery. It is essential to clearly understand these terms and the scope of activities in each of them.

Disaster **Prevention:** It covers those measures which are aimed at impeding the occurrence of a disaster event and/or preventing such an occurrence having harmful effects on communities. Prevention concerns the formulations and implementation of long range policies and programmes.

Disaster **Mitigation:** Measures aimed at reducing the impact of a natural or manmade disaster on a nation or community.

Disaster Preparedness: Measures, which enable governments, organisations, communities and individuals to respond rapidly and effectively to disaster situations. Preparedness measures include the formulation of viable disaster plans, the maintenance of resources and the training of personnel. Organising, planning, coordinating, resource planning and training are its major concerns.

Disaster Response: Response measures are those, which are taken immediately prior to, and following disasters. Such measures are directed towards saving life and protecting property and to dealing with the immediate damage caused by the disaster. Its success depends vitally on good preparedness.

Disaster Recovery: Recovery is the process by which communities and the nations are assisted in returning to their proper level of functioning following a disaster.

2.2.5 Special Characteristics

Disasters are considered phenomenon in themselves with some common characteristics. There me several facts and phenomenon associated with disaster events which requires clear understanding as these have many planning and response implications

Geography of Diasters

The geographic divisions of the total area concerned with a disaster were conceived in order to classify the arising problems and help manage them. Solomon Garb and Eveling Eng divided the area in the three major divisions:

Impact Area: Area in which the impact agent works out its full capacity for destruction. The area will vary with the lype of disaster like in aircraft or train accident the area will be relatively small. But in floods, dam burst, typhoon and storms the area will he very large.

Filter Area: It is virtually the undamaged zone from which the reserves enter the area and through which evacuees and rescue workers must pass. Serious traffic confusion often occurs in this area.

Community Aid Area: The area outside the liltcr area from where the community, special institutions and organised teams operate for performing rescue and rehabilitation roles.

Disaster Behaviour

Analysis of various disaster situations of differing magnitude and consequences carried out over a period of more than 30 years in different countries confirm that there are many common patterns of human and organisational behaviour in emergency situations. The psychology of disaster involves several distinct facets like psychology of victims before, during and after disaster, of the volunteer helper, trained professionals and the onlooker. Each-must be understood in order to cope with the problems. Pre disaster planning is dependent in large parts on what is assumed about human behaviour in emergency situations. Valid assumptions are essential for the planning and implementation of effective emergency measures and post disaster responses.

The Victim: Most people believe that a disaster is some thing that happens Io someone else not to themselves or their families. This is called the 'dclusion of personal invulnerability'. As a result they are likely to ignore or minimise warning and refrain from taking preventive measures. It can be countered by vigorous training or by imaginative action or both. These persons who have ignored all warnings before the disaster impacts often over react to warnings, rumors and wild speculations after the impact, Prompt setting up of an efficient communications system will minimise the harm from this sort of psychological pattern.

Disaster Syndrome: A form of stress or shock reaction, called a 'Disaster Syndrome' has some times been observed in the aftermath of relatively sudden and extensive disasters with acute disorientation and apparent loss of individual purpose or direction. It does not occur in a great number of people and is generally of short duration, A stress situations called 'Counter Disaster Syndrome' has been described where some uninjured or slightly injured survivors of the impact and volunteers may suffer this short duration syndrome which is marked by vigorous rescue activity.

EL Quarantilli disproved the myth about panic flights, helplessness, paralyzing trauma, anti social behaviour and low community morale during disaster situations. Recognition of the ability of people to cope suggests that as a basic premise, the actions and resources of survivors must be considered in planning for and providing assistance in emergency situation.

Convergence in Disaster

Convergence is observed to be a common problem in most disaster events and it has an important bearing on disaster management. Convergence, characterised by the spontaneous movement of large number of people and large amounts of materials towards

the zone of impact, is a common phenomenon in all emergencies. This convergence is motivated by a concern for victims, a desire to help, simple curiosity and the search for information. This movement usually outweighs the outward flow of those wishing to leave. The convergence is described to he of three types:

Personal convergence: The physical movement of people.

Material convergence: The physical movement of supplies and equipment.

Information convergence: The quest for information through the transmission of messages by word of mouth, telephones, wireless etc.

In past disasters unofficial convergence has been one of the greatest obstacles lo giving efficient help to the victims. The extent to which convergence hampers effective rescue, first aid and evacuation is usually much greater than more people realise.

It is important therefore, to understand the convergence phenomenon, its origins and possible ways of dealing with it. Convergence causes logistic and administrative problems, Studies have concluded that convergence remains largely a contextual problem which can not be avoided. Convergence cannot be completeiy blocked out but it can be channeled. Convergence of telephone calls is known *to* jam the communications channel of hospitals and the conveyance of people in hospital causes confusion. Uncontrolled convergence of relief material is likely lo create logistic problems as well as may lead to traffic jams. As convergence is likely to occur after every disaster. it requires careful consideration in order to enhance the usefulness of donations and minimise the administrative and logistic difficulties.

Leadership **in Disaster**

In any attempt to bring order and efficiency out of disorder and confusion, sound leadership is necessary. This is particularly true in disasters which arc the epitome of disorder and confusion. Past experience has shown how helpful sound leadership can be and how it can save lives and prevent suffering. By contrast, poor or absent leadership has sometimes resulted in needless extra casualties. Disaster management involves many agencies aid organisations at various stages. For a total integration and optimisation of resources of multiple channels, multiple sources have got to be systematically led by someone. The leadership principles commonly found useful in disaster situation are:

- Leadership in disaster must be shared.
- Organisation of leadership framework must be clear and well defined.
- The higher levels of leadership in a disaster should, ideally, be held by persons who already have recognised authority under existing law.
- Leadership must understand the principles of organisation and of delegation of authority.
- Leadership should be an open-ended management.

Key Issues

Disaster management implicates different sectors at different times and the need for cooperation and coordination among local, state and national agencies is never more apparent than in the case of disasters, hence disaster management necessitates a multidisciplinary approach. It is not possible for any organisation to carry the burden of the disaster plan. Disasters cannot be managed in a vacuum and many agencies have to be integrated and coordinated into the plan to prevent duplications and confusion. It is necessary to promote maximum coordination of all the community resources for tlic time when disaster may strike, Coordination is a key issue in disaster management.
Disaster is no respecter of circumstances and it is known to strike with suddenness and fury of its own with a curious l'aculty for choosing an inopportune moment to hit. The motto "preplanning prevents poor performance" is most applicable to disasters. A realistic, well-rehearsed and coordinated disaster plan executed by a well-trained system is essential to meet the challenge of disasters. The key issues in disaster management are:

- Preplanning
- Coordination and multisectoral cooperation
- Training
- Regular practice

Check Your Progress 1

1) Define and classify diasters.

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2) Describe the disaster process and its importance.

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3) What is importance of Geography in disasters and convergence in disasters?

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2.3 DISASTER MANAGEMENT IN INDIA

The disaster management system of various countries indicates a need of a clear National Disaster Management Policy for establishing and maintaining adequate arrangements to deal with all aspects of a disaster threat. This policy framework should be at all levels of the national structure and organisations at national, state and district levels. Adequate disaster legislation is necessary to provide authority and assume cooperation and assistance among often competing government jurisdiction. The policy and legislation is to be supported by appropriate organisation and disaster plans. The national level organisations and plans needs to bc supported by regional/state level plans.

India is a vast country, the main land area consists of 32,37,782 square kilometers. India with 2.4 per cent of worlds land mass, seventh largest country in the world, with 15% of worlds population is the second most populous country in the world. The current estimated population of a billion has a population density of 273 persons par sq kilometer, which makes the effects of disasters very serious. India manifests many natural disasters like floods, earthquakes, cyclones and drought etc. and also the manmade disasters like chemical disasters in Bhopal, collapse of buildings, train and aircraft accidents etc. The vulnerability to National Disasters can be seen from the following:

Floods: India is one of the most flood prone countries in the world. On an average about 9 million hectares are affected by flood every year. India accounted for 115 of global deaths due to floods from 1960 to 1980's.

Earthquake: The country has about 56.3 % of total area amounting to 3.3 million sq kilometers vulnerable to seismic activities of varying intensity. The earthquake prone areas have witnessed over 33 major earthquakes within the country. During last 80 years India has lost about 70000 lives due to earthquakes.

Cyclones: India has a very long coastline of 5700 kilometers, which is vulnerable to tropical cyclones arising in the Bay of Bengal and Arabian Sea. Cyclonic storms have been causing considerable damage to life and property in the coastal area of India. The cyclone in Paradip on 30 October 1979 claimed 10,000 lives. Orissa cyclone in 1982 distressed 7 million people and Andhra Cyclone in 1997 killed 10,000 people and 23,000 cattle.

Manmade Disasters: India suffered the largest manmade disaster in Bhopal on 3rd December 1984 when chemical gases leaked killing 2500 people. 17500 were hospitalised besides incapacitating thousands.

The vulnerability of the country requires appropriate disasler plans at the national, state, district level and in each hospital. Each and every response organisation must be prepared lo play a role in disaster situations,

2.3.1 National Level

In the federal set up of India both the central government and state government share the responsibility for disaster management. The basic role of central government is supportive in providing information, financial, technical and material support. Contingency Action Plan for Natural Calamities issued by Ministry of Agriculture, Government of India is the basic document guiding disaster management in India. This brief document provides a policy statement and response mechanism. The focus of this document is mostly rclicf oriented. It is reported that the natural disaster policy is under preparations. The organisational component at the national level is:

- Cabinet Committee headed by Prime Minister

  National Crisis Management Committee under the chairmanship of Cabinet Secretary

- Crisis Management Group under the Chairmanship of the Central Relief Commissioner

- Financial arrangements are basically through the 'Calamity Relief fund'

2.3.2 State Level

The policies, organisation structure and functions at central government level are reflected in the stale government. There is no standard organisation, policies, or functional arrangements, as each stale government has its own organisation patterns, policies and plans to tackle disasters. The primary responsibility of disaster management is of the stale government for relief operations, preparedness and rehabilitation. Each slate has a Stale Crisis Management Group headed by the Chief Secretary. The senior officers from various departments form part of this group.

The state is divided in various districts, which form the basic structure of the state administration and focal functional unit with represenlation of all the elements of administration structure. The district is the basic unit for emergency plans, response, coordination, supervision and monitoring of relief operations. The district administration prepares contingency plans with specific responsibilities for implementation. The districts have District Relief Committees for relief measures and District Control Room for day to day monitoring of relief and rescue operations.

2.4 PRINCIPLES OF DISASTER PLANNING

2.4.1 Principles

Disaster Management means a planned and systematic approach towards understanding and solving problems in the wake of disasters. The effects of disasters could bc minimised, if there is pre-disaster preparedness and properly drawn up disaster plans. Some general principles of disaster planning are as under:

- It should be a continuous process.
- It should reducc the unknown in a problematic situation by foreseeing what is likely to happen.
- Plan must evoke appropriate response.
- Plan must be based on valid knowledge.
- Plan must focus on general principles.
- Plan should serve as an educational activity.
- Plan must be tested.
- Adjust planning to people rather than expecting people to change. their behaviour in order to conform with the planning.

- Greater the preparedness for probable or foreseeable events, more effective the relief operators will be.
- No two disasters are alike, but the problems that a certain kind of disaster is likely to create are quite foreseeable.
- There can be no tailor made plan for all situations, but as most elements of response are common to all disasters, a general preparedness plan will help in a more rational response in various emergency situations.
- Plans must be realistic and adaptable.
- Plans must use existing structure rather than create new ones.
- Plans must be clearly written.
- Plans at each level should be harmonised with those of the levels above.

2.4.2 Disasters and Health Problems

Disasters invariably have health consequences. The health problems in disaster could be due to either or any combination of factors enumerated below:

- Directly due to impact of drowning during floods, injuries during earthquake
- Due to delay in evacuation
- Due to non-availability or inadequate immediate medical care
- Due to disorganisation or non-availability of centres for advanced medical care
- Due to delay in transportation to medical centres.

The health hazards resulting from the disaster events depend upon a large number of factors as given below:

- Population density
- Population displacement
- Disruption of pre-existing facilities
- Disruption of normal health programmes
- Increased vector breeding
- Climatic exposure
- Inadequacy of food and nutrition

There is probably no event that so severely tests the adequacy of health infrastructure as the occurrence of a sudden disaster such as an earthquake and cyclone etc. To a large extent, well-planned health delivery systems is the most important preparation for a catastrophe. Planning, organising and coordinating health care in advance needs the utmost priority in order that a disaster stricken population may be attended in a more rational way.

2.4.3 Organisation for Medical Relief

Depending upon the location and magnitude of the disaster, first level of care is generally organised at the disaster site to provide relief and first aid to the victims. The organisation of medical relief involves two distinct facts:

- Pre-hospital care
- Hospital care

The pre-hospital phase involve despatch of first aid teams and mobile medical services to the disaster site, At site the preliminary phase involves organising on site analysis, on site treatment, stabilisation and transporting Ib selective care facility. The definitive care phase at the receiving hospital involves patient transfer, triage, continuation of treatment, second stage diagnosis, emergency room treatment, intensive care, definite diagnosis and treatment. The recuperation and rehabilitation phase continues for a long period and may even last for years as in case of nuclear and chemical disaster like in Bhopal gas tragedy victims. Medical care, which can be effectively organised at disaster sites, involves some important aspects of organisation and staffing:

- Command and Control
- Communication
- Coordination
- Triage Team
- First Aid Team
- Mobile Hospital
- Evaluation and Casualty Clearing Team

2.4.4 Principles of Mass Casualty Management

Disaster inediciue is a mass and multiple trauma medicine and it is not different from ordinary medicine, Llic distinguishing feature is its method of application and primary concern for yield and efficiency.

Some types of disasters usually result in a large number of casualties, which are beyond the routine handling capacity of the health care system. Application of principles of mass casualty management helps meet the demand of a large number of people. The principles of mass casualty management arc universal and can be applied in any mass casualty situation natural or manmade.

- Doing the best for the most within the available resources
- Triage is inescapable through out the chain of treatment

  Graded care of casualties, lirst aid life saving measures, preparation for evacuation, primary surgery and definitive treatment
- First aid measures carried out at the earliest assumes life saving significance
- First aid at the scene of disaster must be limited to monitoring and restoring vital functions
- Simple and standard therapeutic principles
- The casualty must be conditioned or treated so that the degree of urgency is lessened

Management of mass casualties can be divided into four phases, rescue, first aid, transportation and definitive treatment. Rescue in large-scale disasters in most instances must be of necessity and is performed by the survivors themselves. Tlic rescue team supports the community rescue efforts with special equipment. A reduction in mortality in llie severely injured can be achieved by early first aid. The first aid is usually limited Ib primary life support measures — the main functions of which are maintaining Airway, Breathing and Circulation. The routine practice in medical care — lirst come first treated — is inadequate in mass emergencies. Whenever time, personnel and resources are grossly insufficient to meet all the needs sorting or triage is the only appropriate way to provide a maximum benefit Ib most of the injured. The process involves sorting out those of the wounded whose progress is most favourable.

The mass casualty management involves categorizing the casualty for priority of treatment and evacuation based on the chances of survival and most benefit from

measures. There are various types of classification of casualties available worldwide but the most common categories are as under:

Category I: Immediate Treatment: Severely injured victims who can be saved if they receive appropriate stabilisation, transportation and treatment immediately.

Category II: Delayed Treatment: Urgent but less serious injuries who can be transported and treated alter the most serious have been attended to. These victims will require surgery in 8 to 12 hours,

Category III: Minimal Treatment: Walking wounded who can often be attended in small group and if ambulances are in short supply can be transported by other means.

Category IV: Injuries: Injuries, which are not serious, will generally be. treated and sent back to their homes. In a disaster event causing very large number of casualties this category may include moribund cases or so severely wounded than even immediate care would be inadequate to prevent death.

Tagging is a commonly used method to indicate priority of evacuation. Various types of tags are in vogue. Each patient must be identified with lags stating their name, age, sex, place of origin, triage category, diagnosis and initial treatment given. Usually red tags indicate first priority, yellow priority two and green priority three.

Check Your Progress 2

1) Define the principles of disaster planning.

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2) Discuss the health consequences of the disasters and principles of mass casualty . management.

2.5 OBJECTIVES OF HOSPITAL DISASTER PLAN

2.5.1 Need for Hospital Disaster Plan

The hospitals play a vital rola in the medical care of the community during disaster situation. Disasters pose lots of challenges to the health care system and only those hospitals that arc prepared can meet the demand of such situation.

P.E.A. Savage defined disaster in terms of medical relief and hospitals as "Arrival with little or no warning of many more casualties of all types of degree and severity than the hospital is staffed or equipped to handle at that particular time." This definition focuses on organisational ability and required services, which explains the response needed. Hospitals should be prepared for two kind of disasters:

- Internal Hospital disaster: such as an explosion or a major lire
- External disaster such as floods, earthquakes, technological disasters etc.

2.5.2 Objective and Purpose

The purpose of a disaster plan is to make it possible to attend, promptly and effectively, to the largest possible number of people requiring medical care, in order lo reduce the number of deaths and disabilities. The principal objectives are:

- To prepare the staff and institutional resources for optimal performance in an emergency situation of certain magnitude

  To make the community aware of the importance of the disaster plan, how it is executed and the benefits it provides

- To train the staff as a part of educational activity
- To carry out periodic drills and its evaluation to update plans.

2.5.3 Planning Process and Development of Plan

Disaster care is, of necessity, purely emergency care and because hospital disaster operations are essentially an expansion of day to day emergency services of the hospitals A prerequisite to good disaster management is that emergency systems must be functioning well on a routine basis. The response capability of the hospital will vary from hospital to hospital based on its size, type of hospital, location of the hospital resources available and role allotted to the hospital in over all community plan.

The development of disaster plan should take into account the planning process:

- Analyse the risk and hazards in the geographic location concerned with the hospital
- Carry out vulnerability analysis of the community exposed to the risk and hazards
- The probable demand and nature of work expected during disasters
- Assess the resources available
- Determine response capabilities
- Determine the aim of Uie disaster plan based on factors enumerated above
- Determine organisation structure for disaster
- Development of organisation, allocation of role and responsibilities. Authority structure should be made clear
- Training of organisation
- Testing of the organisation
- Testing of the plan
- Periodic revision of both the plan and the organisation.

The hospital disaster plan provisions should include the following;

- Efficient system of alert and staff assignment
- Conversion of a usable space into clearly defined areas for triage, patient observation and immediate care
- Removal of casualties to more appropriate and definitive medical care facilities
- Special medical services for disaster cases
- Procedure for prompt transfer of patients within the hospital
- Security arrangements
- Establishment of a public information centre
- Evaluation of hospital services and its sources of electricity, gas, water, food and medical supplies
- Method of identifying patients who are immediately dischargable or transferable
- Special disaster.medical record and medical tag
- Planning use of OT, X-ray, blood bank and laboratory.

2.6 DISASTER COMMITTEE

The hospital disaster management committee operates at the decision making level and die action decided upon are executed by the medical staff supported by the institution's logistical and general service units. The composition of the committee should include doctors and nurses as well as administrative staff. The number, specialisation and seniority of committee members Io be decided according to the need. The membership of the committee generally includes, the following:

The Director of Hospital

In charge of Accident and Emergency Services

- Department Heads
- The Nursing Superintendent
- The Hospital Administrator
- A stall' representative

The functions of the hospital disaster committee are:

- To develop the hospital disaster plan

To develop departmental plans in support of the hospital plan

- To allocate duties to the hospital staff
- To establish standards of emergency care
- To conduct and supervise training programmes
- To supervise drills to lest the hospital plan
- To renew and revise the disaster plan at regular iiitervals.

2.7 ORGANISATION, ROLE AND RESPONSIBILITIES

2.7.1 Organisation

The hospitals needs a proper organisation for disaster management. Ideally, the organisation chart in effect during a disaster period should be the hospitals regular one, possibly strengthened and improved. The organisation chart should specify the levels of command in supervision and administration, so that duplication of effort may be avoided. The organisation should provide a definite line of authority established in each areas in advance and there should be no question over who is in charge. The organisation should include medical staff, nursing staff, administrative staff and department heads.

2.7.2 Role and Responsibilities

The effective implementation of the disaster plan would necessarily require clear assignment of the role and responsibilities in all the functional areas essential to support the plans. Clearly laid down role and responsibilities of the following would be essential:

Disastér .Coordinator: Organising, communicating, assigning duties, deploying staff and taking key decisions. .

Administrator: The responsibilities are extensive and most of the authority is executed through deptt heads,

Department Heads: Development of departmental plans to meet the requirement of the over all plan of the hospital.

Nursing Superintendent: Deployment of nursing staff and augmenting key areas of hospital.

Medical Staff: Specific authority and responsibility during initial response and reinforcement of important areas.

Nursing Staff: Role and responsibilities to support critical areas.

The following important departments play a crucial role in disaster management and therefore the role and responsibilities be clearly delineated.

- Accident and Emergency Department
- Operating Department
- Laboratory
- Radiology and Imaging
- Critical Care Units

The logistic support becomes crucial during the implementation of a disaster plan. The role and responsibilities of the following department needs to be clearly laid down to support the disaster plan:

- Planning
- Linen and laundry
- CSSD
- Catering department
- House keeping
- Medical Records
- Porter staff
- Engineering department
- Medico-social worker
- Transport
- Security and traffic control
- Communication
- Media control
- Morgue

Check Your Progress 3

I) What is the objectives of the hospital disaster plan and how will you develop a plan for the hospital?

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2) What is the composition and functions of the Disaster Committee?

2.8 ORGANISING DISASTER FACILITIES

To meet the medical care demands of disaster victims, special functional areas should be set up within the hospital, which includes:

Triage or sorting area: Located with Accident and Emergency services where triage team consisting of emergency physician, surgeon, nursing personnel handle the incoming casualties. Here rapid assessment of the injury and extent of severity of the casualty's injuries are carried out by a doctor/nurse and assigns that casualty lo an appropriate treatment area.

Primary Treatment Areas: Immediately after triage casualties are sent to appropriate treatment areas. These treatment areas would include immediate, urgent and non-urgent tare areas. Those in need of immediate life saving measures are sent to resuscitation room where facilities are available for establishing airway, controlling haemorrhage supporting fractures and treating shock. Casualties should remain in the resuscitation room for the shortest possible time, further investigations and treatment being carried out in another treatment area. Urgent cases needing diagnosis, investigation and initial

treatment of their injuries receive attention in an urgent treatment area. Non-urgent casualties may be investigated, diagnosed and treated in non-urgent treatment area. Special treatment areas may be needed for the management of burns, fractures and in case of chemical or nuclear disaster victims.

Secondary Treatment Areas: The secondary treatment areas include all the wounds, critical care units and operating and diagnostic deptt etc The casualties requiring important care will be taken from primary treatment area to the Intensive Care Unit, Operating Theatres or to special receiving wards which have been evacuated to house the disaster victims.

In-patient Evacuation Holding Area The setting up of one or more wards to receive all the admitted victims of a disaster is essential if medical and nursing staff are not to be scattered around the hospital. Clearing of these designated wards should be carried out at an early stage in preparing the hospital to cope with a disaster, and personnel and equipment can be diverted to the receiving ward. Additional beds are made available in other wards by arranging for suitable patients to be discharged home or transferred to other hospitals.

Additional Facilities: The additional facilities would be required to be created like:

- Control and information centre
- Volunteer reception
- Relatives waiting area
- Media room

The staff alert, recall and deployment, immediately on receipt of information and also to sustain the activity till all the need lasts is a major issue in organising. The initial efforts should be to employ the triage team, reinforce the accident and emergency department and critical care areas. Initial minimum deployment of staff in each area must be given priority. The deployment as initial response has to be followed by the assessment of expected number of casualties of various types and degree based on the disaster event to determine the staffing need in all areas to sustain the activities to meet the requirement. The staffing requirement may continue for few days if disaster is of severe type hence the staff rest, reception and redeployment has to be planned. The need of the portering staff, documentation clerks etc. has to be considered.

The secondary treatment areas would continue to function even when the fresh cases of casualties stop arriving. Hence the staff need of the secondary care area has to be planned. It may require redeployment of staff from other areas. The relieving of the surgical team, intensivist etc. would require attention as no surgical team can carry on without relief for more than 12 hrs. Very often the largest number of casualties fall into non-urgent category hence appropriate staff will be required to care for them.

Support facilities play a vital role in managing the disaster victim. These support facilities like, CSSD Pharmacy, Dietary service, security services, transport etc. would require staff support.

2.9 DISASTER RESPONSE

2.9.1 Response

The disaster response is heavily dependent on the disaster plan, preparedness, training and periodic rehearsals. The disaster response must he in chronological order to facilitate execution. The designated hospital staff should be responsible to activate the hospital disaster plan. The Casualty Medical Officer, Hospital Administrator on duty or Senior Consultant on call can be designated for putting plan into action. Hospital plan often fails to start when disaster strikes because they are designed on an all or none response. Graded response or phased response has been suggested to overcome these problems. The graded response system in vogue are as under:

Green Alert: Should there be a sudden influx of casualties it mobilises on duty medical,

nursing and other paramedical staff Io support the accident and emergency department. It is used at frequent intervals with minimal interference with hospital activity.

Amber Alert: Prepares the hospital to admit a large number of casualties. It is an extension of green alert, which must be completed first. Receiving wards are cleared, staffed and prepared together with ICU and OT.

Red Aiert: It prepares hospitals for a major community disaster, An extension of the green and amber alert mainly in time scale involved.

In smaller hospital only two categories of Plan – a minor plan for small case load and major plan which involves stoppage of normal work of the hospital to cope with rush of disaster victims.

2.9.2 Alert and Recall

The hospital may receive the disaster alert on telephone or through casualty staff when casualties arrives. The details regarding the disaster event, estimated number and type of casualties be ascertained as far as possible, by the person receiving the alert. The designated staff should then take action for alerting and recall of the staff.

Staff alert and recall is first step in implementation of plan. A number of hospital plans have failed in the past because the alerting procedure has been too defuse. Therefore the alerting procedure need to be frequently tested as failure at this level will inevitably mean failure of the rest of the plan.

Method of alerting hospital staff will vary from hospital to hospital depending on type, size, communication facilities and location of the hospital. Public address system, coded light system, personal paging system and telephone system are usually used. In smaller places messenger may have to bc used. Some hospitals use a siren system. There rue many methods used to save time in alerting like alerting Head of the Department who in turn inform other members of the department Hospital switch hoard operators can play a key role in alerting the staff once the disaster plan activation is announced.

A hospital's ability to respond rapidly lo a disaster depends on the time of the day and the day of the week. During working days hospitals are fully staffed but condition will be very different during the night holidays and weekends. A separate staff alert and recall plan will be required by the hospitals.

2.9.3 Deployment

Experience has shown that in the circumstances of disaster there is little or no time to start thinking about how best lo deploy hospital staff. A system of action cards drawn up in advance will enable the hospital plan to put in effect with the minimum confusion and delay. An action card method incorporates written information, advice and instruction for hospital staff. Some action card may be kept on permanent display in Accident and Emergency Department while other are immediately available in easily identifiable racks and can be handed over to staff as rcyuired. Cards of different colours can be used to indicate different stages of alert procedures. The cards should be of standard format and instructions should bc simple and clear.

2.9.4 Disaster Administration

Control Centre

The aunospherc of chaos and confusion and overload of work is expected in disaster situation. An efficient execution of the disaster plan needs effective conlrol to meet the goal. A command nucleus in the form of Control Centre is essential from where the key functionaries organise, communicate and control the implementation of disaster plan.

Staff Report Board

There is a requirement of a staff report board. Whenever key members of the staff arrive in the hospital they report by telephone to the information centre and whereabouts of each individual is plotted on staff report board to facilitate easy contact in case required,

Information Centre

Combining the Information and Control Centre in conveniently sited rooms helps the senior members of the hospital to control the many facets of the hospital during a disaster, An information centre appropriately staffed has a vital role. A hospital administrator acts as a Hospital Information Officer, supervising the casualty and general status board, liaison with various authorities, medical and nursing staff report centres, relatives, reception area and other departments. It also help in drawing attention to bottlenecks or the need to make additional beds available.

Communication

Without communication Infonnation Control Centre can control nothing. A cominunication centre with dedicated facilities within the hospital and outside, based on intercom, telephone, wireless, and other system would be needed.

2.10 DISASTER MANUAL

A written disaster inanual is an essential requirement for each hospital. It serves to provide information, educate staff, helps in orienting the staff joining the hospital and serves as a reference when needed. The disaster inanual should be a working manual, action oriented with a practical and direct review of disaster response. It is important that disaster manual be in the fonn of multiple custom made manuals so that a person can easily tind pertinent information to the specific job.

All items in the plan should be presented in order of application and importance. The expression must be concise and clear. It would be ideal to have a inanual easily identifiable by a distinctive cover and its contents so arranged that information may be obtained as. rapidly as possible. It will have many appendices and annexures on various aspects. Many authors have provided details of the information to be included in the manual but generally the manual should cover the following, important aspects:

- General Hospital Policies and Procedures: It includes disaster organisation roles and responsibilities, the Hospital policies and procedures for alerting, phased response, general instructions, various facilities and procedure for stand down.
- Disaster Notification: It lists plan on working day and silent hour plan.
- Accident and Emergency Department: It covers the casualty management, deployment of staff, emergency medial care, discharge procedure and documentation etc.
- Special Duties and Responsibilities: This section deals with roles and responsibilities of various administrative staff, medical staff, nursing staff, supportive services staff etc.
- Nursing Services: The nursing services, in various areas and the role of the nursing staff in specific areas is provided in this section,
- Departmental Duties and Responsibilities: In this section various departmental duties and responsibilities of department like dietary service, linen stores, CSSD, house keeping, medical records etc. is given.
- In case of specific risk of a particular type of disaster like nuclear or chemical disaster the specific facilities, staff responsibilities etc. could be given.

2.11 DISASTER DRILL

The disaster drill is to test the hospital preparedness and response to determine whether response was effective and efficient. The disaster drill presents an opportunity for the hospital to reach out to the cold community and to coordinate and cooperate with local and state authorities in meeting community needs. There is little doubt that in the absence of a real disaster, the only way to ascertain the level of preparedness and success of response plan is lo test it, The system must be rehearsed until participants are as familiar as possible

with their role. Drill inust be well organised whether announced or unannounced. In the simple exercises the specific procedures drill alerting, staff recall arrangements are tested. Eventually a full scale disastar'exercise can be planned with realistic siinulation or mock casualties, The aim of the drill should be to train, test performance and to demonstrate weakness that requires revision.

Evaluation of the drill is an essential requirement and must be built in to disaster plan. Evaluation will be necessary both in training and following any disaster with the continuous turn over of hospital staff. It is essential that the knowledge of any plan is tested and that the individual must demonstrate knowledge of his role. Evaluation method could be internal committee or external agency evaluation. Evaluation validates and complements planning and helps arrive at a critical assessment of the performance as under:

- Whether the organisational methods provided in the plan were carried out in a timely and proper manner.
- Whether medical care in the disaster area was adequate and efficient.
- Whether the evacuation to hospital proccddcd according to plan.
- Whether intra hospital care was adequate, tiinely and speedy.

Check Your Progress 4

1) Describe the disaster facilities required in a hospital.

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2) Describe the disaster response mechanism and essential aspect of disaster administration.

2.12 LET US SUM UP

In this unit you have learned about the basic concepts of disaster including the disnstcr process and special characteristics of disasler events which have significant management imperatives. The key issues involved in disaster management focussed on the effect for coordination of multiple agencies or multi-disciplinesinvolved in the response operations.

You also learned about the disaster management system at National, State and District levels. The principles of disaster planning described the requirement of a suitable plan and how the medical relief is organised. The medical care during disasler events where the workload exceeds the capabilities and resources available demand that the principles of mass casually management be practiced,

The hospital disaster planning process and method of development of plan is a scientific process for arriving at the objectives and appropriate disaster plan based on the response capabilities. You would have also learned about the role and responsibilities of the staff and facilities required lo care fur the disaster victims. You would have understood the response mechanism and importance of the disaster manual and disaster drill.

2.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) **WHO** has defined disaster as any occurrence that causes damage, ecological disruption, loss of human life and deterioration of health and health services on a real

sufficient to warrant an extraordinary response from oulside tlie affected community.

Classification **of Disasters:** Disaster has been classified in various ways but tlie most convenient method used is the division of disasters into two distinct categories according to their causes:

- Disasters caused by the natural phenomenon
- Manmade disasters

Natural Disasters

- Meteorological disasters—Storms (Cyclones, hailstorms, hurricanes, tornadoes, typhoons and snowstorms), Cold spells, Heal waves and Droughts.
- Typological Dasters—Avalanches, Landslides and Floods.
- Telluric arid Teutonic Disasters—Earthquakes, Tsunamis and Volcanic Eruptions.
- Biological Disasters-Insect Swarms (e.g. locust) and Epidemics of communicable diseases.

Manmade Disasters

- Civil Disturbances — Riots and Demonstrations.
- Warfare — Conventional Warfare (bombardment, blockage and siege).
  — Non-conventional Warfare (Nuclear, Biological and Chemical warfare, Guerrilla Warfare including Terrorism).
- Refugees — Forced movement of large number of people usually across Frontiers.
- Accidents — Transportation calamities (land, air and sea) Collapse of Building, dams and other structures, mine disasters.
- Technological failures (e.g. a mishap at a nuclear power station, a leak at a Chemical plant causing pollution of atmosphere or the break down of a public sanitation system).

2) Disaster situation toto has been conceptualised as a process with different phases. In each phase the information, the action required, the problems encounteredand people involved may bc quite different. The interrelationship of these different phases and activities is important for its management. The time diversion of disaster phenomenon forms an important base for planning. Each type of disaster phase will vary according to tlie type of disaster event with different time element like in an air crash there may be little or no waving as against floods, which may give sufficient waving for preparedness.

3) The geographical diversion forms the basis to classify tlie arising problems it also explain the type of management activity required in the particular geographical area. There are three major divisions:

a) Impact Area

b) Filter Area

c) Community Aid Area

Convergence is a common problem in most disaster event **and** is charecterised by the spotaneous movement of large number of people and large amount of materials towards the zone of impart. This convergenceis motivated by a concern of victims, a desire to help a simple curiosity and search for information. Themovement usually outweighs the outward flow of those wishing to have,

Check Your Progress 2

1) Disaster management requires a planned and systematic approach towards understanding and solving problem to minimize the effects of disaster. The general principles of disaster planning are as under:

Principles: Disaster management means a planned and systematic approach towards understanding and solving problems in the wake of disasters. The effeds of disasters could be minimized, if there is pre-disaster planning are as under:

- It should be a continupus process.
- It should reduce the unknown in a problematic siluation by foreseeing what is likely to happen.
- Plan must evoke appropriate response.
- Plan must be based on valid knowledge.
- Elan must focus on general principles.
- Plan should serve as an educational activity.
- Plan must be tested.
- Adjust planning to people rather tlian expecting people to change their behaviour in order to conform with the planning.
- Greater the preparedness for probable or foreseeable events, more effective the relief operators will be.
- No two disasters are alike, but the problems that a certain kind of disaster is likely to create are quite foreseeable.
- There can be no tailor made plan for all situations, but as most elements of response are common to all disasters, a general preparedness plan will help in a more rational response in various emergency situations.
- Plans must be realistic and adaptable.
- Plans must use existing structure rather then create new ones.
- Plans must be clearly written.
- Plans at each level should be harmonized with those of the levels above.

2) Disasters invariably have health consequences. The health problems in disaster could be due to either or any combination of factors enumerated below:

- Directly due to impact of drowning during floods, injuries during earthquake.
- Due to delay in evacuation.
- Due to non-availability or inadequate immediate medical cue.
- Due to disorganisation or non-availability of centres for advanced medical care,
- Due to delay in transportation to medical centres.

The health hazards resulting from the disaster events depend upon a large number of factors as given below:

- Population density
- Populntion displacement
- Disruption of pre-existing facilities
- Disruption of normal health programmes
- Increased vector breeding

- Climate exposure
- Inadequacy of food and nutrition.

There is probably no event that so severely tests the adequacy of health infrastructure as the occurrence of a sudden disaster such as an earthquake and cyclone etc. To a large extent, well-planned health delivery systems is the most important preparation for a catastrophe. Planning, organising and coordinating health care in advance needs the utmost priority in order that a disaster stricken population may be attended in a more national way.

Principles of Mass Casualty Management: Disaster medicine is a mass arid multiple trauma medicine and it is not different from ordinary medicine, the distinguishing feature is its method of application and primary concern for yield and efficiency.

Some types of disasters usually result in a large number of casualties, which are beyond the routine handling capacity of the health care system. Application of principles of mass casualty management helps meet the demand of a large number of people. The principles of mass casualty management are universal and can be applied in any mass casualty situation natural or manmade.

- Doing the best for the most within the available resources.
- Triage is inescapable through out the chain of treatment.
- Graded care of casualties, first aid life saving measures, preparation for evacuation, primary surgery and definitive treatment.
- Rrst aid measures carried out at the earliest assumes life saving significance,
- First aid at the scene of disaster must be limited to monitoring and restoring vital functions.
- Simple and standard therapeutic principles.
- The casualty must be conditioned or treated so that the degree of urgency is lessened.

Management of mass casualties can be divided into four phases, rescue, first aid, transportation and definitive treatment. Rescue in large-scale disasters in inost instances must be of necessity and is performed by the survivors themselves, The rescue team supports the community rescue efforts with special equipment. A reduction in mortality in the severely injured can be achieved by early first aid. The first aid is usually limited to primary life supported measures — the main functions of which are maintaining Airway, Breathing and Circulation. The routine practice in medical care — first come first treated — is inadequate in mass emergencies. Whenever time, personnel and resources are grossly insufficient to meet all the needs sorting or triage is the only appropriate way to provide a maximum benefit to most of the injured. The process involves sorting out those of the wounded whose progress is most favourable.

The most casualty management involves categorising the casualty for priority of treatment and evacuation based on the chances of survival and most benefit from measures. There are various types of classification of casualties available worldwide but the most common categories arc as under:

- Category I : Immediate Treatment: Scvercly injured victims wlio can be saved if they receive appropriate stabilisation transportation and treatment immediately.
- Category II : Delayed Treatment: Urgent but less serious injuries who can be transported and treated after the most serious have been attended to. These victims will require surgery in 8 to 12 hours.
- Category III ; Minimal Treatment: Walking wounded wlio can often be attended in small group and if ambulances are in short supply can be transported by oher means.
- Category IV: Injuries, which are not serious, will generally be treated and sent back to their homes. In a disaster even causing very large number of casualties

this category may include moribund cases or so severely wounded then even immediate care would be inadequate to prevent death.

Tagging is a commonly used method lo indicate priority of evacuation. Various types of tags are in vogue. Each patient must be identified with tags stating their name, age, sex, place of origin, triage category, diagnosis and initial treatment given. Usually red tags indicate first priority, yellow priority two and green priority three.

Check **Your** Progress **3**

1) **Objectives and** Purpose: The purpose of a disaster plan is lo make it possible to attend, promptly and effectively, to the largest possible number of people requiring medical care, in order to reduce the number of deaths and disabilities. The principle objectives are:

- To prepare the staff and institutional resources lor optimal performance in an emergency situation of certain magnitude.

  To make the community aware of tlie importance of the disaster plan, how it is executed and the benefits it provides.

- To train tlie staff as a past of educational activity.

- To carry out periodic drills and its evaluation to update plans.

Development **of Plan for a Hospital:** Disaster management plan should be developed in a manner that the emergency system must be functioning on a routine basis. It sliould be take into account the planning process, as follows:

- Analyse the risk and hazards in the geographic location concerned with the hospital.
- Cary vulnerability analysis of tlie community exposed lo this risk and hazards.
- The probable demand and nature of work expected during disasters.
- Assess the resources available.
- Determine response capabilities.
- Determine the aim of the disaster plan based on factors enumerated above.
- Detennine organisation structure for disaster.
- Development of organisation, allocution of role and responsibilities. Authority structure sliould be made clear.
- Training of organisation.
- Testing of organisation.
- Testing of tlie plan.
- Periodic revision of both the plan and the Organisation.

The hospital disaster plan provisions sliould include the following:

- Efficient system of alert and staff assignment.
- Conversion of a usable space into clearly defined areas for triage, patient observation and immediate care.
- Removal of casualties to more appropriate and definitive medical care facilities.
- Special, medical services for disaster cases.
- Procedure for prompt transfer of patients within tlie hospital,
- Security arrangements.
- Establishment of a public information centre.

- Evaluation of hospital services and its sources of electricity, gas, water, food and medical supplies.
- Method of identifying patients who are immediately dischargable or transferable.
- Special disaster medical record and medical tag.
- Planning use of OT, X-ray, Blood Band and Laboratory.

2) **Disaster Committee:** The hospital disaster management committee operates at the decision making level and the action decided upon are executed by the medical staff supported by (lie institution's logistical and general service units. The composition of the committee should include doctors and nurses as well as administrative staff. The number, specialization and seniority of committee members should be decided according to tlic anticipated need. The membership of the committee generally includes the following:

- The Director ol' Hospital
- In-charge of Accident and Emergency Services
- Department Heads
- The Hospital Administrator
- The Nursing Superintendent
- A representative from the community/civil administration.

The functions of the Hospital Disaster Committee are:

- To develop the hospital disaster plan.
- To allocate duties lo tlic hospital staff.
- To establish standards of emergency care.
- To conduct mid supervise training programmes.
- To supervise drills to test the hospital plan.
- To renew and revise the disaster plan at regular intervals.

Check Your Progress 4

1) To meet the medical care demands of disaster victims special functional areas should be set up within the hospital, which includes the following facilities:

- Triage or Sorting Area: Located with Accident and Emergency services where triage team consisting of emergency physician, surgeon, nursing personnel handles the incoming casualties. Here rapid assessment of the injury and extent of severity of the casualty's injuries are carried out by a doctor/nurse and assigns that casualty to an appropriate treatment area.
- Primary Treatment Areas: Immediately after triage casualties are sent to appropriate treatment areas. These treatment areas would include immediate, urgent and lion-urgent care areas. Those in need of iminedialc life saving measures are sent to resuscitation room where facilities are available for establishing airway, controlling hemorrhage supporting fractures and treating shock. Casualties should remain in the resuscitation room for the shortest possible time, further investigations and treatment being carried oul in another treatment area. Urgent cases needing diagnosis, investigation and initial treatment of their injuries receive attention in an urgent treatment area. Non-urgent casualties may be investigated, diagnosed and treated in non-urgent treatment area. Special treatment areas may be needed for the management of bums, fractures and in case of chemicals or nuclear disaster victitns.
- Secondary Treatment Areas: The secondary treatment areas include all the

wounds, critical care units and operating and diagnostic deptt etc. The casualties requiring important care will be taken from primary treatment area to the Intensive Care Unit, Operating Theatres or to special receiving wards which have been evacuated to house the disaster victims.

- In-patient Evacuation Holding Area: The setting up of one or more wards to receive all the admitted victims of a disaster is essential if medical and nursing staff are not to be scattered around the hospital, Clearing of these designated wards should be carried out at an early stage in preparing the hospital to cope with a disaster, and personnel and equipment can bc diverted lo the receiving ward. Additional beds are made available in other wards by arranging for suitable patients to be discharged home or transferred to other hospitals.

- Additional Facilities: The additional facilities would be required to be created like:
  - Control and information centre
  - Volunteer reception
  - Relatives waiting area
  - Mediaroom

Support facilities play a vital role in managing the disaster victim. These support facilities like, CSSD, Pharmacy, dietary services, security services, transport etc. would require staff support.

2) **Response:** The response to disaster is heavily dependent on the disaster plan, preparedness, training and periodic rehearsals. The disaster response must be in chronological order to facilitate execution. The designated hospital staff should be responsible to activate the hospital disaster plan. The casualty Medical Oflicer, Hospital Administrator on duty or Senior Consultant on call can be designated for putting plan into action. Hospital plan often fails to start when disaster strikes because they are designed on an all or none response. Graded response or phased response has been suggested to overcome these problems. The graded response systems in vogue are as under:

- **Green Alert:** I should there be a sudden influx of casualties it mobilize on duty medical, nursing and other paramedical staff to support the accident and emergency department, It is used at frequent intervals with minimal interference with hospital activity.

- **Amber Alert:** Prepares the hospital to admit a large number of casualties. It is an extension of green alert, which must be completed first. Receiving wards are cleared, staffed and prepared together with ICU and OT.

- Red **Alert:** It prepares hospitals lor a major community disaster. An extension of the green and mnber alert mainly in time scale involved.

Disaster administration: To work in a cohesive and systematic manner without chaos and confusion it is of paramount importance that every individual in the hierarchy knows his job and the work for each individual is well defined. Control monitoring centres at different level should be established as follows:

- **Control Centre:** The atmosphere of chaos and confusion and overload of work is expected in disaster situation. An efficient execution of the disaster plan needs effective control to meet the goal. A command nucleus in the form of Control Centre is essential from where the key functionaries organise, communicate and control the implementation of disaster plan.

- **Staff Report Board:** There is a requirement of a staff report board. Whenever key members of the staff arrive in the hospital they report by telephone to the information centre and whereabouts of each individual is plotted on staff report board to facilitate easy contact required.

UNIT 3 SECURITY ORGANISATION AND MANAGEMENT

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- enumerate the goals and objectives of the security management;
- describe role and functions of security as a service in hospitals;
- familiarise with the various aspects of protection, loss prevention and security organisation of hospital administration;
- explain the legal aspects of security;
- discuss strategic security plan and standing security policies and procedures; and
- describe security related disaster management in hospitals.

3.1 INTRODUCTION

Hospitals are institutions, similar to any other business organisation, engaged in providing Quality Healthcare. They, however, possess certain unique characteristics, given below:

- They provide free access to just about anyone and are "open for business" 24 hours a day, 365 days in a year. They are one of the most "people_intensive" places, where everyday functions are filled with life and death, sorrow and triumph. The Out Patient Department (OPD) patients and visitors and attendants of patients contribute significantly to the floating population of the hospital.
- The entire hospital operates under continual stress and periodically experiences periods of extreme stress, which may cause irrational, confrontationist behaviour, giving rise to conflicts or even aggression.

- The people in or near a hospital generally fall into three categories -– patients, visitors or staff. The Hospital Security Organisation must understand this grouping, since security will have a different and distinct relationship with each group.

- The hospital security staff, duly authorised by management, present a visible image of a "service" to the patients, visitors and staff, carefully combining it with the fundamental objective of security, which is protection of people and the assets. The security functionary may he tlie first or last hospital employee, a patient or visitor may see. A sccurily staff simply saying "Welcome to ABC Hospital" or wishing 'Jaihind' can reduce anxiety of a visitor/patient. Whatever tasks are performed, whether it is helping someone find a laboratory or a bathroom or taking a theft or accident report, these functions should be performed with energy, enthusiasm and in a civil and polite manner.

- Regrettably, the out-moded system of 'Chowkidars' at the entry points continues to be the main constituent of security in most hospitals in India. Even the government and most private hospitals lack an efficient security system.

- Hospital Security Staff members need to be tactful, sensitive, patient and diplomatic, while dealing with situations in a stressful environment.

It has to be realized that hospitals in India are no longer sheltered or isolated from the strifes and anxieties of onr society. The hospitals too have to face up to the growing challenges. While no database is available of losses in the Indian hospitals, a study carried out in the USA indicates that the hospitals lose around 10% of their purchase inventory due to preventable securily lapses/mis-management. The basic causes are primarily attributable to Security in Hospitals, being treated as a peripheral function, rather than a vital objective of top managements for protection of tlie facility's total assets—property, staff, patients, image and information and of course to establish a system of safeguards "designed to achieve relative safety for all persons inter-acting within tlie hospital and its environment".

While operational aspect of Security Management is the responsibility of the security executive and their staffs, the lop management ol'a hospital is responsible to lay-down the policy frame-work to integrate "Comprehensive Security" in organisational culture of a hospital, to achieve Loss Prevention. Well-organised hospital security department and well-trained security staff should pro-actively assist in creating an atmosphere of safety, goodwill, service and human concern so that the 'Patient-Care' can continue undisturbed.

Check Your Progress 1

Fill in the blanks:

1) The security functionary may be the ..... or ..... hospital employee a patient or visitor may see.

2) The top management of a hospital is responsible to lay clown the .... to integrate "Comprehensive Security" in organisational culture of a hospital to achieve ..... .

3.2 SECURITY THREATS AND VULNERABILITIES OF HOSPITALS

3.2.1 Threats and Vulnerabilities of Hospitals

All hospitals are liable to 'seen' and 'unseen' vulnerabilities. A vulnerability in tlie context of hospitals can be defined as, "something that could lead to injury, harm, or threat to persons, property, ideals or image". As hospital administrators, you should familiarize yourself with the specific vulnerabilities that your institution may face, as no two circumstances or locations or alike. By understanding these, you would be better equipped to direct and monitor the security department Common threats and vulnerabilities that a hospital may face are:

- Thefts — External or Internal
- Patients property losses
- Employees property losses
- Destruction or damage of property including vehicle accidents, attributable to negligence, lack of training or out of sheer malice or external and natural causes
- Information losses, pertaining to confidential or privileged information, medical records of patients, research material and computer security
- . Assaults or robbery upon employees, staff or visitors (workplace violence)
- Fire and arson
- Violation of work-safety norms, including environment pollution, hazards to safety, health and hygiene .
- Anti-national activities, e.g., bomb-threats, sabotage and subversion of employees
- Threats to medical and nun-medical executives or their family members
- Drug theft and drug abuse
- Internal or external disasters
- Medical imposters
- White-collar crimes, like corrupt practices by unethical employees, in collusion with outsiders or independently
- Cases of sexual assault/molestation on the premises
- Strikes or civil disturbances
- Infant abduction

3.2.2 Threat Groups

The above threats may emanate from any of the following sources:

- Criminals
- Disgruntled patients/former patients/relatives/employees/former employees or their friends
- Members of the public with real or imagined grievances
- Terrorists/sympathizers

3.2.3 Security Sensitive Areas/Functions of Hospitals

There are a number of places and functions, in a hospital, that can be considered security-sensitive. Listed below are some of the more sensitive areas/functions of a hospital:

- Pharmacy
- Cash handling areas (cashier, cafeteria, retail shops)
- Medical Records Office
- Emergency Department
- Computer Centre
- Infant and Pediatric Units
- Parking Areas

3.2.4 Strategic Security System

A pragmatic assessment by the hospital administrator of security vulnerabilities and visualization of threats must form basis for formulation of an efficient iuid cost-effective security management plan of a hospital. This will help in providing **'Total Security'** for pro-active Assets **Protection,** security of staff awl patients and **prevention / minimization** of loss of **materials and information.**

3.2.5 Conclusion

Hospitals have become increasingly attractive targets to crime, because of valuable equipment, materials, and drugs. **A hospital** administrator performs **an** anchor's role in **the** hospital security **system in assessing and constantly** updating **the threats and vulnerabilities, laying** down policies **and** directing **and** monitoring **the Security Organisation.**

Check Your **Progress** 2

1) All hospitals face the same types of threat and vulnerabilities. True/False

2) Security of hospital's assets is responsibility of the Security Staff alone. True/False

3) Understanding the security risks would equip a hospital administrator to direct and monitor the security department. True/False

4) Destruction or damage to hospital property can be attributable to:

   a) .....

   b) .....

   c) .....

   d) .....

5) List five of the more security-sensitive areas/functions of a hospital.

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3.3 ROLE AND FUNCTIONS OF SECURITY AS A SERVICE IN HOSPITALS

3.3.1 Role of Hospital Security

The role of hospital security **department** is, "to provide security services to **all staff,** patients and visitors **and for protection** of **hospital** property on **the** premises, through **use** of **well-trained** personnel, technology, prevention activities and **timely response** to requests". It involves treating people equally and with total care and respect, regardless of their gender, religion, age, handicap or any other factor which may put them in a minority category.

3.3.2 Functions of Hospital Security Department

- Analysis of security threats and vulnerabilities in conjunction with the management, civil police and others.
- Preparation of strategic security plan, security standing instructions and security operational deployment plan and their periodic updating, based on directions of the management.

- Organisation and monitoring of security operations and implementation of Security Plans to achieve elimination/reduction of incidence of theft/pilferage of property/ information and crime on premises.
- Advising hospital management on all security matters.
- Conduct of enquiries/investigations as directed by the management, in a professional, efficient and confidential manner.

  Conduct of initial, 'on-the job' and refresher Security Training, as relevant, for all segments of the hospital staff.
- Surveillance and patrolling of the premises

  Access control, issue and record-keeping of identity documents for the employees, contract and casual staff and visitors.
- Control of movement of vehicular traffic within the premises and in its immediate vicinity, falling under limits of external control of the management.
- Reception and conduct of visitors and attendants.
- Assistance with pooled manpower for Fire Control and Emergency Plan
- Assistance in monitoring implementation of Fire and Safety instructions and accident prevention.
- Represent management in mutual aid deliberations, as directed.
- To keep aware of potential threats of criminal activity, through liaison with civil police and other appropriate agencies.
- Vigilance and intelligence duties, as assigned.
- Performance of any other tasks and functions, as may be assigned by the management.

3.3.3 Non-traditional "Service" Functions

In some hospitals, the security staff may be required to perform some other non-traditional 'service' functions too. They may deliver mail, assist and coordinate vehicle parking, provide assistance to victims of crimes or harassment, supervise maintenance and upkeep of lawns and horticulture or taking people to court. All these "peripheral" functions add value to the security functions and make other hospital employees and visitors/patients feel good about security's cooperation. However, such functions should not be at the cost of primary responsibility of security, which is to safeguard the hospital property and the people interacting therein.

3.3.4 Conclusion

A proactive, professional, well-trained security department, which focuses on crime - prevention as well as public service can make significant contribution to a hospital's mission.

3.4 SECURITY ORGANISATION AND PHYSICAL SECURITY MEASURES

3.4.1 Security Organisation

The overall organisation of a hospital would vary depending on whether it is a government, private or charitable institution. No matter what the structure, the medical superintendent (by whatever designation he/she may be called) is normally responsible, besides his other functions, for ensuring efficient loss prevention and organisation of the security functions. It is important that the Security's control is kept under a single agency. Depending on the size of the hospital, the medical superintendent would have directly accountable to him through the head of security department, a complement of security staff comprising a mix of;

a) Chief/assistant security officer

b) Security supervisors

c) Security guards — departmental/contract

3.4.2 The Staff Complement

The security staff may be proprietory/departmental, contracted through an agency or a mix of all. Weighing pros and cons of each system, a mix of departmental and contract security staff, functioning under departmental security officer and supervisory staff provides all ideal mix to ensure efficiency and to achieve cost-effectiveness.

3.4.3 Physical Security Measures

Physical security measures are a vital element of any hospital's security system. **These measures should be planned in depth,** as **a single barrier system fails to provide 'total security'**. These measures, it must be understood, can only be expected to act as physical deterrents, "to discourage the undetermined and delay the determined" and need to be backed up by a series of other contributory measures.

3.4.4 Perimeter Protection System

It comprises:

a) Outer Protective Ring: Fencing or tvalls to define the ownership and to channelize movement.

b) **Middle Protective Ring:** Exteriors of the buildings comprise the middle ring.

c) **Inner Protective Ring:** Within the hospital, a number of protective rings should be established to safeguard vulnerable/sensitive areas, e.g. pharmacy, offices, medical records, computer room/telephone exchange, cashier's locations, infant security, laundry, kitchen/stores etc.

3.4.5 Implementing Physical Controls

I-Iospital administrators are often reluctant to implement such physical control that they feel, may detract from open and friendly atmosphere of the hospital or inhibit free flow of patients, visitors and staff. This attitude has to be balanced with a judicious mix of physical controls to ensure elimination/minimization of losses and to enable the 'patient-care' activities to proceed un-hindered. **Traditionally, the administrators respond to security problems by increasing the** security mall-power. **This** philosophy **needs** to **be** reviewed in the **light** of **available** and effective Security **Technology devices, which are becoming** available indigenously in **a** cost-effective **manner. This aspect** well **be elaborated** upon, **subsequently,** as your **study** progresses.

3.4.6 Conclusion

The hospital management and administrator must constantly review the Security Organisation and its composition, based on the ever changing threats and vulnerabilities. Physical Security Controls are only one component of a hospital's security system and cannot be the sole means of protection. They are to bc complemented by correct policy delineation, security procedures, staffing and operational control, reinforced by security technology devices. **It has** to **be recognized that security** controls **are as efficient** as the people **who** operate them.

3.5 ACCESS CONTROL CONCEPTS

3.5.1 Defining Access Control

We need to understand the concept of Access Control. Simply put, Access Control is "Controlling **the movement** of **people (including vehicles)".** It means permission or

denial of entrance to a given premises/location or within a defined place against unauthorized observation or removal and to prevent injury Io persons or damage to things.

3.5.2 Means and Components

The commonest Access Control System is the manual system, still having almost universal application in India. In the hospitals, checking people entering or leaving a building is a form of Access Control. Essential components of an Access Control System are:

Identification System for Staff: Hospital management should make it mandatory for all staff members to display identification badges at all times, Io allow them access lo the premises/specified segments therein, while on hospital premises on duly. Failure to display the identity badge, regardless **of** designation or seniority, will subject individuals to being challenged and reported for possible disciplinary action. An identification badge should include the following details:

- Logo of the hospital and serial number to prevent forgery.
- A photograph (preferably colour), placed in a manner, that it cannot be replaced.
- Name of the individual, in bold type, which can be read at a istance of three feet.
- Individual's job title and area of work (an employee from laundry would need to explain his presence in OT or pharmacy).
- Optional capability to be used in card-access environments.

Temporary Identification Badges: These should be used as a form of Access Control for contractors, visitors and casual workers. Currently, some temporary badges are designed to "self-destruct", after lapse of the given time period, by becoming discoloured *or* revealing the word "expired"

Card Access System: **A** card access system requires a plastic rectangular card, which needs to be passed through a wall-mounted reader. A variety of card technologies are in use. Explanation of each type, however, is beyond the scope of this lesson. Some systems, which permit proximity identification, by the card being held close to the 'reader', are suitable for senior management/doctors/staff members. The cards should be safe-guarded at all times,

Locks and **Keys:** As part of a hospital's access control system, locks restrict movement of people into or within certain areas e.g. computer room, stores, pharmacy etc. A centralized 'key cabinet' at a control point, controls this system. Masler-keys may be provided to the Security Officer, to have access in case of emergency like fire etc.

3.5.3 Conclusion

Access control system must be installed in each hospital-taking into account, detailed analysis of specific threats/vulnerabilities and requirements. **The** identification **system** should he periodically reviewed and replaced to prevent forgeries.

Check Your Progress **3**

1) Fill in the blanks:

   a) The physical security measures should be planned in ....., as a single barrier system fails to provide Total Security.

   b) The identification system should be periodically ..... and replaced to prevent .....

2) Name the three components of a perimeter protection system.

   a) .....

   b) .....

   c) .....

3) Assessment of security threats and vulnerabilities of a hospital is the sole responsibility of security officer/manager. True/False

3.6 INTEGRATION OF SECURITY TECHNOLOGY

3.6.1 Need for Security Technology

Crime prevention system, based purely on human element, is not only expeinive in the long run, its efficacy too to counter the current or potential types of crimes, is restricted. Equally, it is contingent on quality of security man-power, their training and supervision, which may not always be of the requisite standards. It is desirable, therefore, to augment man-power based security organisations, with security technology devices. Besides making the total security management plan more effective, it may reduce the expenditure in the long run, make security less obtrusive and may even assist in monitoring alertness of the security staff. What is **needed** is a **balanced mix of technology** nnd **man-power.**

3.6.2 Security Technology Plan

A Security Technology Plan needs to be implemented for integration of securily equipment, which would strengthen the manned security operations and would improve quality of monitoring and supervision. The following types of equipment should be considered:

a) CCTV for surveillance at selected locations.

b) Access Control Equipments.

c) Intrusion Detection Devices.

d) Guard Watch Equipment to monitor regularity of search patrols and alertness of guards.

e) Alarms.

f) Augmentation of Security Lighting along the perimeter and key locations.

g) Security Communications in tlie form of dedicated tele-communications lines and walkie-talkiesets.

h) Metal and Explosives Detectors.

i) Metal Detector for screening of incoming mail,

3.6.3 Computer and Information Security

a) Key assignments on EDP Staff should be identified and their verification system be instituted.

b) Simultaneous updates for all Common data/programmes.

c) Regular back-ups of data and programmes. It should be duly indexed and catalogued.

d) **Annual** Maintenance Contract (AMC) by contractual personnel should be carried out **under** supervision of regular EDP staff.

e) Formal training for new entrants and regular refresher programmes for all users should be institutionalized.

f) Anti-Virus precautions.

g) Allocation of computers for security operations.

h) Formal Computer Security Policy and Security Instructions should be implemented.

Check Your Progress 4

1) Security technology devices for hospitals are not cost-effective as they are imported. True/False

2) Security Technology Devices do not substitute or eliminate security manpower. True/False

3) Name four of the more important component of a Security Technology Plan.

a) .....

b) .....

c) .....

d) .....

3.7 SELECTION AND MANAGEMENT OF DEPARTMENTAL SECURITY STAFF/CONTRACT SECURITY AGENCY AND SECURITY TRAINING

3.7.1 System Choice

Out of various modes for provisioning security manpower, i.e., departmental or proprietary, contracted or a mix of the two, the hospital management needs to evaluate advantages and disadvantages at each pattern. For optimum results, the management and supervisory elements should be fully departmental, whereas security guards may be a mix of departmental and contracted security staff.

3.7.2 Selection of Contract Security Agency

The following aspects require careful consideration by the hospital administration, while selecting a contract security agency:

a) Short-listing and selection of an Agency should he done through a Board of Officers, preferably comprising of one executive each from Personnel & Administration, Finance Fire and Security Departments of the hospital. This Board should put up their recommendations showing Inter se gradations for approval of the Board of Management/Trustees or Director of the hospital (whosoever is the final approving authority) Following arc the recommended stages in the selection of a contract agency:

a Short-listing ol' Agency.

Establishing Bid Specifications.

- Visit to Site by the bidders (where required).

Submission or' Bids.

- Final Selection of the Agency.

b) Once the tenders have been received, these should he vetted by the Board of Officers. Deliberations should be transparent. **While selecting the Agency, the Board should keep in mind that the lowest rates may not necessarily ensure quality of service. A system of weightage in the proportion of 60:40 for Professional or Technical merit and 40% for comparative rstcs should be implemented, while considering the man-power contract,**

3.7.3 Verification of Security Personnel

All security staff, including ex-servicemen who have been retired for more than one year, should he duly vetted by the hospital management and verified hy the civil police authorities, prior to employment. Photographs and finger-prints records of staff of all categories must be maintained.

3.7.4 Security Staff Discipline

Maintaining a high degree of discipline amongst security staff is a priority task for the hospital management who should be on the look-out constantly for dereliction of duty or incompetence and deal with it swiftly and decisively. The following types of instances should invite quick action:

a) Absence without notice.

b) Alcoholism and drug addiction/dependence

c) False reporting or failure to report incidents

d) Sleeping while on duty.

e) Un-necessary harashness/violent ways.

f) . Wilful disobedience of orders.

g) Dishonest or corrupt practices

3.7.5 Security Training

a) Training, particularly of the following types needs to be ensured through a professional body or under the Chief Security Manager.

	Minimum Duration
i) Mandatory Induction Training	
– Ex-Servicemen	15 hours
– Fresh Inductees	30 hours
ii) On-the-Job Training	15 hours
iii) Refresher Training	10 hours/2 working days/ 4 half days once every six months
iv) **Security Awareness Programme for all Non-security Executives and Staff Members**	10 hours

b) Security training for non-security staff should be carried out in convenienthatches, for about 10 hrs duration. Induction level training for the contracted security staff should be built in the contractual provisions and standards ensured prior to dctailinent of security guards on duty.

3.7.6 Conclusion

In the foreseeable future security manpower would continue to be the primary basis for security organisation in hospitals in India. It is imperative, therefore that the security staff is appointed/selected, keeping in view the overall organisation structure, environment and mission of a hospital.

3.8 SECURITY AND LAW

3.8.1 Introduction

The hospital security staff, by the nature of their work, have to interact daily with large number of people. Most of these interactions are cordial. However, some of these exchanges may turn out to be stressful and even hostile. **The security officers and their staff mny confront suspicions trespassers, unhappy family members of patients, intoxicated visitors, at times violent or mentally imbalanced patients and angry employees/outsiders or criminals suspected of theft or illegal use of drugs,** In handling such cases, the security staff and in turn the hospital administrators, will face some very

difficult decisions, having to decide within seconds, whether to detain, use force, search, interrogate or initiate prosecution of possible offenders. At times, they must also decide whether to tell other parties about such incidents. **Each of such situations has legal implications. Violation of legal provisions may not only place the security staff in the wrong but the institution too, being the principal employer, may become liable for the acts of violation of the law.** It is, therefore, necessary that you, as the hospital administrators, as also the security staff, should be well-informed on provisions of law regarding the more common legal risks, both civil and criminal, which hospital security staff may have to face, in daily discharge of their functions.

3.8.2 Some Basic Provisions of the Indian Penal Code (IPC) – Concerning Security

While this lesson, for obvious reasons, cannot be all-encompassing, some of the basic provisions of the IPC, having an impact on discharge of security functions arc outlined below. In all cases, however, when in doubt, the security staff must consult with the hospital administration, who should act under advise of the legal counsel. It should be realized that the Industrial Security staff, as of now, in our country, derive their authority, to act from provisions in the IPC regarding Right of Private Defence.

- **Right of Private Defence:** (P C Section 96 & 97): "Nothing is an offence, which is done in the exercise of private defence." There are some restrictions in Section 99. Every person has a right to defend:
  - Firstly, his own body and the hody of iuiy other person, against any offence against the human body,
  - Secondly, the property, whether moveable or immovable of himself or of any other person against an act, which is an offence falling under the definition of theft, robbery, mischief or criminal trespass.
- **Theft** (IPC Section **378):** A theft is always committed in relation lo moveable property.
- **Pilferage:** Is removal of small items due to temptation of daily needs like pencils, pens, cooked food, etc.
- **Robbery** (Section **390):** Robbery is an aggravated form of theft. The most important element ofrobbery is the presence of imminent force or violence.
- **Dacoity** (Section 391): When live or more persons jointly commit a robbery, it will amount to dacoity.
- **Mischief** (Section **425):** Whoever causes or intends to cause or knows that he is likely to cause'loss or damage to the security of the property, commits on offence of mischief.
- **Criminal Trespass** (Section 441): Whoever enters into the property of another with an intention to commit the offence or to intimidate, to insult or to annoy the owner of that property, commits the offence of criminal trespass, Further, whoever has lawfully entered into the property of another and unlawfully remains there with an intention to intimidate, insult or annoy the owner of the property, commits the offence of criminal trespass,

3.8.3 Authority to Arrest, Use Force, Conduct Searches, Frisk, Inspect, Interrogate and Interview

The industrial security officials in our country, do not enjoy the authority normally vested in the civil police authorities. They may detain, temporarily (till earliest handing over to the civil police), in the execution of right of self-defence. **The authority to conduct searches, frisking or inspections, even on the premises, must be with specific authorization of hospital administration, who too must stipulate such possibilities in the conditions of service of their employees.**

3.8.4 Reporting Procedure

All major incidents, accidents, thefts and offences should normally be reported to the civil police in the form of a First Information Report (FIR). **However, invariably prior permission of the hospital management must be obtained by the security staff or departmental heads before any report is lodged with the civil police.** Tlie **FIR.** depending on the situation, may be oral (on telephone) or written; the important points are that it must be lodged without any unexplainable delay and with as much relevant information as is available.

3.8.5 Conclusion

Security function in a hospital, is sensitive, challenging and a responsible task. The hospital administrators and the security staff must be thoroughly conversant with their rights and limitations, when enforcing various directions, in order to avoid the risk of violating laws of the land.

Check Your Progress 5

1) Tlie unjustified use of force, or excessive force, by a security officer, may result in a law suit or criminal prosecution. True/False

2) Security officers may conduct certain searches outside their premises. True/False

3) Violation of any of the legal provisions by security staff may render the hospital, as an institution, liable for acts of violation of the law. True/False

4) The hospital security staff members enjoy powers of the civil police, while functioning within hospital premises. True/False

5) First Information Report (FIR) to the civil police can be lodged only by a legal person. True/False

6) Differentiate between:

a) Theft : .....

b) Pilferage : .....

c) Robbery : .....

d) Dacoity : .....

3.9 STRATEGIC SECURITY PLAN AND STANDING SECURITY POLICIES AND PROCEDURES

3.9.1 Introduction

Security lapses occur in hospitals, primarily due to one or more of the following factors:

- Absence or inadequacy of well-analyzed security policies, directives and guidelines by the hospital management for tlie security department and other staff.
- Inadequate involvement of hospital's top management in securily organisation, in threat assessment, monitoring, review and periodic updating of security orders and instructions.
- Faulty selection of security staff and lack of appropriate training of security personnel and other staff,
- Virtual absence ol' integrated security technology devices.

3.9.2 Effective Security Management in Hospitals

Some of the important counter-measures for ensuring efficient security management in hospitals are as under:

- Preparation of Strategic Security Plan, based on a professional Security Audit. This should be carried out under directions of the top management and must have their continuous involvement.
- Stipulation of security policies, procedures and standing orders and instructions for security department and other non-security staff.
- Effective screening of all employees, especially security staff and contract security agencies.
- Initial/On-the-job/Refresher training lor all security and non-security staff in Loss Prevention.
- Effective organisation of security operations, based on 'site' and 'post' instructions and system of regular supervision.
- Immediate incident reporting/response.
- Mutual Aid Plan and effective liaison with civil police and other agencies.
- Contingency Plans for security-related Crisis/Disaster Management.
- Periodic review and updating of security plans, instructions and procedures.

3.9.3 Central Security Control Room

A Central Security Control Room (CSCR) should be established to execute the following tasks:

a) Act as the Security Office.

b) Be fully equipped to detect explosives, lire arms and conduct electronic and physical searches.

c) Monitor performance of the Security Staff.

d) Monitor the Security of Vital/Sensitive areas within the installation.

e) Be able to communicate in case of urgency, immediately with the Medical Superintendent and Chief Security Officer even after Office 1Iours and Security Posts and Mobile Patrols at all times.

f) Carry out verification, hold records, issue passes for all sections of employees, contracted staff and visitors.

g) Generate MIS reports for the Management on Security aspects.

11) Keep computer based records of incoming and outgoing movement including personnel, vehicles and materials.

3.9.4 Patrols and Post Procedures/Techniques

Effective patrolling is the hack-bone of any good security and safety programme. It affords opportunity to monitor the entire environment, prevent problems from occurring, by instituting timely remedial measures and generating a feeling of 'Security' on the part of staff, patients and visitors alike. Patrols can be on foot (most common type) or a vehicle patrol (including bicycle or moped), 'conspicuous', 'inconspicuous' or selective (concentrating on high-risk/sensitive areas).

3.9.5 Control of Visitors/OPD Patients/Attendants

a) Well-formulated and comprehensive guidelines and instructions for the visitors need to be created to reduce congestion,

b) While anxiety factor of the relatives/well-wishers and the so-callctl, "Indian Culture" of displaying 'visible' sympathy can be appreciated, these must be balanced against the totality of enhanced Security threat, administrative problems of accommodating larger number and the risk of greater infection.

3.10 SECURITY-RELATED CRISIS/DISASTER MANAGEMENT IN HOSPITALS

3.10.1 Introduction

At no time has crisis/disaster management been more critical to the literal survival of hospitals and health-care facilities. The hostage taking of 500 persons, in the year early 2000, in a large hospital in Thailand, by 10 terrorists belonging to a Mynnamar-based so called "God's Army" is an example of the unforeseeablekind of threats. In times of crisis/ disaster, everyone turns to "Security", who may be ineffective, in the absence of a well-thought out, rehearsed and practised disaster-management plan. Traffic control, prevention of crowds and theft, communications, assistance to police and fire crews and handling of press and VIP visitors become critical responsibilities for security staff during emergencies.

3.10.2 Types of Disasters

Basically, there are two broad categories of concern to a security organisation—external or internal. Major disasters can be:

a) External Disasters: Influx of multiple casualties at short notice due to:

- Rail/Road/Air accidents
- Radiation release (like Bhopal gas tragedy)
- Earthquakes (like Latur, Joshimath)
- Severe weather floods or cyclones (Orissa, Andhra Pradesh)
- Civil disturbances/terrorist/militancy situations
- Structural failures
- Fire
- Hot war or war like situations

b) Internal Disasters: These relate to conditions, within the hospital, which disrupt normal operations. These may be:

- Bomb-threats
- Fire incidents
- Radiation release or chemical spill
- 'Hostage-taking or violeiit situation
- Power/water/sewerage disruption
- Staff strikes or patients/visitors agitations

3.10.3 Preparing for a Disaster

The hospital management needs lo formulate a comprehensive disaster response plan, establishment of a control centre and assigning specific responsibilities, in order to deal with the emergency, ensuring that the health-care aspects continue with as little disruption as possible. It is beyond the scope of the brief lesson to go into any greater details of disaster management aspects of hospitals.

3.10.4 Bomb Threat/Response

Bomb threats are becoming a reality for hospitals too. Whether bomb incident involves a hoax threat or a threat that leads to discovery of a bomb or a detonation without warning, proper planning and training will ensure that your hospital is ready to react when an incident occurs. One of the many challenges that face, the decision-makers is the guessing game. Is the threat a hoax or real? Do we commence a hospital-wide search? Do

we evacuate the hospital? Fully or partially'?The organisational plan for dealing with bombs and bomb-threats will ensure laying down guidelines for dealing with the situation, based on available information. It must be realized that in our urban conglomerates, the police bomb detection and defusion squads, may take quite some time to reach. **A hospital's 'Bomb-Threat' plan should cater for creating a protective system without creating panic, till the specialist bomb squads get activated.**

3.10.5 Conclusion

The foregoing points provide only a basic outline of functions, that the hospital security organisation may be required to perform to pro-actively prepare for crisis/disaster situations'. A detailed plan needs to be prepared, disseminated, rehearsed and kept updated.

Check Your Progress 6

1) Hospitals. being vital to the community, can totally depend for security, on police and fire services. True/False

2) During an emergency, penplc will recognize the security uniform and obey all instructions. True/False

3) Most bomb-threats are hoaxes and need to be ignored. True/False

4) Responsibility for the overall threat assessment and for formulation of strategic security management plan in a hospital is of:

   A) Hospital's Top Management

   OR

   B) Chief Security Manager

5) List seven important counter-measures for ensuring efficient Loss-Prevention and Security Management in hospitals

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3.11 GOALS AND OBJECTIVES OF SECURITY MANAGEMENT

3.11.1 Goals

The goal of hospital security department is to "provide security services to all those who are interacting within the hospital premises and to ensure protection of hospital property, through use of well-trained personnel, technology, prevention activities and timely response to emergencies and requests." It involves treating people equally and with total care and respect, regardless of their gender, religion, age, handicap or any other factor which may put them in a minority category.

3.11.2 Objectives

Your major objectives, as hospital administrators are:

- Preparation of strategic security plan, based on threat and vulnerabilities analysis, and formulation of security standing instructions.
- Monitoring implementation of the security operational deployment plan, through well-selected and trained security staff/contracted security agency.
- Guide security department to pro-actively contribute to achievement of your hospital's mission of providing the best treatment and patient-care, allowing people to have peace of mind, while interacting in the hospital premises.

3.11.3 Conclusion

If the hospital's security department can detect or catch 100 thefts/losses per year by their efforts, even at only Rs. 1000 per incident, they would have saved the hospital Rs. 100,000. If the security organisation identifies security and safety hazards before incidents or prevents assaults; it can significantly reduce the material losses and damage to the hospital's image. The above does not take into account security's efforts to help diminish the pain, suffering and inconvenience to patients, visitors and hospital staff, thereby contributing *to* the hospital's overall mission and its image in the public.

3.12 LET US SUM UP

In this unit, yon have learnt the basic essentials of the role of hospital administrators in planning, organisation, review and direction of security administration in hospitals in India — whether in public, private or government sectors. You have learnt of the prevailing security threats and vulnerabilities of hospitals and how to effectively and pro-actively counter these by implementing physical security measures, access control concepts, integration of security technology deices, selection and management of security organisation and security training. Currently, in most organisations, security is considered by the hospital administrators as a peripheral function, relegated to performance by tlic subordinate security staff, without any direction or guidelines. Effective or Comprehensive Security involves all executives and departments and not merely the security staff. Hopefully, at :he conclusion of this unit, you have realized that hospitals in India are no longer sheltered or secluded from the strifes and anxieties, facing the rest of the society. The hospitals too have to face up to the growing challenges and sophistication of die criminals. "A proactive, professional and well-trained security department, which focuses on crime prevention as well as public service will make significant contribution to your hospital's mission and function as an integral, well-respected and essential part of your bigger organisation.

3.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) first, last

2) policy framework, loss-prevention.

Check Your Progress 2

1) False

2) False

3) True

4) a) Negligence

b) Lack of training

c) Sheer malice

d) External or natural causes.

5) a) Pharmacy

b) Cash handling areas.

c) Computer centre.

d) 'Infant and pediatric units.

e) Parking areas.

Check Your Progress 3

1) a) depth

b) reviewed, forgeries

2) a) Outer protective ring.

h) Middle protective ring

c) Inner protective ring

3) False

Check Your Progress 4

1) False

2) True

3) a) CCTV for surveillance.

b) Access Control Equipment.

c) Intrusion Detection Devices

d) Alarms

Check Your Progress 5

1) True

2) Falsc

3) True

4) False

5) Falsc

6) a) **Theft: A** theft is always committed in relation to a moveable property.

b) **Pilferage:** Pilferage is removal of small items due to temptation of daily needs.

c) **Robbcry:** Robbery is an aggravated form of theft; the most important clement of robbery is the presence of imminent force or violence.

d) **Dacoity:** When five or more persons jointly commit a robbery, it amounts to dacoity.

Check Your Progress 6

1) Falsc

2) False

3) False

4) A) Hospital's Top Management

5) a) Preparation of Strategic Security Plan, under directions of hospital's Top Management.

b) Stipulation of security policies, procedures and standing orders/instructions on Loss-Prevention and security for security department and other non-security staff.

c) Effective screening of all employees, especially security staff and contract security agencies.

d) Initial/on-the-job/refresher training for security and non-security staff in Loss-Prevention.

e) Effective organisation of security operations and regular supervision.

f) Contingency plan for security related Crisis/Disaster Management.

g) Periodic review and updating of security plans, instructions and procedures.

UNIT 4 FIRE HAZARDS

Structure

4.0 OBJECTIVES

After studying this unit, you shall he able La

- assess the magnitude of the problem of Hospital Arc hazards;
- enumerate the basic principles of Hospital planning consideration in relation to lire emergency plan;
- dcscribc the causes and source of hospital fire and various types of lire fighting devices and equipment; arid
- explain various structure planning and design consideration for fire detection systems and Lire precaution.

4.1 INTRODUCTION

Fire is a potential hazard in all hospital premises. In this unit, you will learn

UNIT 4 FIRE HAZARDS

Structore

4.0 OBJECTIVES

After studying this unit, you shall be able to:

- assess the magnitude of the problem of Hospital lire hazards;
- enumerate the basic principles of Hospital planning consideration in relation to fire emergency plan;
- describe the causes and source of hospital fire and various types of fire fighting devices and equipment; and
- explain various structure planning and design consideration for fire detection systans and fire precaution.

4.1 INTRODUCTION

Fire is a potential hazard in all hospital premises. In this unit, you will learn

systematically how the consequences of fire in hospitals and health units can be especialy serious because of the difficulties and dangers associated with the emergency evacuation of patients. You will also learn about the aim of management of medical and health services, how outbreaks of fire should not occur in hospitals and if they do occur, how it should be rapidly detected, effectively contained and promptly controlled. In order to achieve this, the role of hospital management and the overall Are-safety policies, fire prevention and fire protection measures in hospital premises are also explamed. In subsequent paragraphs, you will learn about the physical Qctors like building design and construction, together with equipment and furnishings, installation and maintenance of detection and alarm systems, and the local policies for handling emergencies and the need for staff training in all these matters. At the end, you will learn about risk evaluation for your building so that you can lake extra-precautionary measures based on your assessment.

4.2 ELEMENTS OF FIRE

Fire takes a heavy toll of human life throughout the world. As per recent slatistics fire has been ranked as the third largest accident killer nexl to motor vehicles accidents and accidental fhlls.

Given below are eome of the major lire accidents in Health Care Centres

i) October, 1971: Nursing Home Honesdale, 15 persons were killed due to lack of automatic fire protection systems.

ii) December, 1978: Institution for Mentally Retarded, Ellis Ville, I-IS, Lack of automatic detection and suppression and for want of smoke stop partitions — 15 persons were reported killed.

iii) October, 1981: James Ward of Warlingham Park Hospital — 7 patients died by inhalation of smoke and toxic gases.

iv) December, 1984: JP Hospital, New Delhi

v) April, 1994: AIIMS, New Delhi – No loss of life

Health care centres comprising of hospitals and sanatoria fall under the sub-division C-1 under the main head Group C – "Institutional Buildings" in accordance with the classification of buildings based on occupancy as incorporated in the National Building Code, Part IV. The Sub-Division C-1 obviously includes any building or a group of buildings under one management which is used for housing persons suffering from physical limitations because of health or age, e.g., hospital infirmities, sanatoria and nursing home. Therefore, hospital buildings fall within the purview of institutional buildings where a large number of visitors could bc expected at the peak hours besides patients and hospital staff.

The three elemenls essential to start a fire anywhere can best to illustrated as a fire triangle (Fig. 4.1). In the absence of any of the three elements, fire cannot start and this fact is to be borne in mind while designing fire safety plans. Since **oxygen** cannot be eliminated, planners should concentrate on restricting the fuel, i.e. inflammable **materials**/substances, interior finish materials of the building, etc., and **heat,** i.e. electric sparks, open unguarded flames, static electricity, etc., so that the lire does not start/ spread.

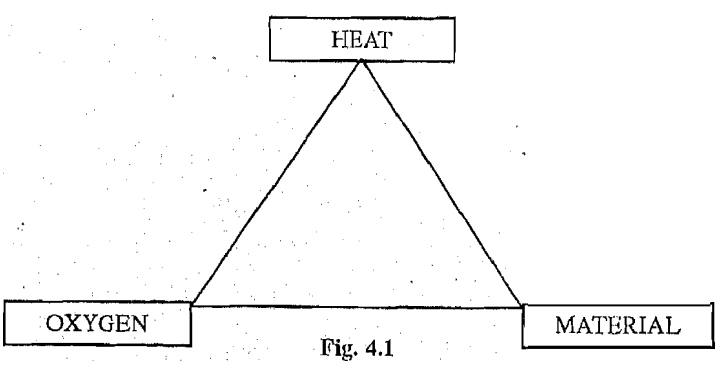

Fig. 4.1

4.3 FIRE HAZARD TRIANGLE

Fire hazard triangle (Fig. 4.2) demonstrates that three factors work, in isolation or in combination, lo pose the hazard. An effective plan for fire safety should, therefore, address itself lo these three factors, i.e. cause (policies and procedure on smoking, maintenance of electrical system, defective equipment, storage of hazardous materials, etc.), spread (types of furniture, fabrics, doors, internal finish material, ctc.), and lack of response (poor training of hospital staff, inadequate alarm system etc.).

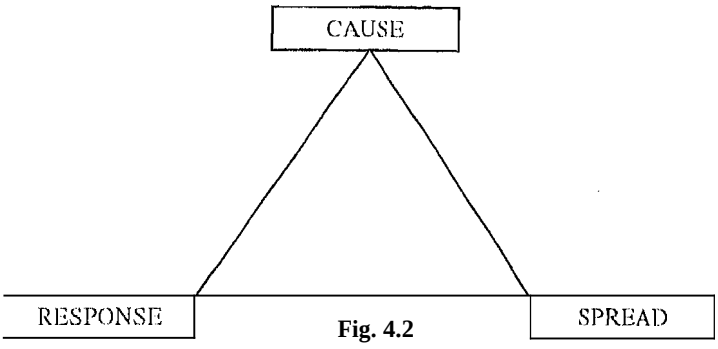

Fig. 4.2

4.4 CAUSES OF HOSPITAL FIRE

Analysis of the most frequent causes of hospital fires (Table 4.1) indicates that human carelessness is the major factor in starting fires in a hospital and therefore, a major effort for combating fire should be directed towards education/motivation of various users of this community facility.

Table 4.1 : Most **Frequent** Causes of **Hospital** Fires

Sl.No.	Cause	%
1.	Smoking	33
2.	Contractors carelessness	18
3.	Carelessness of hospital staff	16
4.	Defective equipment	14
5.	Visitors carelessness	13
6.	Defective wiring	3
7.	Lighting and unknown causes	3
	Total	100

4.5 FIRE PROGRESSION CURVE AND SMOKE DANGER

Before learning to curb fire, it is essential to know how fire progresses or spreads. Studies conducted to see the effects of fire progression have highlighted a very important aspect, i.e. fire grows exponentially, its growth rate increases as long as air and combustible malerials arc around.

The point which you should remember as a designers is that the smoke is much more lethal than flame or heat, as is proved by mortality statistics due to fire, in which 75% victims die due to smoke. What do you understand by term smoke'? Smoke is un-burnt liquid or solid matter suspended in the combustible gases. Smoke attacks the mucous membranes and, worst of all, it impedes visibility, thus contributing lo loss of orientation and eventually leading to panic. Common gases emitted from fires, with their effects, are listed in Table 4.2.

Table 4.2: Common Gases from Fires

Gas	Result
CO_2	Over stimulated breathing
CO	Asphyxiation
H_2S	Respirator and nervous system damage
SO_2	Irritation
NH_3	Irritation
HCN	Cyanosis
NO_2	Anesthesia

4.6 CLASSIFICATION OF FIRES

Fire can bc classified into four grades depending upon the cause and required type of extinguisher to control it:

'A' grade fire is caused by ordinary combustible material like wood, coal, paper, etc. It can be extinguished by using fire extinguishers like soda ash, water, dry chemical power, etc.

'B' grade fire is caused by inflammable liquids, especially those which are lighter than water. Fire extinguishers like Halon 1211 and dry chemical powder type should be used to tackle this type of fire.

'C' grade fire is caused by electrical faults, mostly due to over-loading of the Aluminum wiring. Dry chemical powder fire extinguisher should be used in this case.

'D' grade fire is due to combustible metals like magnesium, sodium, etc.

Check Your Progress 1

1) How are health-care centers classified by National Building Code.?

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2) What are the elements of fire?

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3) What are the five most important causes of hospital fire?

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4) How knowledge of grade of fire helps?

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4.7 FIRE PROTECTION

Fire protection measures for multi-storied and high rise buildings have in general been discussed in Part IV of the National Building Code and ISS 3844. Hospitals housed in the multi-storeyed buildings though not exactly falling in the category of 'high-rise building' need to be provided with fixed installation facilities and adequate means of escape for certain special reasons. In hospitals, majority of patients are incapable even to sit or walk, by their own efforts, therefore in a major fire, intensive approach is necessary for large scale rescue operations and orderly evacuation. It is for these extra protective requirements, internal hydrant installations envisaging wet riser installation etc. is recommended for multi-storcycd hospital buildings irrespective of their heights etc.

4.8 STRUCTURE PLANNING AND DESIGN CONSIDERATION

This aspect is single most important part where if due can is taken during planning and design period the accident rate and its gravity can be reduced significantly,therefore you should learn this component in more details. It is not necessary to remember all this but it will serve a handy ready reference when required.

You will appreciate that the degree of hazard in any structure bears direct relationship with the design of the building, type of occupancy, facilities provided for effective discharge of functional obligation, electrical installation provided in pursuant to the functional facilities, means of escape, compartmentation to keep the premises free from smoke-logging and effects of radiated heat. To some extent it also depends on use of treated and untreated vegetable and synthetic fiber and plastics commonly used for upholstery, mattresses, beds and bedding. Identification of risk and quantification of fire protection facilities directly varies with tlic gravity of hazard in relation to the factors enumerated above. The gravity of potential risk generally encountered in hospitals are given below:

a) Building-structure, design, quality of building material and workmanship.

b) Building services.

c) Central air conditioning facilities.

d) Electrical installation, transformers etc.

e) Functional facilities or special hazards like the provisioning of kitchen, laundry, boiler room, operation theatre, storage for gas cylinders, storage of radioactive material, laboratories and sensitive electrical installations. The fire protection/fire prevention facilities in relation Io the above are discussed in tlie succeeding paragraphs.

4.8.1 Buildings: Harness Communication Zone

i) Hospital planners are absorbed in a process of standardization for new premises based on a modular horizontal development in which standard hospital departments are linked together by a main common passageway/corridor/gallery at each level, together with standardized forms of vertical access, provided by lifts and stairways.

The whole communication system is referred to as the 'harness communication zone', and the main backbone of this on eacli floor is known as the 'harness street'. The whole buildirig form, which is limited lo 4 floors in height, is designed with in a master grid, each square being 16.2 meters in length. Within this grid series of modules (units) are designed, each becoming a standard department, with alternate units becoming courtyards to provide natural lighting and ventilation. The maximum depth will be equal to 4 modules on eacli side of a harness zone. The structure proposed is made to offerone hour's fire resistance to both the structural frame and compartment walls between departments. The harness zone which is designed for the flow of people and the distribution of supplies and services is 10 metres wide, consisting of two main elements: (1) the harness street, and (2) vertical linking, services, plant rooms and miscellaneous accommodation. The vertical linking part of the harness zone contains staircase lilts, ramps, escalators, chutes, ducts, plant rooms and some oflices. All these, either individually or in a group, will form separate fire compartments apart from the Harness Street.

ii) As a thumb rule, structural member of building should be able lo offer a lire resistance for 2 hours. To keep the area free from smoke logging, lobby approach to lift and stair- cases should be protected by a sell closing door of at least ½ an hour fire resistance. Self-close door opening in the direclion of escape should be provided. Two hours fire resistance can bc easily achieved with brick work walls of 22 cms thickness or reinforced concrete of 10 cms floors, Protection to steel columns and beams is achieved with concrete of 4 cms thickness; gypsum concrete for equal thickness also provides fire resistance of 2 hours duration. Paneled door of minimum finished thickness of 44 mm provides half an hour fire resistance. To achieve one-hour fireresistance minimum finished thickness of the door should be of the order of 54 mm.

iii) Compartmentation: A very small percentage of causalities in fire are as a result of direct burning and most people die due to sever exposure to heat and smoke, which mostly contain toxic gases. Human body can endeavor this punishment only to a limited degree and only for very short duration. Taking heat first, the medical authorities believe that a skin temperature of 44°C will result in second degree bums and the temperature is unbearable if skin remains at that point for long enough. However, if the temperature is raised to 55°C similar burns will result in 20 seconds exposure, time is reduced to one second at 65.5°C. Similarly the air inhaled at higher temperature has serious effects on lungs etc. According to medical authorities, 149°C is the maximum survival temperature and that also for.a very short time and not at all in very humid conditions. Compartmentation in relation to fire safety means dividing the building or portion of buildirig into number of parts ensuring that resultant heal and smoke are confined to (he place of origin for as long a period as possible until either fire is extinguished oi safe evacuation is carried out. Compartmentation, properly designed and installed has been successful in limiting fires to the unit of origin, Smoke stop-doors are also interposed between galleries and lobbies and between ward and ward and compartment and compartment to stop ingress of smoke. The smoke stop-doors usually have a fire resistance of half an hour and shall be a single swing type opening in the direction of escape, placed across the corridor to give access to the staircases in either direction. It shall be fitted in a wall or screen having a fire resistance of not less than half an hour. Walls or screen may be incorporated with fixed glazing fire resistance rating of not less than half an hour.

4.8.2 . Building Services

We will lake up each component of building services separately, viz.

i) **Electricity and Gas** are the principal sources of energy lor power, light, heat in any building be it industrial, commercial or residential. Both of these are major sources of ignition wherever they are installed. Tlie passage of an electric current generates heat, which may be used inlentionally for functional facilities and space heating. The heat is also generated in electrical illumination and anywhere electricity is transmitted along a cable. All electrical equipment must be carefully rated according to the work it is expected to do. If it is overloaded, excessive heat will be generated leading to the appearance of spark or fire. Fires are also caused by defects in electrical equipment and through damage to electric wiring insulation. They are also

caused by defects in allowing dry combustible materials to come in close contact with electrical circuit. A high standard of installation and maintenance, therefore, is necessary to ensure safety from fire, which may be caused by the use of electrical equipment.

ii) **Lifts** are the main communication and evacuation system and should confirm with following norms:

a) Walls of lift enclosure shall have a fire rating of 2 hours, and lift car door shall have a iire resistance rating of one hour.

b) Lift motor room should be located preferably on top of the shaft, and following extinguisliess should be provided to deal with any electrical risk. Generally automatic extinguishing system is not recommended as it is manned during working hours, however, heat sensitive detectors operating on rate of rise of temperature and also incorporating fixed temperature mechanism are provided duly coupled to warning system. Lifts should be provided with:

1) BCF Extinguisher 1.25 kg capacity - One

2) CO, Extinguisher 4.5 kg capacity One

c) One lift bank should not accommodate more than four lilts, each separated by a wall of at least two liours lire resistance. Landing doors in lift enclosure should have a lire resistance of not less than half an hour, whereas lift car doors should have fire resistance rating of one hour.

d) **Fire Lifts should be worked with** an **independent source of power other than the source feeding the building. Cables should be laid within the lift shaft to ensure no damage from tire. Lights and fans in the elevators having waoden paneling or sheet steel construction would be operated an 24 volts supply.**

e) Arrangement should exist that in case of failure of normal supply, it should get automatically switched over to alternate supply, failing which it should come down to ground level and be stand still with door open.

iii) **Basement:** Each basement shall he separately ventilated. The staircase of basement shall be enclosed type having fire resistance of not less than two hours and shall be situated at the periphery o l the basement and shall communicate with basement through a lobby provided with fire resisting self closing doors of half hour fire resistance. IF the travel distance exceeds 18.50 m additional staircase at proper place shall bc provided. Storage of corrosive chemicals, flammable liquids, gases or hazardous substances, which liberate toxic vapour on heating is not permitted in the basement.

iv) **L.P.G. Cylinders:** Liquefied Petroleum Gases consisting of mixture of Propane and Butane are generally used in the laboratory, kitclicn and cafeteria as a source of energy. In kitchen a battery of cylinders is used at a time for supply of gas to the gas stove. To overcome shortage, about 25 to 30 charged cylinders are always kept in storage shed. The following points are worth consideration from fire prevention angle:

a) A common manifold connecting a series of cylinders must be equipped with an individual cylinder valve and should also carry a main control valve at the pipe leading to stoves.

h) The cylinder should be kept at a place separated by brick wall of 34 cm thick or by reinforced concrete wall of 15 cm thick, so that the flame/heat generated from the stove could he trapped. Piping of rccornrnended metal should be used for all gas connections.

c) The storage shed for the spare cylinder should be located at an isolated place and no naked flame or spark should be permitted up to a distance of 30 metres in the vicinity of the shed. Ventilation at the floor and roof arid roof levels should be adequately provided.

d) To obviate the chance of any sparlc by friction, a sand bed of 5 cm thick should be provided.

e) No electrical conductors as far as possible should be installed inside the storage shed. In case the necessity exists then all electrical installation should be flame/ spark proof and be in conformity with the BIS regulations. All switches should be spark proof and be installed outside the shed.

f) Filled cylinder should be stacked vertically occupying not more than 3 tiers and empty cylinders could be stacked horizontally in tiers not exceeding five.

g) A fire point should be erected near the shed and two points should bc sited not nearer to 30 m from tlie shed.

h) A "NO SMOKING" board should be displayed at a conspicuous place near the storage shed.

4.8.3 Central Air-Conditioning Facilities

i) **Air Conditioning Ducts:** It has been reported that air-conditioning ducts are the major cause for the spread of fire engulfing tlie entire building. A few buildings in the hospital complex are provided with central air conditioning system. Inlets and outlets ducts originate and finally terminate in the AC Plant room. To eliminate the chance of spread of fire through AC ducts, the following measures are recommended:

a) Insulation and lining including vapour barriers and coatings used in conjunction with ducts should be of non-combustible material. All filters for use in air-conditioning system shall be such that will not burn freely or emit large volume of smoke or other noxious products of combustible when attacked by flames.

b) The air-conditioning ducts should he provided with dampers /stoppers preferably of fusible link type actuating at pre-determined temperature thereby emitting audio-visual alarm. Arrangement should exist lo get the plant switched off automatically on sounding of the alarm and also manually from the place of working. The dampers are installed to stop or to restrict tlie flow of hot gases/ flames from one compartment to another.

c) Damper should be installed in tlie inlet duct at the point of originating from the air-conditioning plant room and in tlie outlet duct at all points where it passes from floor to floor or from compartment to compartment.

d) All the electrical installations arid other electrical fitments must be vapour-proof/flame proof .

e) It is again stressed that switch gears to the hazardous store/flammable liquid storage room, as far as possible should bc located outside the room to avoid the chance of occurrence of my spark.

ii) **Air-conditioning Plant Room:** Heat sensitive detectors, preferably electro-pneumatic type incorporating fixed temperature as well as rate of rise mechanism are considered suitable for AC Plant room. These should be coupled with the automatic warning system emitting audio-visual alarm. **Automatic extinguishing system is not recommended, however, minor fire fighting equipment comprising of two BCF extinguishers of 1.25 kg capacity and one CO_2 extinguisher of 4.5 kg capacity may be installed to tackle any electrical fire. In** addition, one CO_2 extinguisher trolley mounled single cylinder having a capacity of 22.5 kg coupled with adequate length of high pressure flexible rubber hose duly connected with discharge horn may be catered for, to tackle abnormal situation.

4.8.4 Electrical Installation

i) Electrical services in general sliould conform to the following provisions:'

a) Conductors/wiring should be laid in separate duct which should be sealed at every alternative floor with non-combustible material having the same fie resistance as that of duct. Low and medium voltage conductors drawn in shaft and in voids above false ceiling should be laid in separate conduits.

b) Telephone lines, gas pipes and water main etc., should never be laid in the duct used for electric cables.

c) Separate circuits laid in separate conduit pipes shall bc provided for operation of water pumps, lifts. staircases and corridor lighting and blowers for pressurizing system, and be drawn from the main. Switches controlling essential services should bc labelled.

d) Emergency lighting shall bc provided in the staircases/corridors.

e) As an alternative source of supply, a stand by generator should be installed to supply power to emergency lighting circuits, fire lifts standby fire-pumps, pressurization system and smoke to extraction dcviccs. The generator should be capable to feed and operate all the above emergency devices simultaneously. In occupancies where alternate sources of energy is available to feed the above systems in emergent situations? the installation of generator may not be insisted upon provided powers is drawn direct from the Sub Station.

) **Power House:** Power House should be equipped with 2 BCF extinguisher of 1.25 kg capacity and CO_2 extinguisher of 4.5 kg capacity to tackle any electrical risk and the same quantum of extinguishers may be provided in other electrical installations.

iii) **Transformers:** Transformers are installed in the buildings below the ground level, in the first basement in separate fire resisting room of 5 hours fire resistance, to meet load of A/C Plant among other electric installations. The High Power Capacity transformer should be well protected and it is suggested that Bund wall (a dike of adequate dimensions) should be erected around the transformer to arrest the total quantity of coolant (heavy oil) plus 10 percent. In case of transformers installed at ground level, a drainage pipe should be laid from the transformer to soak pit constructed outside the building at a safe place. A fire point with following extinguishers should bc crectcd near larger capacity transformers:

a) BCF Extinguisher 1.25 kg capacity - 2

b) CO_2 Extinguisher 4.5 kg capacity - 2

c) Dry Powder 10 kg capacity - 2

d) A single cylinder trolley mounted CO_2 extinguisher of 2.5 capacity with sufficient length of pressurized flexible rubber hose duly connected with discharge horn may be catered for to tackle abnormal situation.

e) Large capacity transformers housed in basement should be protected hy an automatic high velocity water spray projection system.

4.8.5 Special Hazards

There are certain other areas. also in the hospital buildings. which need to be given special attention from fire fighting point of view. These provisions are discussed in the following paragraphs:

i) a) **Operation Theatre:** Besides the operation theatre, there are other locations where flammable anesthetics are or may hc administered to patients. Anaesthetics such as chloroform, cycloropanc. divinylether, ethylene and nitrous oxide arc stored for emergency use. The operation theatre is always having flammable liquids/vapours and gases, it is. therefore, necessary that electrical installation and other electrical fitments musty be vapour proof/flame proof and should conform to IEE /BIS regulations. Switch gears to the individual rooms as far as possible should be located outside the room to avoid chances of occurrence of any spark. In view of the potential risk associated with such locations, it is recommended that all electrical installations must be intrinsically safe or flame proof so that no spark emerges out in the open atmosphere from the electrical fitments.

h) Operation Theatre should be equipped with early detection cum warning system. Smoke detectors preferably combination of ionization and photo electric cell type, be coupled to a warning system, capable to transmit audio-visual signals to the centrally located control panel sited at a suitable place to be

manned round the clock. Besides the above, manual call points duly linked with the warning system should also be installed outside such premises.

c) Extinguishing system employing CO, as extinguishant is recommended. Manually operated extinguishing system should be actuated subsequent to the sounding of alarm. A battery of CO_2 cylinders connected to a common manifold, each cylinder having a capability of 22.5 kg, should be provided in the corridor or at a place adjacent to the room. Pipe lines connected with common manifold on one side and extended to provide coverage to the entire room should terminate with discharge horn projected to cover all the vulnerable points. On detection of fire as a result of manual actuation CO, would be released in the particular zone thereby extinguishing the fire in the affected compartment. However, evacuation of all personnel must be ensured before the systein is operated. Small fires of electrical origin should be tackled with the first aid extinguishers bracketed against the wall.

ii) Presence of radio-active materials require the need for exercise of every precaution in the storage/handling of materials which are hazardous being in a slate of disintegration emitting continuously radiations, the excessive doze in case of accident could be lethal to the workers. Hence it is imperative that the rooms in which radio active materials are stored/handles shall be provided with the water sprinklers with manually operated remote controlled valve installed at a safe place outside the room.

iii) Laundry rooms, large storage houses and kitchens with abnormal dimensions would be provided with heat detectors preferably electro-pneumatic type incorporating fixed temperature as well as rate of rise mechanism coupled with early warning service. First aid fire extinguishers be provided to tackle fire in the incipient stages in these areas.

Check Your Progress 2

1) How compartmentation helps during fire?

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2) What is the fire rating of walls of lifts'!

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3) Should fire lift the operated on common main source of electricity supply?

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4) Which type of fire detection should be installed in air conditioning plant room?

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5) Enumerated the type of fire extinguishers to be installed near large capacity transformers?

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6) What type of extinguishing system is more suited to operative theatre room?

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4.8.6 Fixed Installation

Protection to Air-conditioned Portion of the Building

The air-conditioned premises housing sophisticated electronic equipments and computers of laboratories accommodating sensitive instruments should bc provided adequate lire coverage envisaging automatic early detection-cum-warning-cum-extinguishing systems, The details of such system is dealt separately at Appendix 1 to this unit.

Here we will confine ourselves to learn, what to do in case of lire in such premices:

i) In case of small fire of electrical origin, on sounding of the alarm efforts should be made to fight the lire with the portable extinguishers installed in the room but if f i e develops into serious proportion and goes out of control, then the system should be actuated by operating the overriding switch provided with in the room. Arrangement should exist to operate the system after closing hours from a remote control device installed inside the gallery/verandah/corridor at a conspicuous and accessible location.

ii) The warning system coupled with the siren should emit two consecutive notes, At the premises should be completely evacuated and the last man should ensure that none is left in the room. At the second warning which I'ollows 30-40 seconds alter the first warning, the system if automatic gets commissioned by its own, but in case of manually operated system, the system should be brought into actuation by the last person by operating the switch provided in the corridor.

iii) Warning should be displayed at conspicuous place inside the room that complete evacuation should e ensured in all circumstances before causing the system to operate. This is necessary to obviate the chance of any casualty as a result of asphyxia due to over flooding of the room with extinguishant discharged.

Fire Protection to Non-air-conditioned Premises

i) Heat sensitive detectors preferable electro-pneumatic type functioning on the rate of rise of temperature and also incorporating iixed temperature mechanism are recommended for installation is non-air conditioning blocks accommodating various types of hazardous stores and costlier plant and machinery. The detectors would be coupled to the warning system, comprising hooters, siren, response indicators. On actuation of the detectors the signals will bc transmitted to the control panel, repeat panel and to the siren installed at the top of the building. One BCF/CO_2 extinguisher single cylinder trolley mounted fitted with high pressure flexible rubber hose and discharge nozzled/horn having a capacity of 25 kg /22.5 kg respectively should be placed near the risk to be protected. However, one BCF fire extinguisher 1.25 kg

capacity and one CO_2 extinguisher 4.5 kg capacity should invariably be installed inside each room/compartment to tackle minor fires in Ilie incipient stages.

ii) ***Protection to General Wards*** : Wards like Intensive Care Units and Emergency wards which have been provided with central air conditioning facilities or with package air conditioners would he covered by the installations of smoke detector mid manual call points as stated above. However, General Wards comprising a part of tlie non-air conditioned portion of tlic hospital would be covered by the sprinkler installation, the salient features of which are as follows:

a) **Detection System**: Quartzoid type detector consisting of a small cylindrical barrel made of special glass is used to hold tlic water valve intact. This bulb is hermetically scaled and contains a quantity of a liquid entrapping a small air bubble. As the temperature rises tlic liquid expands and the size of the bubble decreases until it disappears. A further rise in temperature shatters the bulb breaking it into small pieces thus allowing the water to flow thereby drenching the area. The strength of' Ilie bulb is compatible to withstand any pressure applied to the pipes. By adjusting the composition of the liquid and to a restricted extent, the size of the bubble the bulb type head can be set to operate at any temperature. For normal occupancy situations the recommended rating is 68°C.

b) Quartzoid build detector would perform Ilie function both of a detector as well as of a sprinkler. For light hazard a detector covers an area of 20 m square and these are positioned at 4.5 m apart to meet tlic stipulated requirements of water discharge rate.

c) The detector will be suitably coupled to a network of pipes of adequate size and the entire sprinkler installation should have an in-exhaustive supply of one hour duration.

d) The sprinkler installation should be fed from two independent sources of water supply one of which must be inexhaustible in nature. As per norms, sprinkler installation should be fed from an independent source of water supply, therefore, it is imperative that a sump of adequate capacity with a suitable pump having duty points matching with aggregate requirements of sprinklers heads should be provided and installed at the sump. The feeder will remain charged under prcssurc and with the fall of pressure due to actuation of sprinkler's, the pumps would get automatically commissioned into operalion.

4.8.7 Hazards Associated with Furnishing Material, Curtains Upholstery, Dresses, Bed and Bedding Materials

Some cases of Grc got initiated from a burning discarded cigarette butt accidentally dropped on a bed. There have been a number of cases reported relating to fire in clothing and textiles to which such attention was not paid earlier to reduce such hazards. Apart from the type of dress, material of tlie fabric plays an important role .It is estimated that in India around 10,000 deaths occur annually due to burns and it seems that incidents of fire on account of textiles and clothing is approximately 5- percent. Generally victims are mostly children and women.. Though knowledge of flammability of textile fabrics helps in selecting right type of material which is generally done on aesthetic value of the textile rather then flammability aspect, however it may riot be necessary for you to learn these details at this stage, hence it is given separately at appendix B to this unit.

4.8.8 Water Supply

i) **Static Water Tanks**: Open Static water tanks are not generally recommended in the vicinity of hospital buildings, As hospitals are generally visited by patients along with their relatives, often accompanied by children as outdoor patients and also to visit their ailing relatives, so there could be chances of accidental fall. Hence to avoid mishaps open static water tanks are not to be provided, however, covered static tanks are suggested for giving adequate fire coverage to all the blocks. Underground static tanks covered with a reinforced concrete slab should be provided. The storage tanks should be linked with an approach road 3.6 m in width. The tanks should be

recouped within 18 hours and each tank should have a capacity of at 110 KLs. Adequate opening should be provided for inserting the suction hose.

ii) **Wet Riser Systems:** Wet riser system which is kept permanently charged consists of riser (Pipe) 150 mm in diameter locatcd within lobby approach stair case or within staircase where there is no lobby. Generally one riser is provided to cover a floor area of 1000 sq m. Number of wet riser could bc computed at this scale and be located preferably near to staircase. As per IS 3844, the diameter of the wet riser could be 100 mm if the building is less than 34 in in height wet riser system forms part of basic engineering planning componant,you should ensure that it is functional all the time specially during mock fire drill. You need not remember it, however in case you want to know more about it you can consult Appendix 3.

iii) **Hydrant Installation:** Besides the above arrangement, the entire complex should be encircled by a network of hydrant installation which is a positive source of watcr supply, it is, therefore, suggested that hydrant should bc sited all around the entire premises preferably by the side of the approach road spacing each hydrant at a distance of 45 metres apart. It is advised that the ground installation should also be coupled to the main feeder originating from the sump where two pumps have been installed for pumping watcr into the riser system. Details of hydrant installation system is given at Appendix **3.**

4.9 FIRE POINTS AND ESCAPE ROUTES

i) Adequate number of fire points should be provided outside as well as inside the building at conspicuous places so that these are accessible from all directions. As per stipulated requirements one fire point should be erected on each floor near the staircase and it should be equipped with tlie following first aid extinguishers:

Stored Pressure type water extinguisher 9 ltr capacity	2
Dry powder extinguisher 10 kg capacity	1
CO_2 extinguisher 4.5 kg capacity	1
Ceiling hook	1
Water buckets	2

ii) Requisite number of CO_2 extinguishers of 2.0 kg capacity and BCF extinguisher of 1.25 kg capacity should be provided in the corridors duly bracketed against tlie wall at tlie equi-distance in a manner the person bas not to run more than 15 meters to pick up the extinguisher.

iii) An Internal Board of officers may be constituted to pin-point the locations for erections of fire points considering the gravity of the risk. In brief, tlie location shóuld bc conspicuous and accessible usually from all directions and further should restrict normal functional requirements of the Hospitals.

Notes: 1) Before the use of water is resorted to on elcctricnl appliances, switch gears and fitments, switching off power supply should be ensured in all circumstances.

2) As far as possible, dry powder extinguisher should not be used in the room occupied by tlie patients and in cases where CO_2 or BDICF extinguishers of higher capacity have to be actuated, caution should be exercised to evacuate the patients before operating the extinguisher.

4.9.1 Fuel Store

One fire point may be sited near the POL storage/motor transport section consisting of the following lire fighting equipment:

a) Mechanical foam extinguisher 9 ltrs capacity preferably AFFR 2

b) Dry powder extinguisher 10 kg capacity 2

c) CO_2 extinguisher 4.5 kg capacity 1

d) Sand buckets 4

One BCF extinguisher 1.25 kg capacity and one CO, extinguisher 4.5 kg capacity may bc bracketed inside the POL room as an additional fire fighting equipment.

4.9.2 Manual Call Points

Manual cull stations generally known as the manual call points have been recommended for all the buildings located in tlie complex which would also be connected to the siren/ hooter of adequate range through the waning system. The call boxes should be installed at a distance of 22.5 meters apart especially in the corridors/verandah/galleries of the wards in a manner that dead ends and comers are adequately covered Manual call points are enclosed in a sturdy robust box which is installed on the wall at a distance of one meter above the floor level. The box is equipped with the device which is linked with the main warning system and to protect the device from the dust particles it is covered with a glass plate. A hammer is provided which is to be struck for breaking the glass plate the knob pulls out actuating the system emitting audio-visual alarm with spot indicators and simultaneously transmitting impulses to tlie siren which emits loud repeated notes of sharp pitch compatible with audibility, quite distinct lo alert the emergency services.

4.9.3 Means of Escape

In view of mass evacuation of patients, visitors and staff, Means of Escape in Health Care Centers bears significant importance. In this connection, reference is invited to the contents of IS 3844 and Part IV of the National Building Code which are the main guidelines followed by all concerned within the country. Fire authorities in whose jurisdiction the building is to be located, may, if considered appropriate, be consulted in assessing means of escape for the hospital buildings. It may be appreciated that Municipal Bye-Laws or By-laws is to be discussed with the competent fire authority before implementation. Following points may bc given due consideration in determining the category and quantum of means of escape:

i) The size of the doors provided in the ward should not bc less than 3 units in width i.e. 1500 mm.

ii) Each Ward must be provided with escape route in the ward which should not be less than 2.5 meters in breadth, although provisioning of escape exit on b o h the sides of ward is an advantageous factor, as it would enable the authorities in emergent situations to pull the patients while lying on cot through the exits to the corridor.

iii) Ramp:

a) It is pertinent to note that lifts are never construed as authorized means of escape as per standard practice observed by die authorities in this field. Hence it is felt that Ramps are essential ingredients for hospitals buildings.

b) One stair case in tlie shape of Ramp having inclined plane configuration with a breadth of not less than 2,5 metres should be provided to enable tlie patients to evacuate with their own efforts.

c) Ramps are built in the form of inclined plane free from steps rendering the facilities to the patients to climb down without exerting much efforts. It would also facilitate movements for wheeled stretchers and trolleys ctc, with speed without restriction in case of ambulatory patients.

d) Depending only on the staircases as the means of escape would increase the gravity of efforts as the patient has to come down by staircases step by step which may not be practicable in most of the cases. Obviously more labour is exercised while coming through staircases as com1 red to ramps.

iv) Although lifts are not considered as authorized means of escape yet one lift specially allocated to be used by the patients in emergent situations should be catered for in addition. The dimension of the lift platfonn should such as to accommodate wheeled carriage/stretchers.

v) Lobby Approach Staircase and Lifts : In hospitals over 24 metres in height there shall be provision of a lobby approach staircase provided with firelifts (exclusively for fire brigade use). These fire lifts are capable of carrying at least 6 persons and fully automatic with emergency switch at ground floor to facilitate fire fighting operations. Arrangements should also exist in the lift to cut off all switches installed on each floor so that lift can move non-slop and should stop only at the desired floor. In general, there should be a lobby approach staircases to every 1000 sq meters of floor area of each storey.

Pressurization of staircase: General practice in this regard is that staircases should be pressurized to the extent to slop entry of smoke and toxic gases. This aspect is taken care of in fully air-conditioned buildings,

vi) There shall be sufficient open spaces available on the sides of building so that in case of an eventuality the fire fighting/rescue vehicles have access to the farthest part across the building for carrying out rescue operations.

vii) In addition to the above, all the means of escape — staircases or ramps — must bear directional sign which should be illuminated from an independent source of power supply. The exit sign wherever fixed should be indicated by arrow reflecting green colour instead of red.

viii) Horizontal Exit and Rescue/Fire Tower: To ensure safe evacuation some celebrated authorities recommended the provisioning of a horizontal exit to from the main building, where it is not effected by smoke or radiated heat. The rescue tower is connected with all the floors of the main building through corridors/galleries.

4.10 RISK EVALUATION

Generally Hospitals are located in old pre-existing buildings and it may not be possible now to change the architecture design, however it will be worth an exercise to do risk evaluation of the the hospital building. The risk evaluation for m y building is calculated from the product of the following five factors after assigning weighing factors to each of them depending upon the nature and type of the facility (Table **4.3).**

1) Patient's mobility: It represents the degree to which patients musl be assisted for their safety.

2) Patient's density: It refers lo the number of people at risk in a given Fire zone.

3) Fire zone location: It reflects the accessibility of the zone to the lire Sighting facility, for suppression of fire and rescue operation.

4) Ratio of patients to attendant: It takes into account the impact on the safety of the patients of the number of staff available to respond in an emergency.

5) Patient average age: It reflects the age of the patients. The rating takes into account the susceptibility to harm by smoke, etc.

The total occupancy risk is therefore the product of the fire factors and this calculated risk should be assessed, by the designer in terms of the risk-factor values available in the relevant codes. There may be some limitations to the system which are required to be considered in the planning stage.

As regards structural fire precautions and means of escape, the Bureau of Indian Standards has also formulated some parameters as contained in the Nations Building Code (Part N). It is essential that hospital buildings incorporate structural fire precaution measures in their design taking into account the latest fire-resistant materials, compartmentation and methods of construction including means of escape and active fire protection system.

Table 4.3: Occupancy Risk Parameter Factors

Risk Parameters		Risk Factor Value				
1. Patient Mobility (M)	Mobility Status	Mobile	Limited Mobility	Not Mobile	Not Movable	
	Risk Factor	1.0	1.6	3.2	45	
2. Patient Density	Patient	1.5	6.10	11.30	>30	
	Risk Factor	1.0	1.2	1.5	2.0	
3. Fire Zone Location (L)	Floor	1st	2nd or 3rd	4th or 5th	6th and Above	
	Risk Factor	1.1	1.2	1.4	1.6	
4. Ratio of Patient to Attendants (T)	Patient Attendant	1.2 1	3.5 1	6.10 1	>11 1	One or more None
	Risk Factor	1.0	1.1	1.2	1.5	4.0
5. Patient Average Age (A)	Age	Under 65 Years and over 1 Yenr		65 Years and over Yeas and Younger		
	Risk Factor	1.0		1.2		

* Risk Factor of 4.0 is charged to any fire zone that houses patients without any staff in immediate attendance

Occupancy Risk Factor Calculation

	M		D		L		T		A		F		
Occupancy of Risk	☐	×	☐	×	☐	×	☐	×	☐	×	☐	=	☐

Source : Fire Journal, NEPA.

4.11 LET US SUM UP

In this unit, you have learnt about various aspects of fire accidents in a health case set up. You have also acquired the knowledge of importance of keeping these factors in mind while planning and designing a hospital building. Depending upon the tire hazard present in different parts of hospital premises, now you can assess the need of first aid fire fighting appliances including hose reels, portable extinguishers and fixed fire protection system to cater for any special risk. Based on these factors you can draw a fire plan of the hospital building indicating escape routes, compartmentation and other fire protection facilities and incorporate all these in routine fire evacuation mock drill.

4.12 SELF ASSESSMENT ACTIVITY

The following question to help you to test yourself whether you have grasped all that has been explained in this section. Separate sheets arc to be used for writing out answers to these questions, You may refer to the text of the unit to sharpen your understanding of the subject matter. After attempting these questions you may act as your own evaluator.

i) Study the design and construction of your hospital building, does it conform to the norms of fire safety?

ii) Draw an Improved design observing ideal fire norms.

iii) Can you relocate some wards and make some fire escape route in the existing building?

iv) See where all fire-extinguishers are placed, are these adequate? Discuss your plan with district fire authorities.

4.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Sub-division C-1 under the main head Group C — Institutional Building

2) • Heat
   • Oxygen
   • Material

3) • Smoking
   • Contractors carelesness
   • Carelessness of hospitasl staff
   • Defective equipment

   Visilors carelessness

4) Grade of lire helps in determining the type of fire extinguishers.

Check Your Progress 2

1) Compartmentation by dividing the building into number of parts ensures that the health and smoke generated as a result of lire remains confined lo place of origin as long period as possible.

2) Fire rating of walls of life should be two hours.

3) No, fire lift should have independent source of power supply.

4) In air conditioning plan room heat sensitive detectors, preferable electro-pneumatic type incorporating fixed temperature as well as rate of rise mechanism should be installed.

5) Recommended:

   BCF extinguisher 1.24 kg. Capacity 2

   CO_2 extinguisher 4.5 kg. Capacity 2

   Dry power 10 kg. Capacity 2

   Extra precaution:

   Trolley mounted Co, extinguisher of 2.5 capacity with long pressurized flexible rubber hose connected with discharge horn.

6) CO, extinguishing syslem.

4.14 FURTHER READINGS

Angst, H.B., "Fire Alarm System, Without Alarm System", *Hospital International Management, 1992,*

Army Instruction 2/91, *Fire Fighting equipment,* Govt of India, Ministry of Defence, New Delhi, 1991.

Indian Standard, Code *of Practice for Fire Safety of Non-Industrial Building,* Bureau of Indian Standard, New Delhi,1963.

Prasad, M., "Fire Protection facilities for Health Care Centers", In *Hospital Planning and Designing in Developing Countries,* Academy of Hospital Administration, New Delhi.

Protection to Air-conditioned Portion of the Building

The air- conditioned premises housing sophisticated electronic equipments and computers of laboratories accommodating sensitive instruments should be provided adequate tire coverage envisaging automatic early detection-cum-warning-cum-extinguishing systems

a) **Automatic early detection device:** A combination of detectors comprising of a smoke detector working on ionization principle along with a detector equipped with photo electric cell is considered a suitable device for detection. The detectors would be suitably connected into circuits and zones and further would be coupled lo the warning system. Combination and cross zoning of the detectors to eliminate the chance of false alarm simultaneously to ensure the actuation irrespective of the type of smoke liberated is recommended.

b) **Warning system:**

i) Detection devices, call points, etc. would be coupled to the warning system in a manner that on actuation of a detector, a visual indication would appear near the detector wherever it is installed.

ii) Further in relation to the detector which are installed inside the compartment, a response indicator would be visible being fixed outside the room thereby indicating tlie particular room in which detector has actuated.

iii) A hooter would be coupled in each circuit or each zone, which will indicate the actuation of a particular zone or a circuit in tlie part of the building.

iv) The impulses from the warning system would be fed to zonal panel/central control panel installed at the entry i.e. on the ground floor of each building. In fire conditions it would emit audio-visual alarm depicting the particular circuit or zone which has been actuated.

v) The central panel/zonal panel would be installed at a place which is being manned round the clock.

vi) The signals from the warning system would also be fed lo a repeat panel installed at the fire station so that the Fire Brigade can respond to the scene of fire without loss of time. The repeat panel on receiving the impulses would also cinit audiovisual signals.

vii) Circuit and zone would be coupled to an independent siren installed at top of the building In case of actuation of any detector or manual call point in any of the zone/circuit of a particular building the siren would be of adequate range of at least from 1 to ½ kilo-meter and should emit a sharp note/pitch which should be audible irrespective of noise produced by the general functioning of hospital.

viii) The audio-visual indication given at the repeat panel which is further being supplemented by the sharp note emitted by the siren installed at tiie building is essential to guide the services to the point of occurrence hence no mechanism should be provided at the Fire station lo silence the siren which could only he switched off at the zonal panel.

ix) A smoke detector generally provide coverage to an area or 80 to 90 sq m but in actual practice is restricted to 50 sq m depending upon the situation.

x) Call boxes, manual call stations should also be provided in each room and in the corridors, verandah at a distance of not more than 22.5 m apart. These too would be connected with the warning system through siren/hooter of adequate range, as stated above.

c) **Extinguishing system:** The extinguishing system is generally installed for the rooms accommodating highly sensitive instrumentation. The main features of the system are as follows:

i) A batlery of CO_2 cylinders each of 22.5 kg or 50 kg capacity or equivalent quantum of Halon 1301 should be located at a suitable place outside the room. A pipe should originate from a common main fold connecting the cylinders, and should cover all tlie strategic point of the room. Depending upon the lype of extinguishant used, the discharge horns or nozzles are to be coupled at the terminus of each pipe branched off from the main feeder, so as to cover the entire room. The quantum of extinguishant for total flooding system could be computed at the scale of 33 kg of Halon 1301 for 100 Cu M of volume or. 36 kg of BCF or 51 kg of CO_2 for equal volume. While computing the total quantum of extinguishants due consideration should be given for openings if any within the room.

ii) As the occurrence of false alarm cannot be completely ruled out: hence the automatic flooding system duly coupled with the warning system may not he insisted upon, rather the system should be coupled with a remote control device so that it can be actuated by anyone on sounding of the alarm in case there is a fire or manifestation of flame.

UNIT 1 CASE STUDY/GUIDELINES – NOSOCOMIAL INFECTION

Structure

1.0 OBJECTIVES

After reading this units, you should be able to:

- define nosocomial infection and differentiate it from other types of infection;
- establish the association of nosocomial infection with hospital environment;
- distinguish between hygienic and unhygienic particles in the hospital or your work area;
- explain the potential hazards to patients and health care providers;
- identify the faults and correct them to prevent the infection; and
- explain the role of sound practices in preventing the infection.

1.1 INTRODUCTION

Micro-organisms (microbes) are present everywhere. They are found in air we breathe, water we drink, and the earth we walk on. Similarly the microbes are present in hospital environment. Most of these are harmless and some are harmful. In normal condition the harmful micro-organisms do not effect the patients but due to low body resistance and faulty practices the patients admitted in the hospital may get infection. Thus, hospital in addition to treating the patients also give certain inborn infection to hospitalised patients. The infection occurs due to contamination of air in the ward, the contaminated fomites such as tray, linen and equipment used for patient care such as suction apparatus, endoscope, IV set, oxygen mask, feeding bottles, operation instruments, etc. Nosocomial

(hospital acquired) infection occurs in every hospital beyond doubt but many times it is overlooked. It comes into picture only when it has caused damage out of proportion to the magnitude of relatively minor therapeutic procedure carried out on the patients. Nosocomial infection (hospital acquired infection) is perhaps the single most important factor productivity and performance. It increases'average length of stay and increases total cost of treatment.

1.2 NOSOCOMIAL INFECTION

1.2.1 Definition

Nosocomial infection (hospital acquired infection) can be defined as infection acquired by the patients in the hospital, manifestation of which may occur during hospitalisation (usually after 48 hrs) or after his discharge.' It should not be compared/confused with the infection with which he may have come to the hospital for his treatment. These infections not only effect the hospitalised patients but hospital personnel (health care providers) also. These infections are difficult to treat than the community acquired infection because hospital stains of bacteria are resistant to anti-microbial agents. The common nosocomial infections are post operative wound infection, respiratory tract infection, urinary tract infection and septicemia.

1.2.2 Aetiology and Types

Nosocomial infections occur due to microbes known as Bacteria. These bacteria are present everywhere such as air we breathe, soil we walk on and water we drink, in the hospital environment. In normal condition usually they do not manifest but they manifest quickly when the body resistance is low like admitted patients. The common bacteria responsible for nosocomial infections are:

1)	Post operative wound	–	Stephylococcus aureus
2)	Urinary tract infection	–	E. coli
3)	Septicaemia	–	Pseudomonas
4)	Respiratory tract infection	–	K. pneumonae

1.2.3 Mode of Spread

The nosocomial infections are acquired through "contact". The contact may be due to inhalation of contaminated air or direct,contact with contaminated object.

1.3 DEMONSTRATION OF CASES AND ENVIRONMENTAL CONTAMINATION

1.3.1 Types of Infected Cases

Purpose

In this exercise you will:

a) see the different types of nosocomial infected cases,

b) demonstrate how these infections are developed.

Case 1

A patient of acute dysentery with pain in abdomen was admitted in medical ward. He developed sore throat, pain and fever on fourth day of admission.

Demonstration: The patient developed upper respiratory tract infection (URTI) on fourth day of admission and this was the reason for pain in throat and fever. Throat swab culture shows K. Pneumonae growth. The problem was not at the time of admission but developed after **48** hrs of admission. The problem developed due to contaminated air inhalation in the ward, therefore, it is a nosocomial infection.

Case 2

A patient was admitted for appendicitis and operated on same day. Operation (appendicectomy) was successful and after this he was shifted to' surgical ward. After **48** hours of operation, patient complained of pain at the site of stitches were made and having mild fever.

Demonstration: The operated wound stitched after operation was inspected and found that pus is coming out from stitched area. The area was red and tender. The problem was not at the time of admission as there was no wound. The problem developed in the surgical ward. On culture of pus it shows growth of stephylococcus aureous growth. It shows that either the air of the ward was contaminated or some contaminated object (hand, forceps, scissors) was applied on the wound. Therefore,. it is a nosocomial infection.

Case 3

A patient was admitted in a ward with acute retention of urine. Urinary catheterisation was performed to relief the patient. The patient was relieved from the problem and hospital. But after third day of discharge from hospital he developed fever and burning in micturition and reported back to the same doctor.

'***Demonstration:*** The patient developed fever and burning in micturition after **48** hrs of urinary catheterisation. The problem was due to urinary tract infection. The urine culture shows growth of E. coli. This problem was not at the time of previous admission but developed after **48** hrs of procedure. It shows that the catheterisation was the reason and catheter was contaminated. It is a nosocomial infection.

Demonstration of Environmental Sources of Contamination

Purposes

In this exercise, you will see

- how bacteria spread from your body and surroundings by droplets, hands, air and fomites,
- demonstrate how this can be reduced or prevented by simple hygienic practices e.g., hand washing, disinfection, use of antiseptic agents and sterilization.

Equipment

- Culture plates – blood agar (BA)
- Sterile swab sticks
- Antiseptic agent (70% alcohol)
- Disinfectant solution glutaraldehyde – 2% (Cidex)
- Gloves (sterile)
- Incubator adjusted to 37°C.

Activitiy : Peform the following activities and record your observations

i) Checking *Air Contamination*

Expose sterile BA plates for 1 hr in different parts of a room, incubate for 24-48 hrs at 37 °C, do colony counts and describe the different types of bacteria grown on the plate.

ii) *Spread by Cough*

Cough on a BA plate with lid open kept at a distance of 1 feet, incubate and examine as in (i).

iii) *Use of **Hand** Washing*

Culture hands before and after washing with antiseptic agent, incubate plates and examine as in (i).

iv) *Spread of Infection by Dust*

Collect dust with help of a swab from a patient's bed and culture on BA plate, incubate and examine as in (i).

v) *Use of Disinfectants to **Reduce** Contaminants*

Culture a thermometer after taking temperature in a patient's mouth, dip in disinfectant for 10 mts. Reculture on BA plate, compare results on two plates as in (i).

From the above observations you can conclude that:

- Microbes are present inside and outside the human body.

  They can be transmitted to the patient by oral, respiratory routes or by direct contact.

  Prevention of spread of infection involves hygienic practices.

  Sterilization and disinfection reduce contamination.

1.3.2 Mode of Spread

The nosocomial infections are acquired through "contact". The process of contact can be:

A patient inhales contaminated air. The air comes into the contact of body. URTI is developed,

- A contaminated catheter (unsterile) is used in patient. The urethra comes into contact with contaminated catheter and gets UTI.
- **A** sterile post operative wound comes into contact with hand, forceps or any other contaminated object. The wound is infected.
- **A** patient was injected drug through a contaminated/unsterile needle with syringe. The body comes into contact of contaminated needle and gets infected.
- A contaminated/unsterile endotracheal tube is applied on patient. The lungs come into contact with contaminated tube and get infected.

Above experiments show that the mode of spread of nosocomial infection is **"contact"**. Therefore, if the contact is avoided, the infection can be prevented.

1.4 CONTROL OF INFECTION

Practices **of universal** precaution: Principle of universal precaution is based on the fact that any type of fluid coming out from the body of patient is considered to be infected. Therefore, precautions to be taken in every case whether infected or non-infected.

1.4.1 Hand Washing

Avoid contact by hand washing. Frequent contact with patient body fluid, blood, tissue by hand of the health care provider provide a means of transmission of infection from patient to patient and patient to personnel.

- Hand washing with soap and water under running tap washes the most of the microbes and prevents the spread of pathogen to non-contaminated area.
- Hand washing is the most effective and most economical method of infection control.
- Running water inhibits the growth of microbes (bacteria).
- Hand washing can also be done with anti-microbial agents (e.g. chlorhexidine i.e. savlon and habitant, alcohol). Friction from a brush or vigorously rubbing the hands together removes direct micro-organism.
- Always dry your hands with clean dry towel or air dry.

Fig. 1.1: Hand Washing

1.4.2 Use of Barrier Precautions

Barrier precaution such as gloves, mask, gown should be used by the health care provider while dealing with infected patient. This will further help in preventing the nosocomial infection to other patient.

1.4.3 Waste Disposal

Waste generated from diagnosis, treatment or immunization to be treated first then disposed finally. Detail you will find in Unit 2 of this block.

1.4.4 Use of Disposable Items

Use of disposable (sterilize) to be encouraged so that chances of spreading the infections are minimized.

You should visit the ward and observe that how many hospital employees are really applying the method.

Fig. 1.2: Barrier precaution'

Activities

- Wash the hand with soap and running water before and after examining the patient and generating the waste.
- Put on gloves in hand, face mask before you go for dressing the patient, examining the infected patient.
- Throw the blood/pus soaked cotton, gauze in separate container identified for it i.e. yellow plastic bag.
- After examination generating the waste throw the gloves in identified container (blue/white plastic bag).
- Use the sterile consumables on patients.
- Discard the needle immediately after use by needle destroyer and then put the needle and syringe inside disinfectant for one hour.
- Segregate the waste at source collected in covered container for further disposal.

1.4.5 Disinfection/Aseptic Practices

Many of the substances are used in various procedure carried out on the patient. To prevent the nosocomial infection, these substances should be disinfected or sterilized. Therefore, it is very essential to confirm the sterility of the material. Many of the times same substance/appliance/equipment is used on many patients. Therefore, here we have to confirm that the substance/appliance/equipment is properly sterilized before used for second patient. The common sterilization methods are:

a) Chemical Method

Chemical agents destroy only pathogenic organism on or in an object. The process of destroying the pathogen is called "disinfection" and the object is said to be disinfected. The chemical used for lifeless objects is called disinfectant (formaline, chlorine, carbolic acid, gluteral dehyde) and if the same is used for living object (tissue of human body) the chemical is called antiseptic (ethyl alcohol, iodine, gention violet)..

Common Chemicals Used for Disinfection

Class	Example
I) Phenol and cresol	Lyson, settel
2) Alcohol	Ethyl alcohol (spirit)
3) Halogen	Iodine, chlorine compound
4) Aldehyde	Formaline
5) Dye	Gention violet
6) Acid	Boric acid, carbolic acid
7) Gas	Ethyline oxide
8) Oxidising agent	Hydrogen peroxide
9) Surface active agents	Soap

The effectiveness of these chemical disinfectants depends upon:

i) Concentration of the disinfectant

ii) The number – type and location of organism

iii) The temperature and pH of treatment

iv) Time of contact with chemical

Some of the substances used are exposed to disinfection. These are laringoscope, endoscope, colonoscope, urinary catheters, nasogastric tubes, endotracheal tube etc. Different chemicals are used for different substances.

- Ethylene oxide a volatile and explosive chemical is rarely used for disinfection/sterilization for the substances which melts at temperature greater than 100°C. The examples are plastic materials i.e. catheter gloves, syringe, etc.
- To disinfect sharp instruments, endoscope, cystoscope, use gluteraldehyde (2%) or carbolic acid (5%).
- To disinfect cheattle forceps we use chlorhexamide (5%) + citramide (savlon)

You should visit the Operation Theatre, Intensive Care Unit, Ward, OPD and observe that how these chemicals are used for disinfection of various items and record your findings.

Activities: Peform the following activities.

Take large covered container depending upon size, flexibility of the equipment,

Equipment to be sterilized : Endoscope; Urinary catheter; Nasogastric tube; Endotracheal tube; PCNL endoscope.

- Wash the equipment thoroughly.
- Fill up the container with chemical (gluteraldehyde 2% – cidex) to the level that the equipment is completely merged in the chemical.
- Cover the container and leave for 2 hours.
- Take out the equipment after 2 hours and wash with sterile water or saline.
- Now it is sterilized and you can use it.

b) **Sterilization**

Heat (Dry and Moist)

- **Dry** heat such as hot air oven on incineration denatures enzymes, dehydrates microbes, and kills by oxidation effect. A standard application of dry heat in a hot air oven is 170°C for 2 hours. It is used for dry sterilization of glass wares such as.glass syringe, pipette, test tube, blunt instruments.
- Incineration is used in hospitals for destroying infected swabs dressing, operated materials, laboratory materials, bedding, etc.
- Direct flaming is used to sterilize inoculating loop in microbiology laboratory. In emergency direct flaming is used to sterilize needle and blades.
- Moist heat is used in pasturization, boiling and autoclaving.
- "Autoclaving" is most effective method of moist heat sterilization using steam under pressure. Increased pressure raises the boiling point of water and produces steam with higher temperature., The standard conditions for autoclaving are 15 pounds per square inch, 121°C for 15 minutes. The process also kills the endospore and makes material sterile. In modem hospital, autoclaver (sterilizers) are available in operation theatre (TSSU) and Central Sterile Supplies Department (CSSD). Autoclave is preferred for material made of cotton (gauze, sandoge, drops, linen, etc.) and blunt instrument. It is not ideal for material made of plastic and rubber.

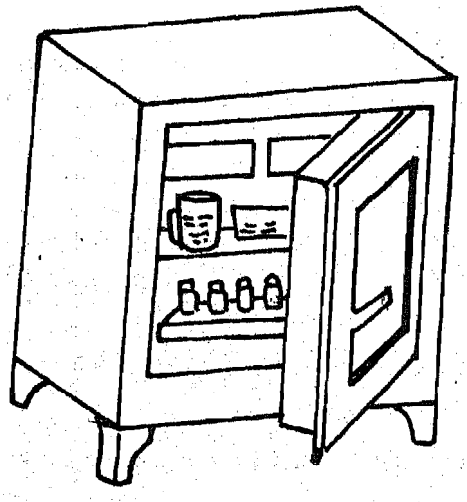


Fig. 1.3: Hot Air Oven

Activities: Perform the following activities.

Materials to be sterilized : Gauze, cotton, linen, glass syringe, blunt instrument, etc.

Clean and wash the material to be sterilized.

- Wrap the cotton/gauze piece in a perforated drum. **A** chemical indicator of sterilization is sticked on the top of material.
- Place the material on perforated stand or diaphragm after adjusting water level the autoclave is switched on.
- The lid is kept in position and is closed tightly by means of screw clamps. .
- The steam valve is kept open until all air is expelled out and only steam comes out.
- Steam valve is then closed so that pressure begins to rise. As the pressure rises, temperature also rises accordingly. When the pressure is 15 lbslsq. inch i.e. temperature is 121^{0}C, the time is noted as zero time. Automatic steam release valve maintains the pressure at pre-adjusted valve. In this case 15 lbs/sq. inch.
- After 20 minutes the autoclave is switched off and is allowed to cool down. When pressure gauge indicates zero pressure, the steam valve is opened and the autoclave can be opened and all sterilized materials are removed and dried.
- The efficiency of the sterilization can be checked by temperature, pressure and time taken, change in colour in chemical sticker and incubating the media at 37^{0}C in an incubator for 24 hours. If growth is observed then autoclaving has not been carried out properly. Repeat the same process.

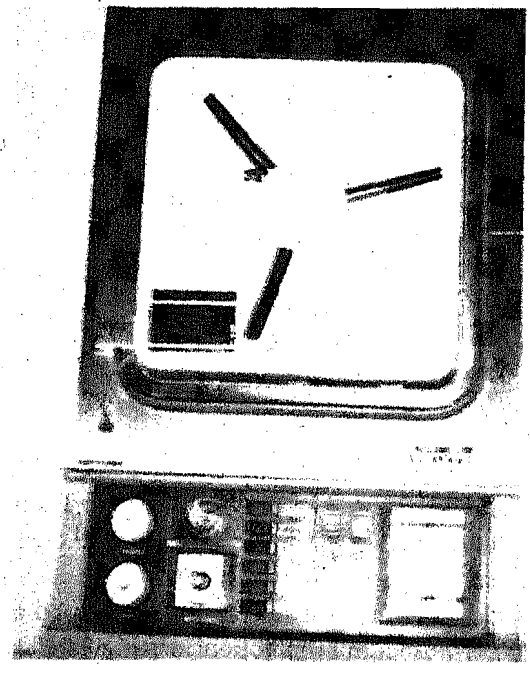


Fig. 1.4: Autoclaving Machine

1.4.6 Waste Disposal Practices

All waste generated in the hospital is not infective. It is only 10% of the waste generated is infective. Sound practices for infected waste disposal minimizes the chances of nosocomial infection. Infected waste is potential hazard to patients,

health care providers and public. The proper disposal of waste can be achieved by applying Biomedical Waste (Management and Handling) Rules, 1998, Ministry of Forest and Environment, Govt. of India. Rules say segregation is the essence of effective waste management. Based on above the biohazardous (biomedical waste) has been categorized into ten categories. Accordingly they have identified five types of coloured heavy-duty polythene for collection of waste. The treatment and final disposal of waste is also done based on the category. You will learn more about Hospital waste disposal in Unit 2 of this block,

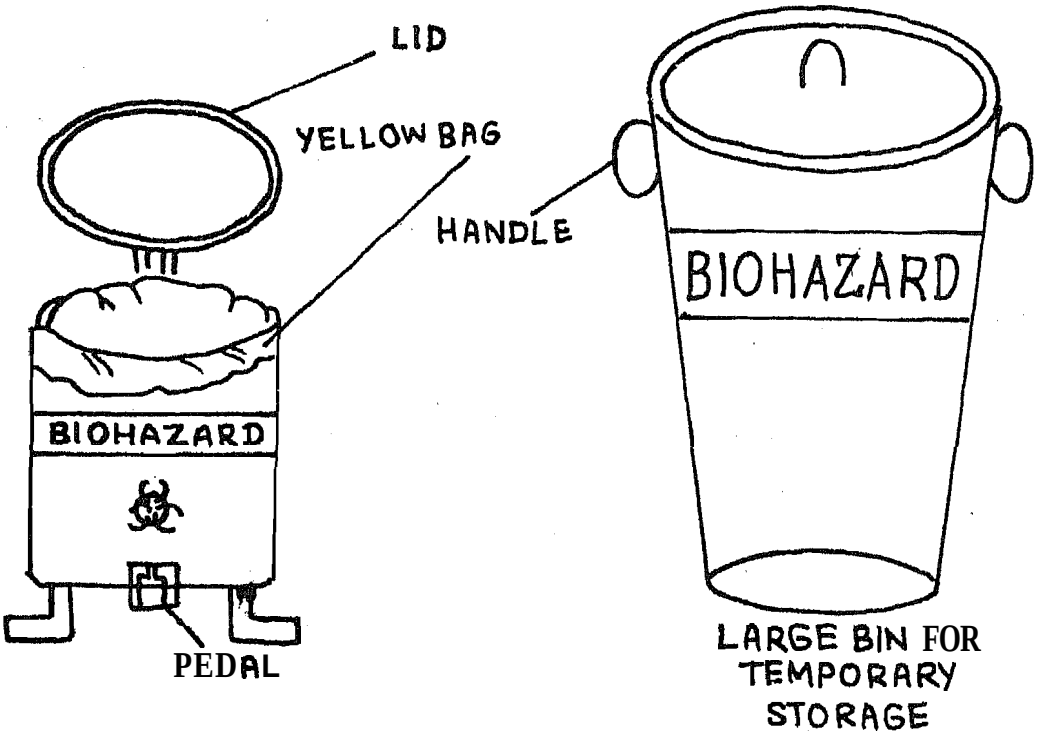


Fig. 1.5: Container for Infectious Waste

1.4.7 Health Education and Training for Health Care Providers

As you have learnt that the health care providers are responsible for nosocomial infection. The mode of spread of infection is contact. The contact can be in many ways as illustrated in sub-section 1.2.3 & **2.3.2** of this block. It is imperative to educate the health care providers about the infection, its spread, complication. The health care providers must be trained to follow the proper sterilization and hospital waste disposal practices.

1.4.8 Hospital Infection Control Committee (HICC)

The administrative control of nosocomial infection can be achieved by the Hospital Infection Control Committee. Every hospital should have HICC. The HICC includes various disciplines such as administrator (Medical Superintendent) Surgical, Medical, Laboratory, Sanitation, Sterilization, etc. The infection control nurse coordinates and monitors the patients, environment and laboratory function. **A** constant surveillance of nosocomial infection in patients should be done. Drug policy should be laid down on antimicrobial susceptibility patterns of pathogenic bacteria encountered in infection diseases in the hospital patient from time to time. Standardization of disinfection and cleaning procedure and continuous implementation and training of personnel is very important to minimize the infection rate. You as an administrator have a very important role to play in prevention of nosocomial infection.

1.5 LET US SUM UP

In this unit of practical manual you have learnt that nosocomial infections are acquired infections in the hospital and, therefore, hospital is responsible for its prevention and control.

You have also learnt that nosocomial infection increases average length of stay and at the same time also increases the cost of treatment. Moreover, nosocomial infections are difficult to treat as most of them have resistant strain. Health education and training programme of Health care providers have paramount role in prevention of these infections.

Further you have learnt that the only mode of spread of infections' is contact and therefore, avoiding the contaminated object in the patient's body is the essence of prevention of infection. The control of micro-organism by disinfection and sterilization is an essential factor in maintaining good health of patients.

Autoclave and chemical disinfections are commonly used practices for disinfection. At the same time sound hospital waste management also plays role in control of infection.

Towards the end you learnt that Hospital Infection Control Committee is responsible for prevention and control of nosocomial infection.

In this unit, Practical Manual you have also performed various activities to gain proficiency in prevention and control of nosocomial infections.

UNIT 2 GUIDELINES FOR WASTE DISPOSAL IN HOSPITAL

Structure

2.0 OBJECTIVES

After completing this unit, you should be able to:

- identify the types of waste generated in the hospital and segregate the biomedical waste from rest of the waste;
- make understand for rationale for hospital waste disposal and potential hazards involved in improper waste disposal;
- explain the process of generation, segregation, transportation, treatment and final disposal of waste and technology involved in the process; and
- based on above to develop the sound practices of hospital waste disposal.

2.1 INTRODUCTION

Since beginning, the hospitals are known for the treatment of sick persons but the secret of these places which throw the adverse effect on human body and environment remained hidden till now. Now it is a well established fact that there

are many adverse harmful effects to the environment including human being which are caused by the hospitals. The secret of cause is the "Hospital Waste" generated while delivering the patient care. Hospital waste is a potential health hazard to the health care worker, public, and flora and fauna of the area. Disposal off hospital waste was witnessed by the health care providers and the common public but merely taken as a filthy and unwanted product. Discovery of hospital acquired infection, transfusion transmitted diseases, rising incidence of Hepatitis B and HIV, increasing land and water pollution leading to increase the possibility of many diseases, air pollution due to emission of hazardous gases by incinerator such as furan, dioxin, hydrochloric, etc. have compelled the authorities to think seriously about hospital waste and the diseases transmitted through improper disposal off hospital waste. The thrust area has now become a threat for the public health and ultimately the Central Government had to intervene for proper handling and disposal off hospital waste and passed an act in July, 1996 and made Biomedical Waste (Handling and Management) Rule in 1998.

A modern hospital is a complex, multidisciplinary systein which consumes thousands of items for delivery of medical care and is a part of physical environment. All these products consumed in the hospital leave some unusable leftover i.e. hospital waste. The last century witnessed the rapid mushrooming of hospital in the public and private sector, dictated by the needs of expanding population and advent and acceptance of "disposable" has made the generation of hospital waste a significant factor in today's hospitals.

2.2 HOSPITAL WASTE

2.2.1 What is Hospital Waste

Hospital waste refers to all waste generated, discarded and not intended for further use in the hospital.

2.2.2 Types of Hospital Waste

a) **General waste:** It is. like household waste, e.g. paper, plastic, rappers etc.

b) **Pathological waste:** It contains tissue, organ, body part, blood etc.

c) **Infectious waste** which could cause tlie infection, e.g. culture stock, waste from laboratory, surgery and infectious patient.

d) **Sharps** which could cause cut or puncture e.g. needle, scalpel, saw, glass, blade etc.

e) **Pharmacological waste:** Example, unused or discarded drug, chemical etc.

f) **Chemical waste:** Solid, liquid and gaseous chemical, e.g. cleaning, house keeping disinfecting product.

g) **Radio active waste:** Solid, liquid and gaseous waste that is contaminated with radio nuclides.

2.2.3 Amount and Composition

In India the amount of hospital waste generated ranges between 1.5 kg–2 kg/ bed/day.

Composition

a) Non Hazardous 85%

b) Hazardous 15%

1) Hazardous but not infective 5%

2) Hazardous and infective 10%

2.2.4 Biomedical Waste

Any solid, fluid and liquid waste including it's container and any intermediate product which is generated during the diagnosis, treatment or immunization of human being or animal in research pertaining thereto, or in the production or testing of biological and the animal waste from slaughter houses or any other like establishments. All biomedical waste is hazardous.

Classification of Biomedical Waste (as per Biomedical Waste Management and Handling Rules, 1998)

Categories of Blotnedical Wastes

Option	Waste Category Waste Class	Treatment and Disposal
Category 1	Human Anatomy Wastes (Human tissues, body parts)	Incineration deep burial*
Category 2	Animal Wastes (Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, discharge from hospitals, animals houses)	Incineration deep burial*
Category 3	Microbiology and Biotechnology Waste (Waste from laboratory culture, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	Local autoclaving/micro-waving/incineration
Category 4	Waste Sharps (Needles, syringes, scalpels, blades, glass etc. that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection (chemical treatment autoclaving/ micro-waving and mutilation/ shredding

Option	Waste Category Waste Class	Treatment and Disposal
Category 5	Discarded Medicines and Cytotoxic drugs (Wastes comprising outdated, contaminated and discarded medicines)	Incineration/destruction and drugs disposal in secured landfills.
Category 6	Solid Waste (Items contaminated blood and body fluids including cotton, dressing, soiled plaster casts, lines bedding, other material contaminated with blood)	Incineration Autoclaving/microwaving
Category 7	Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, IV sets etc.)	Disinfection by chemical treatment and autoclaving/ microwaving/shredding
Category 8	Liquid Waste (Waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	Disinfection by chemical treatment and discharged into drain
Category 9	Incineration Ash (Ash from incineration of any biomedical waste)	Disposal in municipal landfill.
Category 10	Chemical Waste (Chemical used in production of biologicals, chemicals used in disinfection, as insecticides etc.)	Chemical treatment and discharge into drains for liquid and secured landfill for solids.

Colour Coding and Type of Container for Disposal of Biomedical Wastes

Colour Coding	Type of Container	Waste Cntqory	Treatment Option
Yellow	Plastic bag	Cat. 1, Cat. 2, Cat. 3 and Cat. 6	Incineration/deep burial
Red	Disinfected container/plastic bag	Cat. 3, Cat. 6, Cat. 7	Autoclaving/Microwaving/ chemical treatment
Blue/White	Plastic bag/ puncture proof container	Cat. 4, Cat. 7	Autoclaving/Microwaving/ chemical treatment and destruction/shredding
Black	Plastic bag	Cat. 5 and Cat. 9 and Cat. 10 (solid)	Disposal in secured landfill

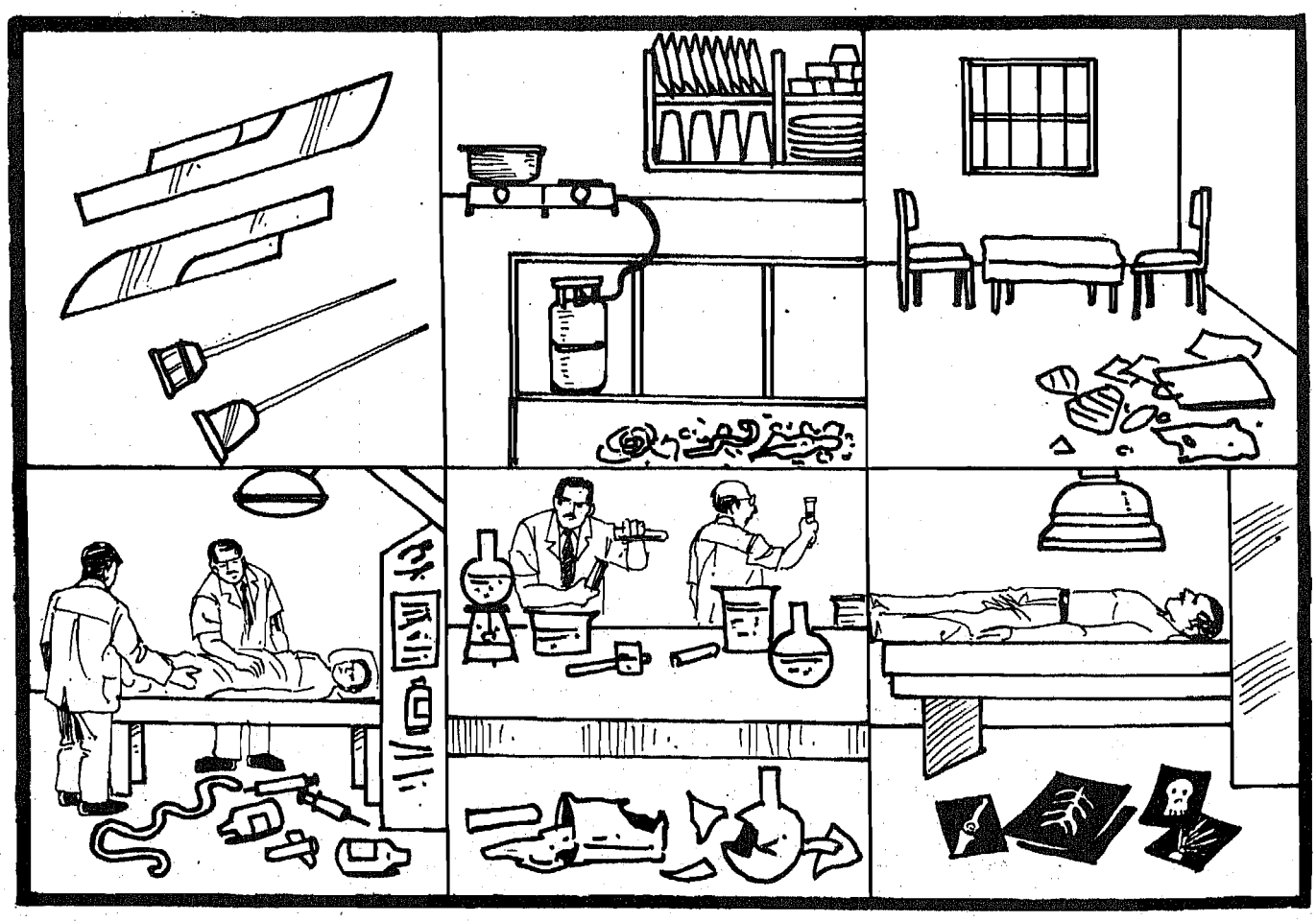


Fig. 2.1: Hospital Waste and Source of Generation

2.3 RATIONALE FOR WASTE DISPOSAL

2.3.1 Patients and Hospital Acquired Infections (Nosocomial Infection)

In last unit you have already learnt that nosocomial infections are developed in some of the patients due to hospitalisation. Infectious waste is one of the reasons for. it. In addition to post operative wound infection, URI, UTI, there are more and more chances of developing HIV, Hepatitis B, etc. diseases. The hazardous waste is a potential reservoir of the infection and diseases in patients are transmitted through it.

2.3.2 Health Care Providers at Risk

In addition to patients, health care providers such as doctor, nurse, patient helper, technician, and sweepers are also exposed to develop many diseases including nosocomial infection if the waste is not properly handled and disposed. The other hazards are body injury, chemical burn, etc.

2.3.3 Population at Risk

Hospital waste without proper treatment if thrown in open area is also hazardous for the population in the vicinity. Ragpickers are mostly exposed to the diseases such as HIV and Hepatitis B.

2.3.4 Environmental Pollution and Hazards

Now it is well-established fact that there are many adverse harmful effects to the environment including human being which can be caused by hospital waste. It causes environmental pollution and'effect man, animal, flora and fauna of the area. Air pollution due to emission of hazardous gases by incinerator, e.g. dioxin, furan, hydrochloric acid are very common. Environmental pollution includes air, water and soil contamination.

2.4 DEMONSTRATION OF WASTE GENERATION

A hospital consumes thousands of items for delivery of medical care. All those items leave some unusable leftovers. During the health care delivery, some products of the body such as blood, tissue, organ, pus, etc. are released which also become part of waste. Different types of waste are generated from different types of treatment and procedure. Here we will see that how the waste is generated in different areas of the hospital,

2.4.1 Visit to Ward

The following are the waste generated in ward:

- Leftover food
- Leftover drug
- Rappers of drug, syringe and edible items
- Bark of fruits—such as orange, banana etc.
- Needle and plastic syringe after use
- Dressing material after use (pus or blood soaked)
- IV canula, IV set and IV bottle pack
- Blood bottle pack and BT set

- Plaster material removed
- Chemical such as savlon, spirit, betadine used during dressing
- Disposable gloves, catheter and other tubes
- Used paper

2.4.2 Visit to Intensive Care Unit (ICU) and Operation Theatres (OTs)

During your visit to ICU and OT, you will observe that following wastes are generated.

- Leftover drugs and chemicals
- Rappers of drug, syringe and other consumable items:
- Needle and syringe and other types of consumable after use.
- Blood, tissue, body organ taken out during operation.
- Sponge and other items used for soaking.
- IV canula, IV set and IV bottle.
- Blood bottle and BT set.
- Chemical such as savlon, spirit, betadine, iodine used during dressing.
- Disposable syringe, gloves, face mask, cap, catheter and other items.
- Broken vials, ampule, blades, scalpels etc.

2.4.3 Visit to Laboratory

In the laboratory set-up following wastes are generated.

- Chemical, reagent, culture media used during experiment.
- Gloves, face mask used.
- Syringe, needle after use.
- Rappers of vials, ampule, bottles.
- Container used for sample collection.

2.4.4 Visit to Areas where Radioactive Material is Used

You will notice following waste material where you visit to areas radioactive material.

- Vials, bottles, syringes used for keeping and using the radioactive material.
- Gloves, syringe, needle, face mask etc.

2.4.5 Visit to Other Areas

In other areas you will find following wastes materials.

a) Kitchen
   - Leftover food

b) Blood bank
   - Syringe and needle after use
   - Blood used for testing
   - Gloves, face mask
   - Rappers of disposables
   - Paper

c) Sample collection centre
   - Needle, syringe after use
   - Rappers of the consumables
   - Cotton swab after use
   - Drop out blood, CSF etc.

d) Medical store
   - Drug and chemical rapper
   - Carton, used bottles

e) Laundry
   - Unusable linen

f) Animal house
   - Used animal
   - Blood
   - Gloves, syringe, chemical used
   - Sharps.

2.5 DEMONSTRATION OF SAFE DISPOSAL

2.5.1 Segregation and Container

Biomedical waste (hazardous) consists of approximately 15% of total waste generated in the hospital. Rest 85% waste is non-hazardous. But infact, usually the segregation of the waste is not done at the source of generation and all waste is mixed up. Therefore, the complete waste becomes Hazardous. Segregation is the essence of waste management. Biomedical Waste (Management and handling) Rules, 1998 has described 10 types of biomedical waste and different types of containers for segregation, collection and transportation of biomedical waste.

Demonstration – Biomedical waste

1) **Surgical Ward**

In surgical ward you will find many post operative patients. The dressing of the wound is done periodically. During the dressing of the patient following waste is generated:

a) Removed gauze and cotton soaked with discharge or blood or both.

b) While cleaning the wound some of the chemical/antiseptic solution used.

c) Gauze and cotton used for cleaning the wound.

d) Gloves used during cleaning the wound.

e) Wound debridement was also done and tissue taken out.

Analysis

As per Biomedical Waste Management and Handling Rule following category of waste is generdted and to be segregated and collected in different coloured containers.

Waste	Category	Container
Blood/pus soaked cotton gauze	Solid waste (Biomedical)	Yellow/Red plastic bag
Chemical/antiseptic solution	Chemical waste	Diluted and drained
Gauze/cotton used for cleaning the wound	Solid waste (Biomedical)	Yellow/red plastic bag
Gloves used for dressing	Solid waste (Plastic)	Blue/white
Tissue	Human Anatomical waste	Yellow plastic bag
Scalpel used	Sharp	Puncture proof container

Opinion

a) Yellow, red, blue and white coloured plastic bags are required for collection of different types of waste.

b) Waste should be segregated in different types of bags at the time of generation.

2) Blood Collection Centre and Laboratory.

You will find following types of waste generated in this area:

a) Gauzelcotton used for applying the antiseptic on body.

b) Syringe and needle used for drawing the blood.

c) Blood drops fall down on table etc.

d) Chemical discarded after testing the blood.

e) Gloves used in drawing and processing the blood.

f) Rapper of the syringe/needle.

Analysis

As per Biomedical Waste (Management and Handling) Rules, 1998, following types of waste is generated and to be segregated and collected in different types of containers.

Waste	Category	Container
Cotton/Gauze applied	Solid waste	Black Plastic bag
Needle used	Sharps	Puncture proof container
Syringe and gloves used	Solid waste (Plastic)	Blue/white bags
Blood and tissue–Human	Anatomical waste	Yellow plastic bag
Chemical discarded	Liquid waste	Diluted and drained
Rappers of syringe/needle	General waste	Black

Opinion

a) Yellow, red, blue, white, black plastic bags and puncture proof container are required for segregation and collection of different types of waste.

b) Before collecting the waste it should be segregated in different types of containers at the time of generation.

3) Operation Theatre

When you visit the operation theatre, you will find the following types of waste:

a) Gauzelcotton and chemical/antiseptic used for part preparation

b) Fresh blood and blood soaked sponges

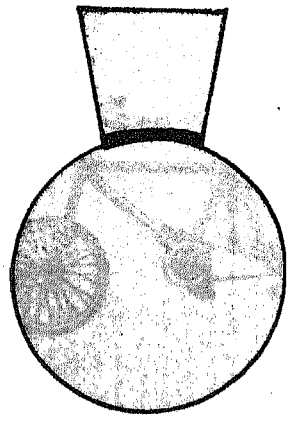
c) Body part/tissue removed during operation

d) Gloves, face mask, cap (disposable)
e) **Needle,** syringe, blades, scalpel, broken ampule used
f) Rappers of needle, syringe, drugs and other consumables
g) IV canula, IV* and BT set and bottles.

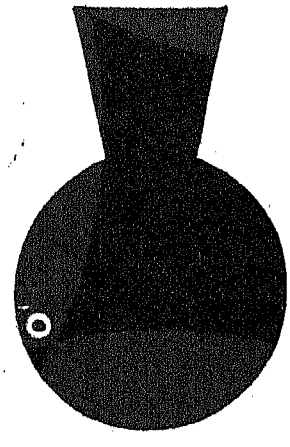
Analysis

As per Biomedical Waste (Management and Handling) Rules, 1998 you will find following category of waste generated and to be segregated and collected in different types of containers.

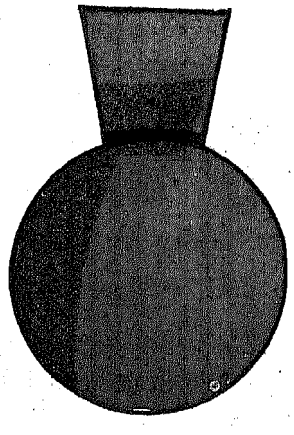
Waste	Category	Container
Gauze/cotton used	Solid waste	Black plastic bag
Blood, body part/Tissue	Human Anatomical waste	Yellow plastic bag
Gloves, syringe, Canula, IV and BT set and bottle	Solid waste (Plastic)	Blue/white bag
Needle, blade, scalpel, broken ampoule	Sharp waste	Puncture proof container
Rappers of needle, Syringe, drugs	Domestic waste	Black.



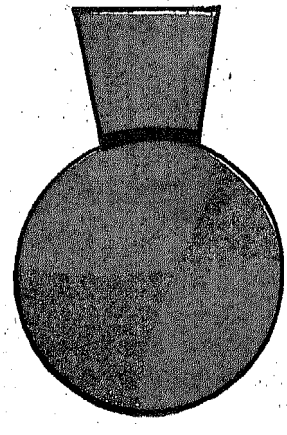
infectious Non-Sharp?Waste **(Incineration)***



Incineration Ash, Solid Chemical Waste (Secured **Landfill)**



Plastic & Sharps **(Autoclave/Chemical/** hlicrowave, Shred, Recycle or Landfill



Infectious Non-Sharp Waste (Autoclave/Chemlcal/Mlcrowave, Landfill)

Fig. 22: **Colour** Coding of Waste Bags

a) Yellow, red, blue, white and black plastic bags and puncture proof containers are required for segregation and collection of different types of waste.

b) Waste should be segregated at the time of generation.

2.5.2 Transportation

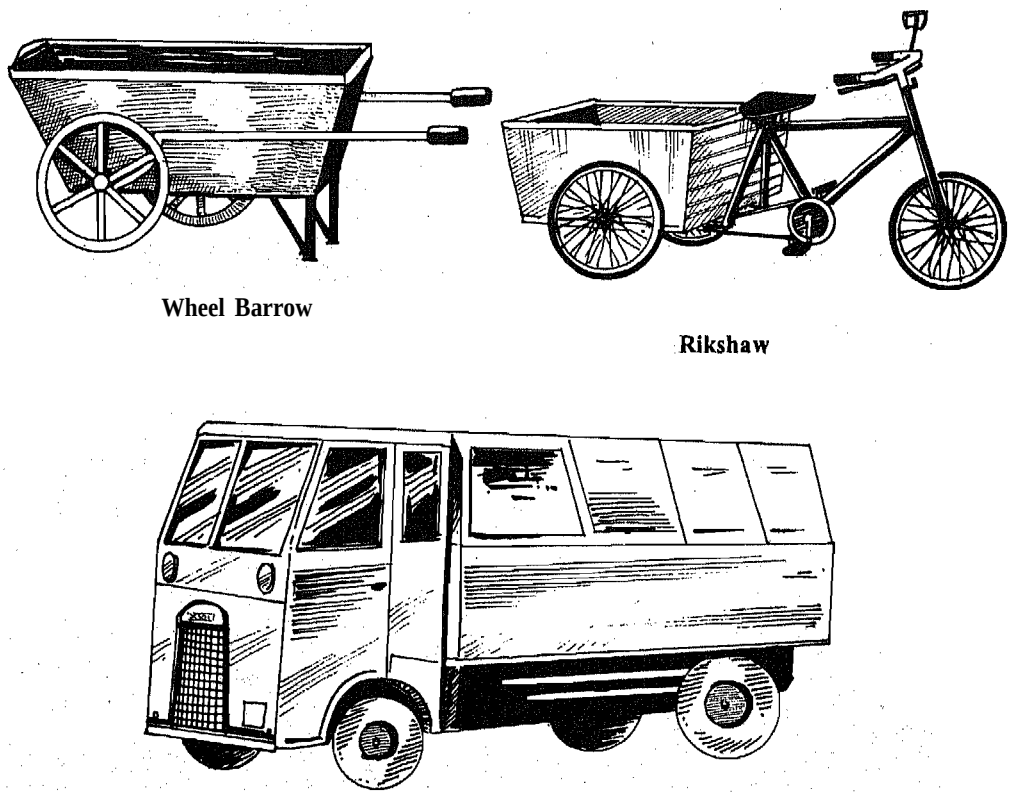
You have observed that how the different types of biomedical waste is generated, segregated at the source. The segregated waste in different plastic bags/puncture proof container is now collected by the person identified in same coloured large container. Each container is thoroughly closed and levelled for cytotoxic and bio-hazardous identification.

The transportation of the collected waste will now be transported by a central team of identified. Following are the pre-requisite for transportation:

a) The waste transportation route must be designated and avoid the passage of waste through patient care area.

b) Biomedical waste and general waste should be collected and transported separately.

c) Dedicated wheeled container trolley or cart should be used and these should be cleaned and disinfected after use.



Wheel Barrow

Rikshaw

Fig. 2.3: Transportation

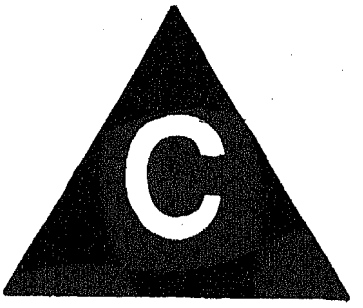
d) Transportation of waste for longer distance should be done in dedicated vehicle.

e) All efforts to be done to prevent pilferage, spilage and transmission of infection.

Biohazard Symbol

Biohazard

Cytotoxic Hazard Symbol



Cytotoxic

Fig. 2.4: Handle with Care

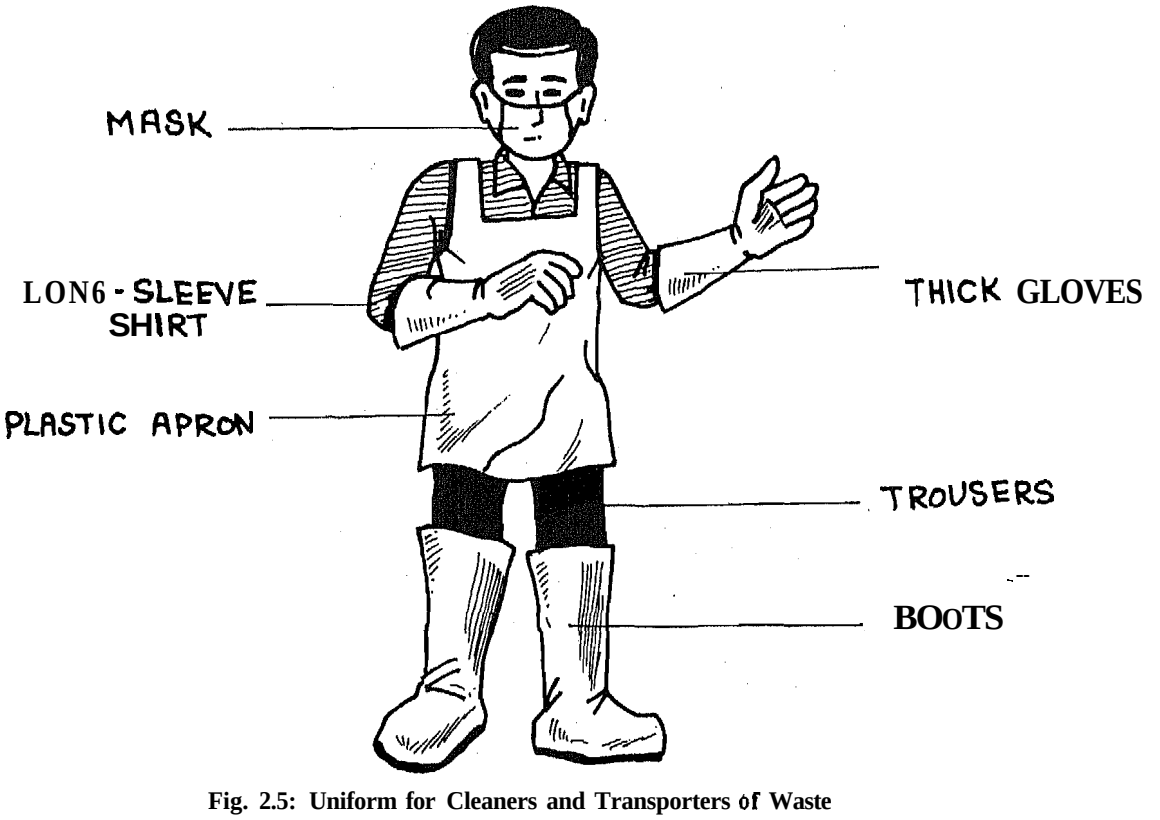


Fig. 2.5: Uniform for Cleaners and Transporters of Waste

2.5.3 Treatment and Disposal

You should know, before the final disposal of hospital waste, the treatment required for biomedical waste. The general waste (85%) does not require any treatment. This can be taken away by the local authority, rest 15% of hospital waste (biomedical) requires treatment. The objectives of treatment are:

a) to disinfect the waste so that it is no longer the source of infection

b) to reduce the volume of the waste for aesthetic reason.

c) to make recycle items usable.

You have learnt that there are 10 categories of biomedical waste. Among all, the sharp category is very important. You must have observed that needle prick is very common to staff nurse or technician while they recap the used syringe.

Similarly broken ampoule, scalpel, blades are also likely to harm the body if not properly disposed. In view of potential hazard to doctor, nurses, technician etc., it will be safe if these sharps are disinfected and destroyed at the time of generation, of waste (immediately after use). Watch how this can be possible.

a) Take the syringe and needle for injection purpose or drawing the blood.

b) Use the gloves and face mask before procedure is started.

c) Once work is over, do not detach the needle from syringe and do not try to recap the needle.

d) Put the needle inside needle destroyer and cut the sharpened end and thereafter put the complete structure in disinfectant.

e) If needle destroyer is not available put the needle with syringe in the container of disinfectant.

f) Leave the needle and syringe for 30-45 minutes and collect.

g) Now the complete structure is disinfected and is no longer a biological hazard.

h) The disinfectant used for disinfecting can be of any following types because most of the bacteria and virus including HIV are killed.

1) 2% Gluteraldehyde solution
2) 1% solution of hypochlorite solution
3) 95% solution of ethyl alcohol
4) 3% solution of hydrogen per oxide
5) 5% solution of formaldehyde
6) 0.5% solution of lysol
7) Bioling

The rest of the biomedical waste is treated with following ways.

1) Autoclave and Microwave Treatment

In previous unit you have learnt that how the autoclave functions. The same principle is applied here. The principle is that some category of the waste should be autoclaved first and make it disinfected then send for final disposal. Waste category 1, 2, 3, 4, 6, 7 should be treated by this method.

Microwaving and hydroclaving are advance methods of sterilization of the waste.

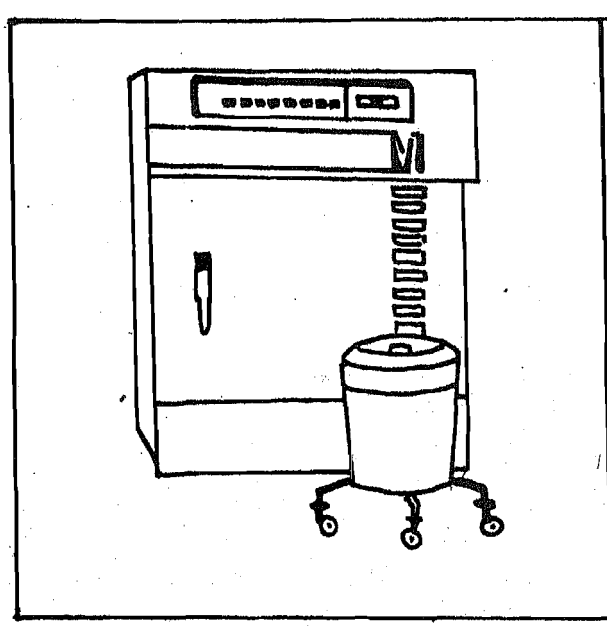


Fig. 2,6 (a): Microwave

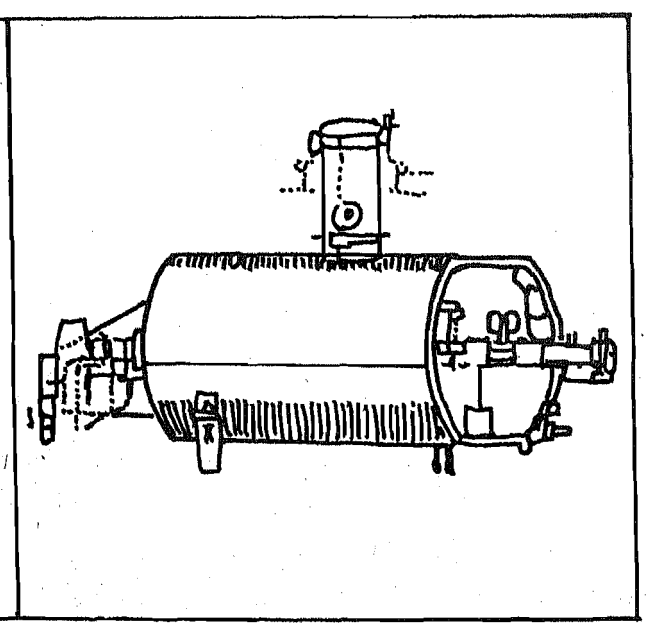


Fig. 2.6 (b): Hydroclave

2) Deep Burial

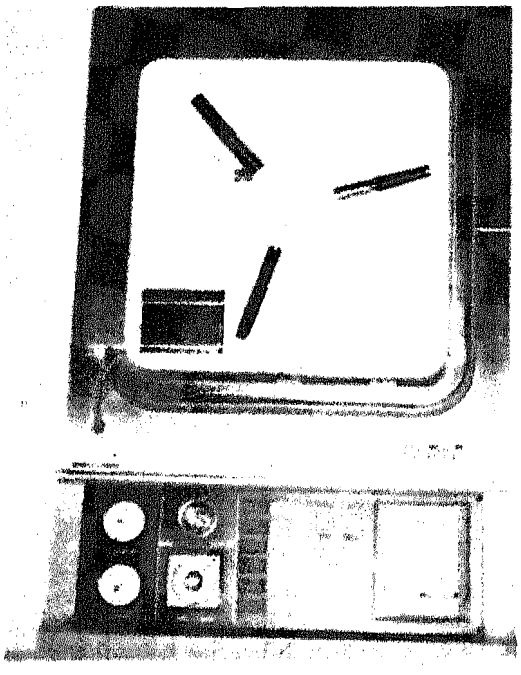
Certain waste like category 1, 2 after autoclaving should be disposed by deep burial to avoid the access of man and animal. Similarly waste sharp,should be disposed. This process can be applied in the cities where population is less than 5 lakh.

3) Land Filling

Waste like category 3, 4, 6, 7 after autoclaving can be used for land filling of low lying area. General waste can also be used for this purpose. Secured land filling is required for incinerator ash, discarded medicine, cytotoxic substances of solid chemical waste.

4) Shredding

The plastic materials such as IV canula, IV/BT set, bottle and other types of plastic can be shredded after disinfection or autoclaving. The plastic can be sold for reuse because now it is safe (non-infected),



Pig. 2.6(c): Autoclaving Machine

5) Incineration

The waste category 1, 2, 3, 5 can be incinerated. It is very often seen that all category waste is just thrown inside the incinerator but it is not correct. Incinerators are of many kind but diesel operated (oil fired) is the best one. They generate the desired temperature for combustion and also are cost effective

The incinerator should meet the standards for combustion efficiency, emission and ash as laid down by pollution control board. The desired temperature of primary and secondary chamber are 800°C (± 50°C) and 1050°C (± 50°C) respectively.

The incinerator is very harmful if it does not meet the criterias. Gases like furan, dioxin, hydrogen chloride are emitted and are very harmful to the human population. They are carcinogenic and effect the lungs. The environmental pollution is very common.

Demonstration

- Identify the waste to be incinerated i.e. category 1, 2, 3, 5, 6
- Put all together in cart, wheel barrow, trolley and bring to the incinerator.
- Put all waste inside the incinerator depending upon capacity and close the door.
- Start the burners of primary chamber.

  Measure and monitor the temperature of primary and secondary chamber.
- Watch the smoke coming out of stake, if it is thick black, it shows that the combustion is incomplete.
- After desired hours take out the incinerator ash.

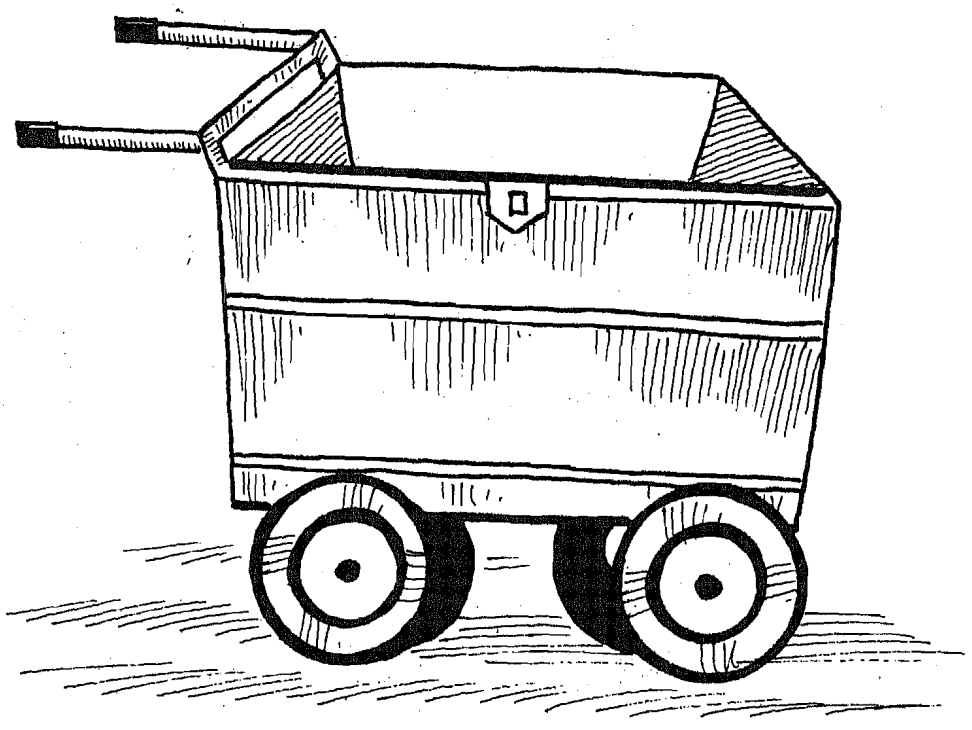


Fig. 2.8: Troiley for Transporting Hospital Waste

- Periodical inspection of the incinerator should be done for the following:
  a) Incineration ash
  b) Gases coming out from stake
  c) Material to be incinerated.
- The ash is to be land filled properly. Now you can understand that the incineration is quite different from the burning. Incineration process kills all bacteria and reduces the volume to negligible quantity (ash).

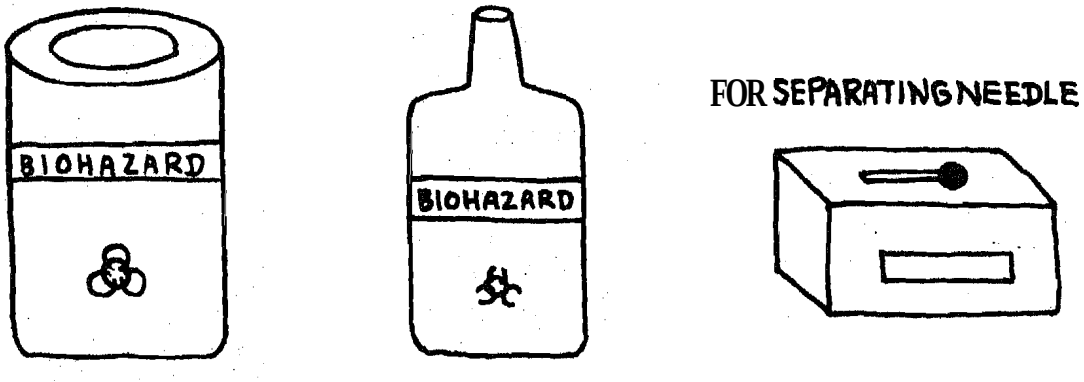


Fig. 2.9: Containers for Needles, Surgical Blades

2.6 EDUCATION, TWINING AND SAFETY MEASURES

Each and every hospital must have well planned awareness and training programme for all category of personnel including administrator. Practice of universal precautions should be followed by all categories of hospital employee coming in contact of hospital waste, They should also be immunized for disease like Hepatitis B.

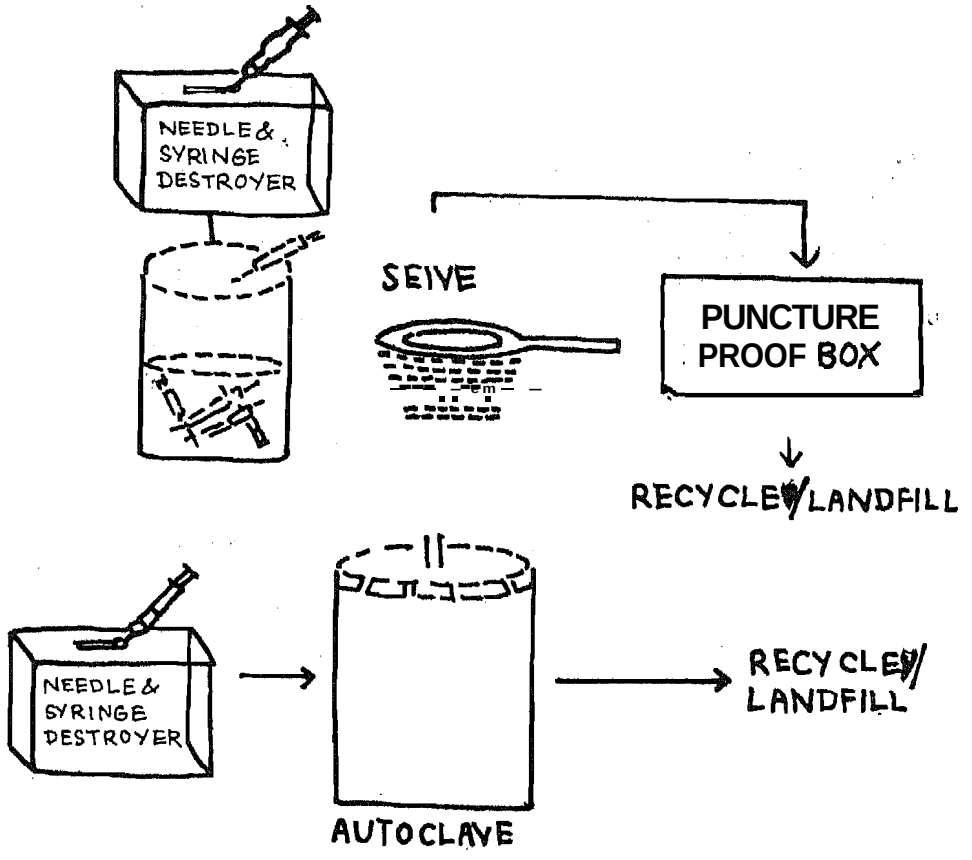


Fig. 2.10: Needle and Syringe

Demonstration – Universal precaution and waste

- Wash the hand with soap and running water before and after examining the patient and generating the waste.

Fig. 2.11: Hand Washing

- Put on gloves on hand, face mask before you go for dressing the patient, examining the infected patient.

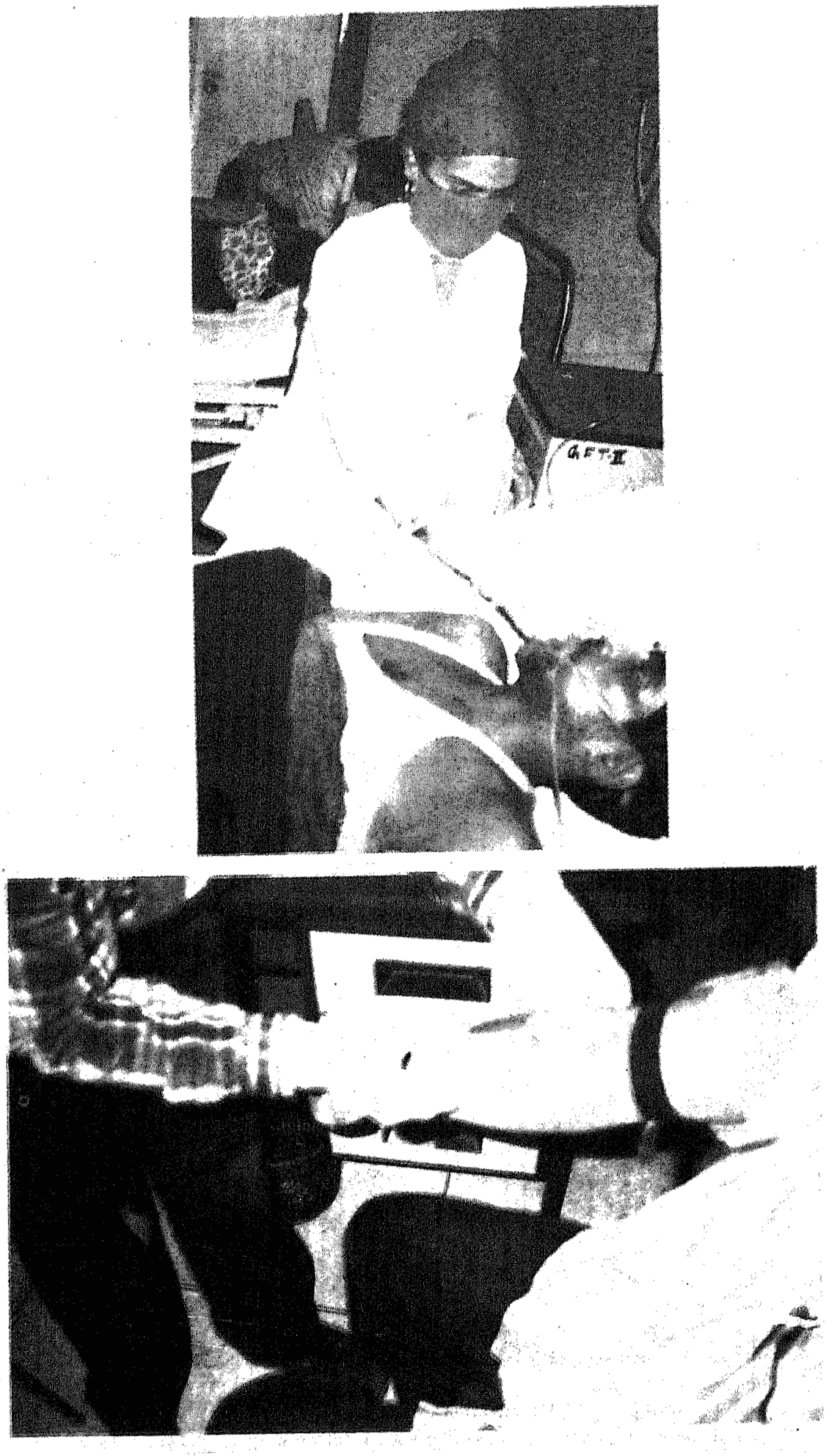


Fig. 2.12: Measures for Universal Precautions

- Throw the blood/pus soaked cotton, gauze in separate container identified for it i.e. yellow plastic bag.
- After examination generate the waste, throw the gloves in identified container (blue/white plastic bag).
- Use the sterile consumables on patients.
- Discard the needle immediately after use by needle destroyer and then put the needle and syringe inside disinfectant for one hour.
- Segregated waste at source should be collected in covered container for further disposal.
- Wash the hands after process.

2.7 · LET US SUM UP

In this unit of practical manual you have learnt that only 15% of waste is biohazardous. The average production of hospital waste is approximately 1.5-2.0 kg/bed/day. The waste should be segregated at source of generation to avoid complete waste hazardous. Therefore, segregation is essence for hospital waste management.

You have also learnt that Government of India, Ministry of Forest and Environment has passed the rules for safe hospital waste disposal known as Hospital Waste (Management and Handling) Rules, 1998 and as these rules, the waste has been classified into ten categories.

You have also learnt that waste collection is to be done in prescribed coloured bags and containers. Hazardous and non-hazardous waste to be collected and transported separately.

You have learnt the need to treat the biomedical waste to be treated before final disposal. Distinfecting the sharps at point of generation and autoclaving, incineration are the effective methods of treatment. Incinerator causes environmental pollution if it does not meet the standards laid down by Ministry of Forest and environment.

Practices of universal precautions to be adopted while dealing with biomedical waste have also been discussed and the need for educating/training all the categories of employees in the hospital for safe disposal of waste has also been emphasised.

UNIT 3 GUIDELINES FOR DISASTER MANAGEMENT MANUAL

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- enlist the various stages of the disaster;
- enumerate the points which a Hospital/Health Manager should keep in mind while developing a disaster manual;.
- outline the layout of a disaster manual; and
- analyse the disaster manual of a hospital.

3.1 INTRODUCTION

In Unit 2 of Block 3 on disaster management of this course, you have learnt about the definition of disaster, types of disaster and underlying principles for management of various medical and health problems during a disaster. In this unit, you will learn how to apply the concept and principles of disaster management into practice. This unit contains the various stages of disaster, the need for preparing a disaster management manual and its essentials components.

It is expected that after going through this unit, you should be able to apply the concepts and principles of disaster management learnt in theory.

3.2 STAGES OF DISASTER

You will agree to that a good state of preparedness before the striking of a disaster can reduce its impact and the greatest number of lives can also be saved during the first few hours after the disaster has occurred. If the lives have to be saved, local health authorities need to prepare an efficient disaster preparedness plan well in advance laying special emphasis on commonly occumng disasters. Before you go for learning the steps of developing a disaster manual you need to understand the following stages of the disaster:

1) Warning Stage

The first stage is the period of time when meteorological, seismological and other forecast related departments could predict the occurrence of a disaster before it strikes. It can be a few hours to forty-eight hours before in case of a cyclone and a week before in case of floods.

2) Stage of Impact

The second stage is the time period during which the disaster actually strikes, It may be just a few minutes in case of earthquakes, hours in cyclones and days in floods.

3) Stage of Rescue Operations

The third stage is the time when the actual rescue of the victims and their evacuation is being done. This requires active interventions and need to be completed at the earliest in the most efficient possible manner. It should not take more than two to three days even for a worst of the disasters. It requires good disaster preparedness.

4) Stage of Health and Medical Relief

You will agree to that from the health and medical point of view, this is the most crucial stage of the disaster management. The mortality, morbidity and the loss of property are inevitable when the disaster strikes. It shall however be a further disaster if survivors of the disaster succumb and suffer due to relief work being not up to the mark. It requires a lot of foresight, planning, coordination and management. An efficient relief phase is in fact the hallmark of a competent Hospital/Health Manager.

5) Rehabilitation Stage

The last.stage is that of rehabilitation. The displaced persons are then to be rehabilitated in their original settings. This depends on the resources of the stage and its commitment. Healthy rehabilitation is possible only if there is good political support. A poor rehabilitation phase results in an exodus as large number of refugees and the people migrating to nearby urban areas resulting in slums, unemployment and deprivation.

3.3 DISASTER MANUAL

The disaster manual is an important written document of disaster plan, which is to be activated during disasters. As stated earlier, for disaster relief, the health/hospital authorities need to develop a plan in the form of a disaster manual, While preparing disaster manual following points should be kept in mind:

- The plan should be 'simple' to be understood by everyone, so that it can be put into action immediately,
- The plan should be 'flexible' to fit in different types of disasters.
- It should be 'clear and concise', so that even in panic and confusion, staff should be able to act upon it instantaneously.
- It should be adaptable for all hours i.e., day and night including holidays, when most of the staff is not available.
- It should be an 'extension of normal hospital and public health working', so that people can act on it immediately in a routine manner.
- It should be rehearsed before implementation and updated according to experience gained.
- The concept of triage, basic life support and advance life support should be understood well and followed to determine priority in order to manage emergency and mass casualties. The terms triage and basic life support in this context have already been explained in the theory unit on disaster management.

Since this disaster manual is an important written document of disaster plan, it should include as many types of disasters as possible after thorough planning and deliberations. It should be clear and concise and vital information should be presented first. The suggested layout of the disaster manual is described below. However, each hospital/health institution has to modify it as per its requirements.

The disaster manual can be divided into following sections:

Introduction

- Distribution of responsibilities
- Chronological action plan
- Checklist of personnel and items
- Rehearsal and conclusion

3.3.1 Introduction

The first section of a disaster manual is the introduction, which enumerates all aspects of disaster management. The introduction should include:

- Disaster alert code
- General principles of conduct
- Brief synopsis of total plan

The disaster alert code word is given for activation of disaster plan. The message carrying this word when received by staff, they should immediately report for duty. This saves valuable time where every second counts.

3.3.2 Distribution of Responsibilities

The second section of disaster manual contains the duties and responsibilities of different individuals involved in disaster relief work. This should include in detail the responsibilities of individuals and concerned departments. The action cards describing in detail the responsibility and action to be taken by each member and key hospital staff involved in disaster management such as Medical Superintendent, Medical Officer in charge of casualty department, matron, nursing officer, public health supervisors and workers, telephone operators, clerks, messengers and stretcher pullers etc. These cards are issued to these people as soon as they are assigned the disaster duty. These action cards would serve a more useful purpose if hospital/health authorities get timely warning about likely disaster and type of casualties anticipated.

3.3.3 Chronological Action Plan

The action plan should be listed in chronological order and should include:

- The Medical Superintendent/Chief Medical Officer may get alerted by casualty itself, if accident is too near the hospital or by getting information on telephone or through a person. The person receiving information should gather details regarding casualties, regarding place, time of accident, the estimated number and type of casualties and source of communication. The reaction time for hospital will depend upon place and time of accident, while type of casualty will determine the type of preparation required by the hospital.
- The designated hospital staff should be responsible to activate the hospital disaster plan. The casualty medical officer, hospital controller and hospital administrator and senior specialist can be designated. The switchboard operator, duty clerk or casualty department in-charge should notify key personnel, activate emergency departments like Radiology Department, OT, Blood Bank, Laboratory Services, Medical Stores and supportive services like dietary services, security staff and ambulances. The complete detail of resources mobilisation should be given. The maximum number of staff should be available within 10 minutes of disaster notification. The matron or senior nursing officer on duty, should prepare pre-arranged ward(s) for receiving the casualties.
- In any disaster, it is likely to get large number of injured persons at short interval for treatment. In order to accommodate them there must be a plan for immediate expansion of beds and following action may be helpful if taken in advance:
  - Expansion of existing hospital beds by utilising all available space such as comdors and conference hall etc.
  - Discharging minor cases
  - Transfer cases to other hospitals

- The possibility of occupying buildings in close proximity of the hospitals such as schools and colleges etc. may be considered.

- The command nucleus should be fonnulated immediately and it should be near the casualty department. This nucleus includes hospital superintendent, matron or senior nursing officer and hospital casualty officer.

3.3.4 Checklist of Manpower Equipments and Drugs

The next section of the manual should contain the checklist of manpower involved in relief work, as well as checklist of equipment and drugs required for the reliefwork.

For managing the disaster effectively an elaborate checklist of various categories of medical and health personnel should be included in the disaster manual. Similarly the disaster manual should contain a detailed list of equipment/instruments and medicines.

The hospital should have adequate buffer stock of essential medicines like I.V. fluids, dressing materials, splints, oxygen cylinder and suction apparatus etc. District Chief Medical Officer and Hospital Superintendent should prepare an exhaustive list of medicines and hospital equipment. The quantity of these medicines and location should also be decided and known to all medical officers.

3.3.5 Rehearsal and Conclusion

The last section of manual should contain testing mechanisms/procedures for the plan. It should have provision for conducting periodical rehearsals or mock exercises to ensure the effective implementation of the plan.

The periodicity and type of rehearsal should be explained to all concerned. The rehearsal could be of many types like pre-announced, mini-drill without moving patients or simulating disaster. The rehearsal will test the plan and will bring lacunae, which will help to improve the plan accordingly.

The conclusion section should contain specific instructions or vital information, which can be useful in effective implementation of the plan. It may also contain the inventory of available health institutions/hospitals in the catchment area; resources available at these institutions and the mechanisms for coordination with these institutions.

You will agree to that there can be no tailor made disaster plan for all the hospitals. Each hospital has to evolve its own plan, based on the above considerations and it has to be revised from time to time, as each experience brings new perspectives.

3.4 ACTIVITY

After going through this unit, you visit a hospital and obtain a copy of the disaster pladmanual, compare the hospital disaster plan/manual with the checklist given below and record your observations/findings/comments and discuss the same with your academic counsellor.

Checklist of Disaster Management Plan

General Considerations

Have appropriate portions of the hospital disaster plan been officially incorporated in the disaster plan?

- Does the plan take into account all the possible disaster situations'of the community in which the hospital is located?

Is there an awareness in hospital personnel of the specific phases of the area-wide plan disaster operation applicable to the community in which the hospital is located?

Does the plan meet the requirements imposed by geographical location?

- Does the plan include provision for handling of increased patient loads through a variety of routines designed to meet different situations?

Organisation **for** Disaster

Are all key personnel included in the plan?

Is the plan for each department individually published, in the hands of each responsible department head, and known to all personnel of each specific department?

Is the assignment of key responsibilities fixed within each department?

- Is the organisation for evening, night, weekend, and holiday routines established so that the disaster plan may be activated as promptly as during day shifts?
- Is a designated area established for command nucleus?

Initial Alert

- Does the plan provide for prompt activation of the hospital on the occurrent of a disaster?
- Is the administrator or his representative on duty or available immediately by telephone at all times?
- Is there an organised procedure for reporting internal failures?
- Is there a procedure for alerting the hospital switchboard?

Activation of Plan

- Does the plan authorise and direct a designated individual or his alternate to make the necessary judgment promptly?
- Is authority to activate any phase of the disaster programme assigned to an individual who is backed up by several responsible officers?

Receipt and Control of Casualties

- Is the receiving and sorting area accessible and in close proximity to the areas of the hospital in which definitive care will be given?
- Is the sorting staff organised and directed by an experienced physician?
- Are sufficient equipment, supplies, and apparatus available in an organised manner to permit prompt and efficient patient movement?
- Is there a traffic control chart showing patient movement to and from special treatment areas, i.e. operating room, delivery room, urology, radiology and from these to bed areas or to the discharge areas?
- Will all entrances and exits be controlled?
- Is there an organised discharge routine sufficiently streamlined to handle large numbers of patients upon short notices?
- Have provisions been made for evacuation of the patients by utilising all available transport?
- Is there a predetermined schedule signifying which wards, room arrangements, classrooms, etc., will be used for housing emergency casualties?
- Are reserve supplies of linen, bedding and emergency clothing included in the plan?

Expansion of Patient Areas

- Are there emergency stores of equipment and supplies located adjacent to each ancillary department?
- Is there a plan by which personnel will be assigned to activate expanded ancillary units?

Internal **Communication** Systems

- Is there an organised communication system to substitute for telephone or other electrical systems in the event of a complete power failure?
- Will key communication personnel be provided with schematic area layout maps showing key areas for disaster operations?
- Does the plan provide the expansion of the hospital by using nearby building such as churches, schools, halls etc. for use as auxiliary hospitals or wards?
- Does the plan call for coordinating the hospital activities with the Police, Fire Brigade, Engineering department, Telephone and Transport departments.
- Does the plan provide for coordination with other hospitals and health facilities in the event of a disaster?

Evaluation **of** Existing Disaster Plan

- Is the plan reviewed by a permanently assigned planning committee at least annually?
- Are test exercises or drills conducted periodically?
- Are critiques held after each test exercise?

3.5 LET *US SUM UP*

In this unit you have learnt about the various stages of disaster viz. warning stage, stage of impact, stage of rescue operations, stage of health and medical relief, and rehabilitation stage. You have also learnt about the need for development of a disaster manual, its essential characteristics and layout, The disaster manual contains five sections i.e. introduction, distribution of responsibilities, chronological action plan, checklist of personnel and items, rehearsal and conclusion. You have also learnt that the manual should be concise and simple and should include all possible types of disaster in that particular area. You have also carried out the analysis of a disaster manual of a hospital, which will help you to develop an effective and viable disaster plan for your own set up.

UNIT 4 FIRE MANUAL GUIDELINES

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- appreciate the importance of having a manual for fire fighting;
- develop emergency fire order for all the staff of your hospital;
- ensure smooth fire fighting drill for all the employees of your hospital; and
- help the authorities to minimize the loss of life and property in case of fire in a hospital.

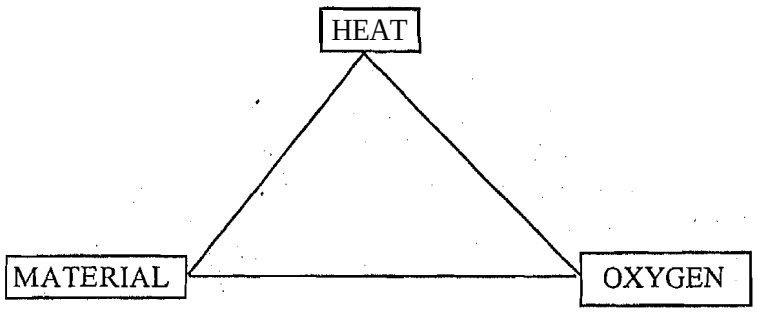
4.1 INTRODUCTION

Fires pose a continual threat to hospitals and nursing homes. Year after year fire claims their victims and cause property damage, fire keeps breaking out despite whatever precaution taken. The ,statistics of Swiss Hospitals have recorded following sources of origin of fire: 47 per cent in patient wards, 21 percent in kitchen, laundry and store-room, and the balance in many small unobstructive places where it is apparently impossible to stamp out fire. Thus, fire has a very special place among all the potential hazards, this becomes all the more special when it involves sick and dependent human beings as in hospital scenario. The safety of lives of patients of a hospital should be the primary concern, interest and responsibility of hospital authorities and personnel i.e. doctors, nurses, para-medical and technical staff and non-medical staff. Personnel of all categories working at the hospital and other buildings (non patient areas) should have a basic elementary knowledge about fire safety, fire fighting and rescue operation.

To implement fire fighting procedure efficiently and effectively, all the staff working in the respective departments should be aware of the hazards of fire and their responsibilities, if eventuality so very arises. The procedure laid down should be disseminated to all the staff and should also be practice periodically.

4.2 TUBES OF GRADES OF FIRE

The name fire is given to a process whereby any substance combined chemically with oxygen in the air produces heat and light. Fire is thus a combination of three things i.e., (i) Heat, (ii) Material, and (iii) Oxygen. If any one out of these three things is eliminated from the fire, the fire is automatically extinguished. Fire is, /therefore, fought or extinguished always on these principles.



Grades **of** Fires

Fire has been classified as A-grade, B-grade and C-grade fire.

A-Grade Fire

A-gradc fire is caused by all ordinary combustible material like wood, coal, paper, etc. This type of fire is extinguished by using fire extinguishers like soda acid, CO_2, dry chemical powder, water, etc.

B-Grade Fire

B-grade fires are caused by **inflammable** liquids specially those which are lighter than water. For this purpose fire extinguishers like Halons and dry chemical powder should be used.

C-Grade Fire

C-grade fires are caused by electrical faults, either in fittings or in distribution points. The causes of such fires are generally because of the over and excessive loading on the aluminium wiring. Most of the fires at the hospital have occurred because of the electrical faults or due to unauthorized excessive loading of the electrical circuits.

4.3 ELEMENTS OF FIRE SAFETY

The basic approach of any institution should be to have well laid down fire-manual and practiced fire policy. The fire safety programme consists of following elements in chronological orders:

a) Prevention

Prevention encompasses those activities of fire safety programme which occur before actual fire. This will include:

i) Detection and correction of the hazards

ii) Fire control pre-planning

iii) Employee and occupant education

iv) Design and specifications considerations

v) Periodic equipment testing

vi) Well rehearsed drills and liaison with fire department.

These measures are essential to prevent and also organize the system to take appropriate action in case of any contingencies. It is difficult to attain all these prevention absolutely, therefore, pragmatic approach should replace idealism, the organisation may compromise and should chalk out and reheare what is reasonable within economic and operating limitations.

Though all components of fire safety are so closely integrated that it's difficult to separate them, all fire elements mentioned above play a prevention role at some stage or other. It is also important that a regular periodic inspection of fire fighting appliances, any obstruction to fire-escape route, careless use of oxygen cylinders, flammable liquids and any other fire programme violation.

b) **Detection**

The application of **automatic early warning fire detection system** has helped a great deal in early detection of fire. The fire detectors require a sensing unit which measures the presence and/or changes in the products of fire, which are basically flame, heat, smoke, and gases. The functioning of detectors are based on these senses, and they are activated when the standards are exceeded, and once detector senses an abnormal condition, it must transmit a signal to an annunciator. This signal can activate any predetermined message or alarm on which an appropriate action can be taken by the ear-marked staff. Fire detection system in most of the hospital services, are combination of sensors due to the varied application presented by the medical care environment. Automatic fire detection has following components:

i) Sensors

ii) Response detectors

iii) Manual call buttons

iv) Wiring system

v) Electronic hooters

vi) Local control panel

vii) Main control panel

The various types of fire sensors are enumerated as:

i) Fixed temperature sensors activate when a pre-selected temperature is reached. These sensors are quite in-expensive and have good reliability. They also require very little maintenance.

ii) Rate of rise sensors activate when the temperature accelerates rapidly. The rate of temperature rise to be exceeded is generally in the range of 15^0 F to 20^0 F per minute.

iii) Combination of fixed temperature and rate of rise of temperature: While the temperature rising devices are reliable and maintenance free but they are rather slow to respond to slow burning and smouldering fire.

iv) Photocell detection units sense the mashing of light beam by smoke particles or the reflection of smoke particle into the cell. They are reliable but require considerable maintenance compared to heat sensor. They are also slow to respond to hot clean fire.

v) Flame sensors are not widely used but do provide fast response to the quick developing fire. They are fairly expensive and require a fair amount of maintenance activity.

vi) Products of combustion sensors are quick to respond and to detect either visible or invisible gases. They provide a means for early warning and are used quite extensively despite a relatively high degree of false alarms.

c) **Containment**

The third element of the fire safety programme is that of containing smoke and fire. The objective is to contain the fire in the area of origin, when this is not possible the concept is one of providing successive level of defence or areas of refuge from fire. There are fire of these basic areas defined in the "line safety code", they are also referred to as the unit concept, which are - room, a compartment, a floor, a building and exits, all these units have distinct function in the fire protection system.

i) **Unit one:** The room is the smallest unit and is the first line of defence. The function of unit one is to provide the first barrier against the passage of smoke.

ii) **Unit two:** The compartment is the second level of defence with the intent of providing two areas of refuge on any given horizontal plane of the hospital. If an area must be evacuated the initial movement will be horizontal as opposed to a vertical movement. The compartment is created by smoke and fire resistive partitions.

iii) **Unit three:** The floor, or floor assembly, is the next level of containment. The function of the floor assembly is to prevent the spread of fire and smoke from one floor to another, either above or below, the floor involved. These assemblies are penetrated by stairways, shafts and chutes, which require spread protection.

iv) **Unit four:** The building is the fourth unit or level of fire protection. It must remain structurally intact for a period of time.

v) **Unit five:** The exit is the final unit in the unit concept of fire protection, The basic requirement is that at least two remote exits be provided on each floor or fire section of the building. This means that two separate means of exit should be visible from any location in corridor.

Note: The containment of the fire can also limit the air needed to sustain combustion. A fire will generally rise to seek ventilation. If it cannot continue to rise, the smoke and heat build up will work back downward, looking for a lateral opening. If there is any air in the room that is breathable it will be found closest to the floor. When a fire is contained extreme caution must be taken when entering the area as the opening of the door may provide the exit the fire is seeking.

d) **Evacuation**

The fourth and very important component of the hospital fire safety plan is evacuation of patients, visitors and staff. The employees of hospital are responsible to see that every patient is evacuated to safety.

Evacuation can be whole or partial and it can follow vertical or horizontal flow. The total evacuation of patient from a hospital is however a last contingency. The concept of evacuation plan will be to move the patient horizontally to the safe area (compartment) on the same floor and required than only to shift vertically by two or three floors up and down. Wheel chairs and stretchers are useful and often necessary for evacuation, but they may not be available at the time and place of emergency. The blankets and sheets are most important piece of equipment on hand for evacuation purpose, the blanket/sheets can be handled by one person to drag a patient, and where two carriers are available the blanket can be used as impoverished stretcher.

A vertical evacuation plan is mandatory for a high rise building, a building with seven or more stories. The exit routes should be well maintained, the elevators need special consideration for fire evacuation.

e) **Extinguishment**

The last element of the hospital fire safety programme is extinguishment of the fire itself. The suppression of fire is achieved either manually or by automatic extinguishing system.

Know Your Fire Extinguishers

Pressurized Water

2 1/2 Gallons

Range: 3035 feet

To be used on Class A Fires (Wood, Paper, Trash, Bedding, etc.)

.....

Carbon Dioxide (CO_2)

5-15 lbs.

Range: 4-6 feet.

To be used on Class B Fires (Flammable Liquids) and on Class C Fires (Electrical)

.....

Dry Chemical (ABC)

5-10 lbs.

Range: 12-20 Feet

Can be used on Class A, B or C Fires

.....

Halon (ABC)

5-10 lbs.

Range 10-15 feet

Can be used on Class A, B or C Fires

.....

For proper and effective use of Fire Extinguisher you can remember the word

PASS

P Pull the pin

A Aim low (at the base of the fire)

S Squeeze the handle

S Sweep from side to side

Remember to keep an exit path between you and fire if you choose to use an extinguisher,

The stand pipe and hose located in the hospital building are used to provide quick and convenient water streams on upper/lower stories of high rise buildings. This system of water hose is basically installed to be used by fire department or trained Fire Brigade personnel.

The automatic extinguishing system comprises automatic water sprinkle system, which also acts as an alarfn device. The operation of the sprinkler is generally activated by a holding link, which melts at a given temperature. The sprinkler systems utilized in hospital are almost always of wet system type as opposed to a dry system. Other piped extinguishing methods are steam, water spray, foam, carbon dioxide, dry chemicals and halon agents.

Employees Reaction: Proper employee reaction to the fire situation is one of the fundamental factors in saving lives and property. The safety is a race against time, and the action taken and lack of action in few minutes can make the difference between a minor fire threat and a tragic disaster. Since the employees must react instinctively when fire breaks out, detailed instructions are seldom remembered and hence acronyms expressing essential steps are suggested.

A) **S** Save patients or person if in immediate danger.
A Alarm –.Sound the alarm.
V Vent – Close doors and windows to keep fire contained.
E Evacuate – use evacuation routes and first-aid
E Extinguish – fire extinguishers equipment.

B) **R** Rescue those **in** danger,
A Activate the nearest alarm, dial security, give location.
C Close doors, contain the smoke and fire. ,
E Evacuate and zxtinguish.

It is essential that to execute these steps properly, all staff members irrespective of their jobs and status must receive continuous in-service training. Unless the personnel have been through the actual experience, a very few persons are able to imagine the swiftness with which the fire danger can spread and the panic that can ensue. Hence, larger the staff members have received the training, the better the chances that they will react correctly under extreme stress.

4.4 FIRE SAFETY TRAINING

Planning for a fire emergency requires cooperation and understanding from every employee in the hospital. Each employee is potentially the one who may discover a fire or be the first to arrive at the scene of an alarm. The degree of personnel turnover and their effective involvement in carrying out fire preventive measures largely depends upon their continuous in-service and new employees training.

Robert Palmer of North Memorial Hospital in Minneapolis, a national recognized authority on Hospital fire safety, has emphasized the importance of following functions:

a) Rescuing those in immediate danger
b) Properly reporting the fire
c) Confining the fire
d) Securing the fire
e) Using the proper extinguisher
f) Controlling employees, visitors and patients, and
g) Meeting and guiding fire department personnel to the scene.

The Hospital Administration should earmark a staff member responsible for imparting regular in-service and to new employees fire safety training. The methods for training may include:

a) Training session, where employees are actually handling fire extinguishers and patients requiring evacuation.
b) Posters of fire prevention and safety.
c) Organising fire drills.
d) Assessing the knowledge of employees by random stopping and questioning them about their role in case of hospital fire, the person who answers the question correctly should be suitably rewarded.
e) Audio-visual aids are very effective means of imparting training as it leaves a clear image in mind, which is easy to recollect.

4.5 GENERAL INSTRUCTIONS

1) All the fire escape routes (staircases and corridors) which have been encroached upon or blocked, must be got cleared for providing emergency exit.

   (Sister in charge of the wards to ensure that fire escape staircases and corridors are not encroached upon. Fire safety officer to carry out periodic checks of all the fire escape routes and staircases).

2) All the gas pipelines, particularly the oxygen lines and their regulators, must be thoroughly checked periodically and a proper record of its checking be maintained by manifold room in charge. Any problem of leakage of gas should be immediately intimated to manifold room as well as to the Medical Superintendent Officer/Duty Fire Officer and-action to be taken to avoid fire hazard.

3) All heating appliances must be used with a plug and socket of proper ampere and use of excessive load from a particular point. Sister in charge ward to

ensure that over loading of electrical points is avoided. All electric appliances should conform to BIS specifications.

4) Monitoring system in every department and section should be introduced to ensure that person leaving last, satisfies himself that all the unwanted heating appliances are switched off.

5) Proper type of fire extinguishers and other fire fighting equipment should be readily available for use in the event of fire. Special safety and fire preventive measures should be ensured where very costly and sensitive electronic equipment has been installed. Fire safety officer to ensure provisions of fire extinguishers and other fire fighting equipment in all wards/ departments and sections. Sister in charge ward to ensure that fire extinguishers and fire fighting equipment issued to the ward is kept in readiness for use in case of fire.

6) "No Smoking" instructions and other safety precautions must be enforced in all Stores, Lecture Theatres and Auditorium, Manifold Room, X-Ray Department and Laundry etc.

7) Good housekeeping: Attention to matters commonly referred to as "good housekeeping" can reduce the likelihood of fire incidences. The basic practices, therefore, to be observed is to avoid the accumulation of rubbish particularly in "out of sight" spaces e.g. lift shafts, behind radiators, basements, dead-end of corridors and keep cleaning rags and materials in a non-combustible container after use.

8) Sister and officer in charges of respective areas should ensure that wall fire hydrants are functional in each area. They are one CO, cylinder and one Soda Acid/Water, CO, Fire extinguishers and one water drum with 9 buckets full of water is available at all times.

9) Fire safety officer to detail one person by name for checking that fire equipment held in the departments are available physically accordingly to the list available in the fire control room and they are serviceable. Establishing a fire control room with all communication facilities.

10) Electrical checking for overloading and state of wire specially in sensitive areas, should be carried out periodically.

11) Fire resistant materials must be used on renovation and construction work.

12) Whenever inflammable fluid is there it must be labeled.

13) Each area must have'a plan as per, type of fire.

14) Fire escapes:

a) All fire escape routes and emergency exit doors should be clearly marked with illuminated paints and electrical sign posts with clear directions in Hindi and English.

b) Keys of all emergency exit doors snould be kept in the box near the door. Sister in charge ward must frequently check the key box so that in the event of emergency, the emergency doors' are quickly opened. Staff of each ward and department should be made conversant about these matters.

c) The locks of the emergency doors should be such that they can be opened by one master key, which will be kept in central fire control room. The key should be kept in the box near the door and one key be with sister on duty.

4.6 DO'S AND DON'TS FOR ELECTRICAL FIRE PREVENTION

1) Lights and fans should be switched off when not required or rooms are to be locked.

2) Flexible leads to portable appliances should be well-protected to avoid damage to the insulation of wires.

3) Defective heaters and appliances should be removed immediately from service until these are repaired and tested for satisfactory performance.

4) The capacities of connecting leads; wires and switches must match the load requirements of equipment.

5) All heaters, table and pedestal fans etc. should be fitted with proper guards.

6) Proper and secure earth connections to the heating appliance and other electrical equipment must be ensured.

7) In case any excessive heating, burning smell or sparking in wiring or connections is noticed, control switch should be put off immediately.

8) Do not connect portable electrical appliances to the electrical outlet points through bare and loose ends, proper plug tops be used always.

9) Do not use more than one portable electrical appliance to a single outlet point at the same time.

10) Do not use heaters and high rated equipment on light (5 ampere) socket outlets.

11) No multipurpose plug tops should be used for connecting more than one appliance on a socket outlet point.

12) Extension Boards should be normally used, if unavoidable, the extension boards should not have more than a set of 15 ampere 2 Nos. of socket outlets.

13) Do not add or connect any new electrical equipment unless proper wiring and outlet point of matching capacities are provided,

14) Heaters and hot plates must not be left unattended while these are on.

15) Passages and approaches to main switches, distribution boards and riser-rooms should not be blocked or locked.

16) Do not pile or stock office-records and other stores near socket outlet points or in riser rooms.

17) Do not block or close the heat dissipation system and arrangements of electrical machines and equipment.

18) Do not use stabilizers or emergency light topes, as racks.

19) Use of heaters must be avoided in entire basement storing spaces particularly stationery, linen and medical stores.

20) Do not keep heaters and heat producing appliances too close to the overhanging curtains, combustible and other flammable items and chemicals.

21) All the electricians to pay extra attention for using proper insulation after repairs.

4.7 ACTION TO BE TAKEN IN CASE OF FIRE IN A HOSPITAL

1) Action by employee or worker on the spot

i) To verify the extent of fire outbreak.

ii) To intimate at once to immediate superior present on duty in that area.

iii) Worker in the area will take immediate action to put off the fire.

iv) Sister in charge/Doctors on duty/Sr. worker on duty to inform M.S., Security Officer-cum-Fire Officer and fire guard located in the Building.

2) Action to be taken by sister in charge present on the floor, who acts as a Controlling Authority

A) *If Small Fire*

1) Organise few personnel available to extinguish the fire using fire extinguisher or by improvisation.

2) Get all inflammable material removed e.g., spirit, oxygen cylinders, cotton, bandage, rags and mattresses etc. from the site of fire.

3) Put off main switch if there is an electric short circuit.

4) Organise shifting of patients, specially, lying cases, with help of available staff and attendants of patients to places of safety.

5) Get the fire escape route opened.

6) Close the oxygen supply from manifold room and change over to portable oxygen cylinder supply.

7) Ambulant patients to be guided to go to other floors by using staircases.

8) Ask Medical Superintendent Officer/Fire Officer for trained manpower.

9) Do not attempt to evacuate the patients (except from immediate danger) unless ordered to do so by Medical Superintendent, Fire Department.

10) While evacuating organise the shifting of non-ambulatory cases first horizontally and then by lifts/ramps/staircase, patient charts should accompany the patients unless it is impractical given the emergency.

B) *In Case of Big Fire*

1) Raise fire alarm

2) Fire escape routes to be opened by the key kept in the box, fixed near fire escape route. If key is not available the lock can be broken and open.

3) Walking patients will go out horizontally to rescue area and then by using the staircase.

4) Lying cases will be shifted away from the site of fire to rescue area, then their rescue will be organised by staff immediately available with guidance from Doctors/Sisters/Senior workers present on the spot, and with the extra manpower which will be sent by M.S./Fire Officer

5) Doctors/Senior Sisters/Seniormost workers present on the spot will assist sister in charge on duty in operations till Fire Officer or any other officer deputed by M.S./Fire Officer.

4.8 PROCEDURE AFTER FIRE ALARM

Security: Security will meet and direct the City Fire Department to the fire location. They will also maintain communications at the fire and direct those not involved in the emergency to evacuate the area. They are authorised to stop others from entering the building in jeopardy. They will call the fire department and give street address and floor number where the incident is occurring. They will also communicate with Maintenance and Plant Operations to assure that everyone is aware of the alarm.

Telephone operators: Immediately upon being notified of a fire or visible smoke, telephone operators will immediately initiate rehearsed fire drill.

Operating rooms: If surgery is in progress, all decisions affecting the patient's welfare will be made by the surgeon in charge. Operating room personnel must be familiar with the locations of medical gas shut-offs.

Maintenance control room: Upon receipt of an alarm, Control Room personnel will despatch via mobile radio all maintenance employees assigned to the Emergency Response Team to the fire location. They will also notify security to assure that everyone has received the alarm.

Emergency response team: Employees from the Maintenance, Security and Environmental Health and Safety Departments staff are the Emergency Response Team. They shall immediately upon notification of a fire alarm proceed to the area of alarm. They should pick up fire extinguishers as they approach the area in jeopardy,

Elevators: During the period of alarm, elevators will be returned to the ground floor level and remain inoperative. Security will take the Emergency Response Team and Fire Department to the floor below the fire, via elevator if necessary.

The emergency Response Team is directed by Hospital Medical Superintendent1 Fire Officer, Director of Maintenance and Plant Operations or the senior team member present.

4.9 WHAT TO DO IN CASE OF FIRE IN NON-PATIENT BUILDINGS

1) Pull the nearest fire alarm box. Dial designated telephone, give the location of the fire.

2) Be familiar with fire exits, fire alarm boxes and fire extinguishers in the building where you work or live.

3) When the fire alarm sounds, evacuate your area and go to the nearest fire exit stairway; close doors behind you.

   In building with a PA (Public Address) system, there will be an announcement of "Fire Alarm, All Clear" following the silencing of the bells. In buildings without a PA, the silencing of the bells will serve as "All Clear".

4) If you have been trained in the use of portable fire extinguishers and you decide to fight the fire, always position yourself between the fire and a path of escape. Never try to extinguish a fire until everyone has been evacuated from danger

a) While giving information to aforesaid authorities speak clearly without creating "PANIC" to the patients, staff and to the informer.

b) Specify the exact location of the fire indicating its severity.

c) While intimating the Local Fire Brigade tell them the route they should adopt for an early and easy excess to fire location.

Use of Fire Extinguishers

See Section 4.2 (e) of Unit 4 of this block.

For Fires Other than Electrical or Oil Fires

Water, CO, fire extinguishers, water in 'D' shape water drums containing 9 buckets, should be used. In case fire is on bigger magnitude, then water hoses connected to wall fire hydrant should be used till arrival of the Delhi Fire Brigade.

4.10 EVACUATION PLAN IN THE EVENT OF FIRE

There are two approaches, which can be implemented for evacuation.

Evacuation Types

Partial: The severity of the incident dictates the degree of evacuation. Always begin with persons in the most immediate area of danger.

Keep the doors of patient rooms closed until they can **be** moved to safety.

Total: If fire or smoke conditions warrant, a total floor evacuation will be called for. The decision to totally evacuate will be determined by the Medical Superintendent/Chief Executive Officer, the Director of Environmental Health and Safety.

General principles of evacuation in Multistorey Building:

1) Horizontal evacuation is easier than vertical 'evacuation.

2) Evacuate lying cases horizontally first and than evacuate vertically down.

3) Evacuate patient to three floors down depending on the site of fire as the floor immediately above and below has potential risk of fire if it is not brought under control.

4) Evacuate able bodied and ambulant patients preferably by stairs.

5) Evacuate lying cases by lift if possible.

Patient Care Areas Requiring Special Attention

There are many problems in evacuation of following type of patients from patient care areas, These are:

1) Disabled patient or lying cases needs support.

2) Life support measures like oxygen etc; may be required for patient even during evacuation. Evacuation with ventilatory support.

3) Paediatric cases and babies in nursery will need assistance from attendants.

4) Unconscious cases required to be evacuated as lying cases.

5) Some of the psychiatric cases will require embroil support during evacuation for their safety. One has to avoid panic amongst such cases.

6) Orthopaedic cases rendered immobile due to disease or plaster will need total assistance in evacuation.

7) Cases under immediate post operative care will need extra attention specially those with ventillatory support.

8) Patients under going operation.

The decision for evacuation of the patients from the site of fire will have to be taken by doctor/sister present on the spot depending on the extent and severity of fire. This decision should be taken in due course without creating any undue panic, The doctor/nurse on the spot will have to take charge of situation till arrival of Fire Safety Officer/Medical Superintendent.

Assessment of total number of patients needing assistance in evacuation should be made by doctorlnurse on the spot and project additional requirements of manpower, wheel chair, stretchers/trolleys to the Medical Superintendent/Hospital Administration/Fire Officer. Till arrival of additional help mobilize all available manpower in the ward and utilize available wheel chairs, trolleys and stretchers.

4.1 CHECKLIST FOR FIRE PREPAREDNESS

To implement the fire fighting programme effectively every hospital must draw and rehearse the fire preparedness and document the checklist:

Sl. No.	Subject	Yes	No
1)	Water hydrant located strategically		
2)	Water hydrant connections are standardised/ compatible with local fire department loose lines		
3)	Sprinker system provided where indicated		
4)	Fire Alarm system working effectively		
5)	Adequate Fire Extinguisher available		
6)	Following are available and in working condition in each working area:		
	a) Wall Fire Hydrant		
	b) One Soda Acid/Water, CO, Extinguisher		
	c) One CO, Extinguisher		
	d) One Water drum D shaped with 9 buckets of water		
	e) Adequate availability of water	/	
7)	Presence of any Electric loose connection/ defective improper Electronic points (if yes – location)		
8)	Any combustible/inflammable matcrial near potential fire point (if yes – material and its location)		
9)	Fire escape routes arc free (if no location of any obstruction)		
10)	Fire escape routes door lock keys available		

Sl. No.	Subject	Yes	No
11)	Emergency fire lights and directional sign adequate		
12)	LPG is stored in a cool and non fire area		
13)	LPG inspected for linkage on receipt		
14)	Kitchen exhaust working		
15)	Fire lift connected with generator is working		
16)	Fire safety regulation training programme imparted to Hospital staff satisfactorily		
17)	Up-to-date list of training record maintained		
18)	Periodic/surprise check carried out		
19)	Record for periodic check maintained		
20)	Last periodic/surprise check carried	Date	Time

This checklist will help you in assessment of fire fighting preparedness in your own set-up and take necessary steps for an effective and efficient implementation of fire fighting programme.

4.12 LET US SUM UP

In this unit of practical manual, you have learnt about the importance of having a manual for fire fighting in a hospital. You have learnt about the grades of fire elements of fire safety and various types of fire extinguishers. You have also learnt about the fire preparedness, plan and action to be taken in case of fire in a hospital. It is expected that after going through this unit of practical manual, you will be able to analyse the safety needs of your hospital and draw up a safety plan to protect your hospital from fire hazards.

4.13 FURTHER READINGS

Manual for fire fighting at AIIMS Hospital by Dr. RK Sharma.

Thomas Jefferson, University Fire Manual on Internet (Physics-web master e-mail).

Development of Fire Emergency Programmes, American Hospital Association, Chicago-10, Fillinois.

Army instructions 2/91, Fire Fighting Equipment, Govt of India, Ministry of Defence, New Delhi,1991.

BLOCK INTRODUCTION

The first block of this course on Community Health contains five units.

Unit 1 deals with the Concepts in Community Health and in this unit you will leam about the natural history of diseases, factors determining health and of interventions to prevent the occurrence of diseases: Important indicatiorslindices to measure health status of the community have also Been discussed in addition to the stages for epidemiological surveillance.

Unit 2 deals with Hospital and Primary Health Care. In this unit you will learn the concepts of primary health care. The very important aspect of the role of hospitals in primary health care is discussed in detail in this unit. You will also get to know some of the important norms with respect to targets and achievements in the field.

Unit 3 of the block deals with the Principles and Concepts of Epidemiology and Biostatistics. In this unit you will learn epidemiological methods and types of epidemiological studies. You will also leam epidemiological forecasting and about management of epidemics.

Unit 4 of this block is on Occupational Health. In this unit you will learn about the definition, scope and application of occupational health in industries. You will also learn how the occupational health has come to occupy the front stage in the scheme of health, ensurement and management specially so as in the most vulnerable segment of our society is affected. The workers in factories and establishment are very much exposed to such diseases: You will also learn the role of international agencies on the subject.

The last unit of the block is on Health Insurance, It gives you an overview of the evolution of the subject in our country. The two largest ongoing schemes i.e. ESIS and CGHS have been discussed in detail. You will also learn about the emerging scenario in the field due to the recent decision of union Government to open up the subject of insurance to private sector including joint set-up with foreign companies.

UNIT 1 CONCEPTS IN COMMUNITY HEALTH

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the natural history of disease;
- describe the important factors determining the health of the individuals and the community;
- describe the interventions which can prevent the occurrence of disease during its various stages;

  list the important indicators and indices which measure the health status of the community;
- list the steps for developing an epidemiological surveillance system; and
- apply the concepts of community health particulary epidemiological surveillance in the prevention and control of diseases in the community.

1.1 INTRODUCTION

The normal course of the disease in man along with the knowledge of the factors governing a person to stay healthy or fall ill are of immense help to an administrator. It assists him in deciding the interventions he has to implement along with the stage of the disease at which they are to be implemented.

The pooled information about the health status of the community along with the various factors affecting health coming at regular intervals gives him the feedback about the efficacy of the interventions. It may also suggest the changes or the modifications that may have to be made in the programme intervention.

These basic concepts of community health along with the use of epidemiological surveillance as a managerial tool have been described briefly in this unit.

1.2 NATURAL HISTORY OF DISEASE

You would be wondering why should administrators be reading about natural history of disease. It should be read by historians and kept in the archives. The strange thing is that the more the administrators know about the natural history of disease the more effectively they will be able to control disease. So the next question is how do we know about the natural history of disease. It is not knowing the disease from antiquity but knowing the course of the disease in the population.

In fact, the natural history of disease is best studied in a virgin population in which there are no health interventions. But, it does not mean that it cannot be studied wherever health interventions have been applied. By comparing the nautral history of disease in both of these groups, we determine the effectiveness of these interventions and get clues for better prevention and control.

Disease originates via independent processes before man is involved. Hepatitis A virus needs to survive in the environment and find adequate measures for propagation before causing disease in man. These factors in the environment create a disease stimulus long before its interaction with man to produce disease. This preliminary interaction of agent, host and environment is tenned the period of 'prepathogenesis.'

The course of disease in man starting from the first interaction between agent, host and environment, through the full-blown disease to its final outcome is known as the period of 'pathogenesis'.

The combination of the processes of both these phases, prepathogenesis (process in the environment) and pathogenesis (process in man), is termed the natural history of disease.

Agent is the primary cause without which a specific disease cannot occur. Disease agents can be classified broadly into the following groups:

1) Biological Agents

These are the living agents of disease like viruses, rickettsiae, fungi, bacteria, protozoa and metazoa. Examples are streptococci,, candida, plasmodiums etc.

2) Nutrient Agents

Any excess or deficiency of the intake of nutritive elements may result in nutritional disorders. Examples of such disorders are protein, energy malnutrition, anaemia, goitre.

3) Physical Agents

Exposure to excessive heat, cold, humidity, pressure, altitude may result in illness.

4) Chemical Agents

These disease may be endogenous or exogenous. Endogenous chemicals are those which are produced in the body as a result of some derangement of function e.g. uric acid (gout),

calcium carbonate (kidney stones). Exogenous agents are those which arise outside the human host e.g. allergens, fumes, insecticides.

5) **Mechanical Agents**

Mechanical agents are chronic friction and other mechanical forces resulting in injuries and death.

6) Hereditary Factors

Hereditary factors are part of the genetic makeup of humans which are inherited e.g. the trait for thallessemia, polycystic disease, Down's syndrome.

7) Social Agents

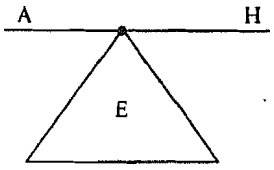
Like poverty, smoking, drugs, alcohol are known to aid causation of disease.

The term **'Host'** refers to **'man'** and more specifically, this particular man is group of men of immediate concern. Host factors may be biologic (age, sex, race, specific immunity) or behavioural (as governed by habits and customs).

"Environment" embraces all that is external to the agent and the human host(s) immediately in question. These factors are numerous and are subdivided into three classes, which relate respectively to the physical, biologic and socio-economic segments of the environment.

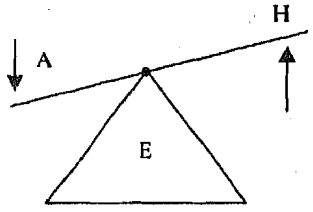
1.2.1 Interaction of Agent, Host and Environmental Factors

To illustrate graphically the interaction of agent, host and environmental factors, Dr. John Gordon has employed the analogy of a lever balanced over a fulcrum (represented by environment) and each weight at either end represented by agent and host.



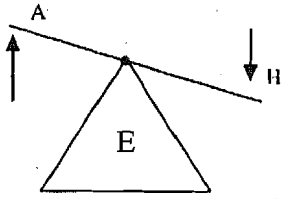
A = Agent
H = Host
E = Environment

Fig. 1.1



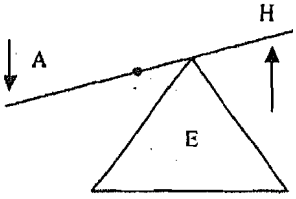
Increase in the ability of an agent to infect and cause disease in man

Fig. 1.2



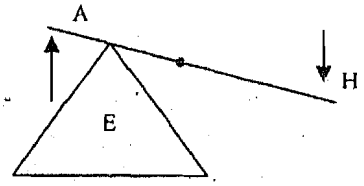
The proportion of susceptible in the human host population is increased

Fig. 1.3



Environmental change facilitates agent spread

Fig. 1.4



Environmental change after host susceptibility

Fig. 1.5

Interaction of Agent, Host and Environmental Factors

Source: J.P.; Hall C. E and Elveback *L. R., Epidemiology Man and Diseases*. The Macmillan Company, New York.

The agent and host exist in equilibrium in the environment. The host thus stays healthy (Fig. 1.1).

Any increase in the ability of an agent to infect and cause disease in man can be seen in the case of HIV which was able to infect and cause disease in man within the past two decades, and also in the increased resistance of microbes to commonly used a antibiotics (Fig. 1.2).

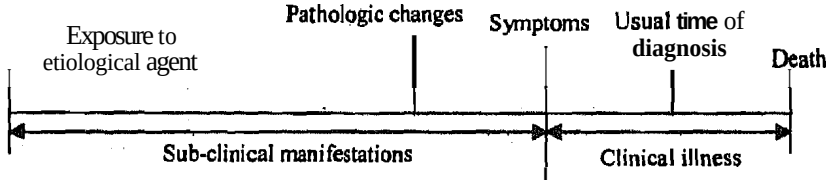
In Fig. 1.3, the population may fall ill due to its increased susceptibility. In Russia, there have been a few cases of diphtheria reported in the recent past. This had followed the suspension of the immunization against diphteria thinking that the population was not at risk against diphtheria any more. This had reduced the immunity of the community and placed them at a higher risk of contracting the disease.

In Fig. 1.4, the change in the environment facilitates the spread of the agent, like in the Bhopal Gas Tragedy in 1984, the sudden leakage of the toxic gas in the environment killed the people or made them seriously ill.

The epithelial lining of the respiratory tract is effected in the people constantly inhaling polluted air in the urban areas. This predisposes them to frequent respiratory infections. (Fig. 1.5).

122 Spectrum of Disease

But the presence of varying balances of these three factors does not simply lend itself to the mere causation of disease. The severity and extent of disease in the individual passes through various stages, is signified by the "spectrum of disease". It is the sequence of events that occur in the human organism from the time of exposure to the aetiological agent till death. It is composed of sub-clinical and clinical components. Whether an individual with the disease progresses through the entire spectrum depends on the availability and efficacy of preventive and therapeutic measures, which if introduced at a particular point of the spectrum, will completely prevent or retard any further development of the disease. For example, in cancer of the cervix, the spectrum consists of dysplasis, carcinoma in situ and invasive carcinoma.



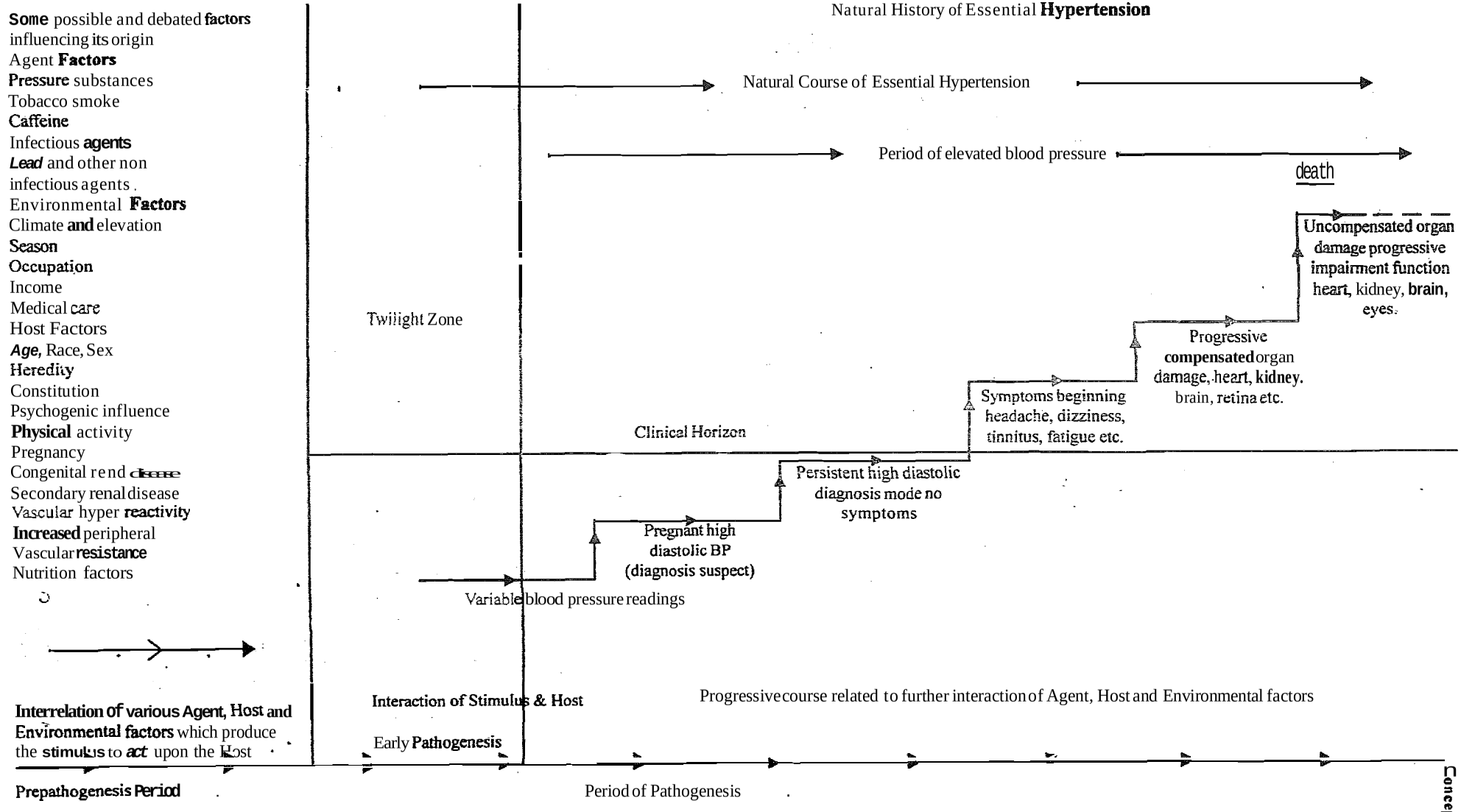
Foundntlons of epidemiology: Lilieufield

In infectious diseases, this spectrum is usually known as the "gradient of infection" which refers to the sequence of manifestations of illness in the host reflecting his response to the infections agent. Extremes of this spectrum extend from inapparent infection to death. In poliomyelitis, over 90 percent of the infections are not clinically apparent whereas in measles, over 90 percent of infected persons exhibit clinical illness.

Doctors are usually aware of a small part of the spectrum of disease (usually clinically apparent) and this part is proverbially known as the tip of the Iceberg.

1.3 DETERMINANTS OF HEALTH

We all know that a child born in a developing country is ten to fifteen times more likely to die before reaching his first birthday than a child born in a developed country. Similarly, he may expect to live upto fifty years as compared to eighty years in some developed countries. We have also observed that during the World War II fighting in the same area in similar conditions more European soldiers developed jaundice (Hepatitis A) as compared to Indian soldiers. So what determines whether a person will fall ill or die? Is it just being born or living in a particular geographic area or more than that? Obviously it's more than that. Health is a multifactorial amalgamation of various determinants. Some of the important ones are:



Source: Leavell and Clark, *Preventive Medicine for the Doctor in his Community*, Mc Graw Hill, USA.

i) Genetic

The positive health advocated by WHO implies that a person should be able to express as completely as possible the potentialities of his genetic heritage. The genetic make up of each individual is unique and connot bê altered after conception. The genetic constitution determines the health status to a great extent. It predisposes individuals to various diseases like thalassemia, cancer.

ii) Environment

Environment may be internal or external. Internal environment is dealt with by internal medicine. The external environment involves all that is external to the individual. The environmental factors range from housing, water supply, psychosocial stress and family structure and occupation.

iii) Socio-cultural

Social interaction with parents, peer groups, friends and siblings and through school and mass inedia affects the life-style of individuals. Personal habits like smoking, alcohol intake, drug abuse are developed through social interaction. Obesity, drug addiction, cirrhosis are a few examples of medical problems resulting from social causes.

Life-style can have a positive effect also on health. Reduction of smoking, avoiding red meat, regular exercise all contribute to a healthy life-style.

'iv) Economic

Economic performance is the major factor in reducing morbidity, increasing and improving life expectancy. Economic status determines the purchasing power, standard of living, quality of life, family size, disease pattern and deviant pattern. It is one of the crucial factors which determine health Seeking behaviour,

However, affluence leads to habits like increased alcohol intake, drug abuse, excess consumption of junk foods. Hence, economic affluence can act as a double edged sword in affecting health status.

v) Health **Services**

Provision of maternal and child health services to the population at large determines the status of health of the community. Health services must be equitably distributed, affordable and socially acceptable.

vi) Political System

The percentage of GNP spent on health is a quantitative indicator ofpolitical commitment. To achieve the'goal of health for all, WHO has set the target of at least 5 percent expenditure of each country's GNP on health care. India spends 3 percent of it's GNP on health care.

Let's review the status of tuberculosis in the last two centuries in U.K. Tuberculosis was a major public health problem in the eighteen century. However, with the industrial revolution the economic status of the people started improving. They started living in bigger houses and hence there was less overcrowding, The nutritional status and the literacy levels improved. Surprisingly the deaths due to tuberculosis started going down despite the fact that there was no effective treatment or immunization In fact, the prevalence of tuberculosis started literally halving itself every twenty five years from1850 A.D. onwards.

The number of people suffering from tuberculosis had come down to a large extent till streptomycin was discovered in the thirties. However, almost all of them were dying of it. After the discovery of streptomycin the deaths in the people suffering from tuberculosis came down drastically. So, we saw that socio-cultural, economic and environmental factors resulted in a drastic decrease in the prevalence of the disease but health services reduced the death rates in the persons suffering from the disease,

In the second half of the twentieth century efforts were made to eradicate the disease, Though U.K had not reached the eradication level set by WHO, the disease ceased to be a public health problem. However, with the epidemic of HIV/AIDS the immunity of these

patients went down and they started presenting with the disease and tuberculosis once again became a public health problem. So, we see how a person falling ill is governed by so many factors.

1.4 LEVELS OF PREVENTION (INTERVENTIONS)

What would any individual want regarding an illness. First of all he/she should not contract an illness. If unfortunately he/she does contact an illness, it should be treated at the earliest. It should have no sequalea and if some sequalae have to be there, they should be minimized. He should be able to carry out his normal activities or at least the basic minimum physical and social activities. These actions form the world of preventive medicine and the precise level at which the intervention takes place determines the level of prevention.

Needless to say the best way to prevent a disease would be by initiating intervention before the illness occurs. This is known as 'Primary Prevention'. Treating the illness as early as possible is called 'Secondary Prevention', Trying to limit the disability and rehabilitate the person in his own environment is known as "Tertiary Prevention".

1.4.1 Primary Prevention

Primary prevention thus is preventing man from developing overt disease. In other words, it is preventing the disease in the "prepathogenesis" phase of the natural history of disease. It may be achieved by 'health promotion' and 'specific protection'. Health promotion in the case of communicable diseases is to try to prevent if not eliminate the interaction between the agent and the host, so that the illness is not caused. Efforts may be directed towards destroying the agent (in communicable diseases) by spraying with DDT or by chlorination of drinking water, Interventions may be made in the environment by the elimination of the breeding sites or by proper storage and transmission of the drinking water.

The host may be educated and motivated to lead a life-style whereby protection from the disease may be possible. In the case of above mentioned diseases it may be by using mosquito nets or repellants creams and washing hands before eating food.

Health promotional activities may include promoting proper nutrition, housing, recreation, exercise and good home and working environment along with leading healthy life-style. Counselling and periodic health examinations arc other health promotional activities.

Health promotional activity for a non-communicable disease like myocardial infarction could be directed towards reduction of cholesterol in diet (agent), reducing passive smoking and stress at work place (environment) and promoting optimum weight, physical exercise and periodic health examination (host).

Specific Protection

Specific protection as the name suggests is by introducing interventions which specifically protects the host e.g. by giving vaccinations or by giving specific nutrients like fluorides, iodized salt etc. It may also be protection from carcinogens, ultra-violet rays or from accidents like wearing of helmets, seat belts etc.

1.4.2 Secondary Prevention

Early Diagnosis and **Prompt Treatment**

Secondary prevention is initiating intervention during the pathogenesis phase i.e. the disease process has started in man. The purpose is to diagnose the cases as early as possible and treat them. This may be by case detection, screening to cite a few examples. The aim is to cure the patient of the disease and prevent its spread along with preventing the complications and sequalae and limiting the disability as much as possible.

1.4.3 Tertiary Prevention

Disability Limitation

Very often people come for treatment at a very advanced stage of the disease. This is generally due to medical care not being provided at the appropriate time either due to non-

availability of medical care facilities or due to non-utilization of the services. Sometimes, it may be due to the incomplete knowledge of the disease. Disability limitation is either preventing or delaying the consequences of a clinically advanced disease.

Rehabilitation

This level of prevention is more than looking at the disease from the medical or surgical point of view. The aim is to return the person to a useful place in society and make maximum use of, his remaining capabilities. The person after his treatment should not only be physically but mentally, socially and economically adjusted or rehabilitated in the society.

Now let's look at some examples of the levels of prevention:

Communicable Disease: Poliomyelitis

Primary Prevention	
i) Health Promotion	Health education, provision of safe drinking water and proper sanitation.
ii) Specific Protection	Immunization against polio, increasing herd immunity and elitnination of wild polio virus by "pulse polio" immunization.
Secondary **Prevention**	
Early diagnosis and prompt treatment	Identification of AFP cases and diagnosing ifparalysis due to polio (AFP surveillance)
Tertiary **Prevention**	
i) Disability limitation	Physiotherapy
ii) Rehabilitation	Physical – by providing artificial artificial limbs, social by counselling for improving social esteem, vocational by teaching skills to get gainful employment.

Non-communicable **Disease:** Diabetes

Primary Prevention	
i) Health Promotion	Health education regarding the disease and leading life style by which the diseases can be avoided/delayed.
ii) Specific Protection	There is no specific protection in a disease like diabetes.
Secondary Prevention	
i) Early diagnosis and prompt treatment	Regular screening for early diagnosis of the disease prompt treatment and its prompt management by diet, exercise or drugs.
Tertiary Prevention	
i) Disability Limitation	Given top priority while treating the diseases at every stage.
ii) Rehabilitation	A perfect example ofrehabilitating the patient to live with the diseases.

Check Your **Progress** 1

Name the level ofprevention (intervention) in the following examples:

a) The male health worker giving chloroquin to the persons having fever in a high malaria zone.

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.....

.....

b) A child being given Vitamin 'A' solution six monthly.

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c) Artificial limb being provided to a person whose foot has been amputated.

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d) Screening by pap smear for cervical cancer.

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1.5 INDICATORS OF HEALTH

The question that immediately comes to mind is that why should we spend time developing indicators and then measuring them. Indicators arc variables which help us to measure changes. They measure the health status of a conimunity and also compares the health status between two or more communities or geographic regions. Health care needs are also assessed which are important for the allocation of scarce resources. Finally, they can be used for monitoring and evaluation purposes whereby we arc educated about how well (or poorly) are health care programmes progressing and perhaps why.

The commonly used indicators are:

1) Mortality indicators
2) Morbidity indicators
3) Disability rates
4) Nutritional status indicators
5) Health care delivery indicators
6) Utilisation rates; fertility rates
7) Indicators of social and mental liealtli
8) Environmental indicators
9) Social-economic indicators
10) Health policy indicators
11) Indicators of quality of life
12) Other indicator series
   - HFA indicators
   - Social indicators
   - Basic needs indicators

1.5.1 Mortality Indicators

Mortality indicators as the name suggests measures to death. Representing the traditional measures of Health, these are the most often used indicators even today. In fact, they are the starting point in most health status evaluation. For instance, the deaths due to communicable diseases have gone down in recent years.

It is a fair indicator of the comparative health of a community because in many countries it is the only available indicator. The disadvantage is that it gives no indication as to the cause of death.

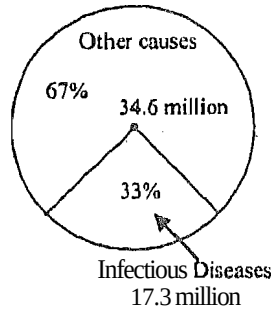

Fig. 1.6: Deaths from Infectious Diseases (1995)

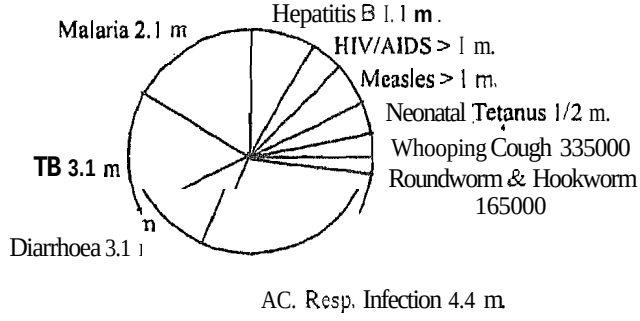

Fig. 1.7: *Ten* Biggest Killers

3 Infant Mortality Rate (IMR)

It is the number of deaths under one year of age in a given year to the total number of live births in the same year, usually expressed as a rate per thousand live births. It is a very sensitive indicator of the standard of living of the population. It is one of the most

universally accepted and sensitive indicators because IMR *is* the largest single age category of mortality, affected quickly by health programmes. Decline in IMR is attributed to-

a) Improved standard of living
b) Better control of communicable diseases
c) Advances in medicine
d) Improved nutrition
e) Better health care services

ii) Neonatal Mortality Rate

$$\frac{\text{Number of deaths of children under 28 days in a year}}{\text{Total live births in same year}} \times 1000$$

iii) Post Neonatal Mortality Rate

$$\frac{\text{Number of deaths of children between 28 days and 1 year}}{\text{Total live births in same year}} \times 1000$$

The reason for dividing IMR in two is that etiology and cause of death for the two groups is very different. Neonatal mortality especially early neonatal mortality (i.e. before 1 week or before 48 hours of birth) is mainly due to prematurity, congenital malformations, low birth weight, hypothermia etc. whereas as post neonatal mortality is mainly due to infection and malnutrition.

The importance of the division of IMR in post neonatal, neonatal (early and late) is of great help in deciding programme management. When the IMR is high and infrastructure and services poor, focus is laid on bringing down post neonatal mortality. In India, post neonatal mortality formed around two thirds of IMR about a quarter of century back and today it forms about 40% of the IMR. In the developed countries early neonatal mortality forms around two thirds of IMR.

iv) Perinatal Mortality Rate

$$\frac{\text{Late fetal and early neonatal deaths} > 1000 \text{ gm.}}{\text{Total low births} > 1000 \text{ gm.}} \times 1000$$

This ratio gives us an idea of the extent of pregnancy wastage and quality and quantity of health care services provided.

(When the numerator does not form a part of the denominator, it is called a ratio).

v) 1-4 year Mortality

$$\frac{\text{Number of deaths 1-4 years}}{\text{Number of children 1-4 years}} \times 1000$$

This is a more sensitive indicator than IMR of social situation in a country.

vi) Maternal Mortality Rate

Total number of female deaths due to conplications of pregnancy, child birth or within 42 days of delivery from puerperal causes in an area in a given year per 1000 live births in the area.

This also is a ratio generally written as a rate.

vii) Disease Specific Mortality Rate

It is the mortality rate due to specific diseases

viii) Proportion Mortality Rate

It is the proportional mortality rate due to a disease or a group of diseases.

1.5.2 Morbidity Indicators

3 Incidence Rate

It is the number of new cases of the disease reported during the year per thousand mid-year population. It is a way to measure the rate at which the population becomes recognisably ill.

ii) Prevalence Rate

It is the number of cases of the disease known to exist on a given day per thousand population on that day. Prevalence rate is normally calculated for chronic diseases as it is easier to measure. In the chronic diseases the prevalence rate is more than the incidence rate. However, in acute illness of short duration viz. episodes'of diarrhoea, ARI, malaria, the incidence rate will be more than the prevalence rate as the number of people ill on a particular day would be less.

iii) Notification Rates

This is the notification and diseases like polio, cholera and plague.

Other morbidity indicators include attendance rates; admission, readmission and discharge rates; duration ofhospital stay; and spells of sickness/absence from work/school.

1.5.3 Disability Indicators

i) Event Type

- Number of days of decreased activity
- Bed disability days, workloss days

ii) Person Type

- Limitation of mobility, activity
- DALY
- Sullivan's index

1.5.4 Nutritional Status Indicators

i) Direct

- Clinical Assessment
- Dietary Intake
- Anthropometry

Age Known		Height for age Weight for age Head and chest circumference
Age unknown	:	Weight for height Midarm circumference
School Entry	:	Weight for age Weight for height
Weight of Newborn	:	Average LBW (<2.5 kg).

Skin Fold Thickness
Stem Stature Index
Body Mass Index
Biochemical and Biophysical Test

ii) Indirect

Mortality and Morbidity Data.
Food Consumption Data

1.5.5 Utilisation Rates

i) Actual coverage
ii) Availability, accessibility, attitude
iii) Proportion of infants immunized under UIP (Universal Immunization Programme)
iv) Proportion of pregnant wome receiving

- antenatal care
- intra natal care
- post natal care

1.5.6 Indicators of Social and Mental Health

i) Suicides
ii) Homicides
iii) Rapes
iv) Alcohol and Drug Abuse
v) Battered Bady Syndrome

1.5.7 Environmental Indicators

i) Air
ii) Water
iii) Solid wastes
iv) Noise

Water: Microbiological, toxic substances, specific substances, radioactive substances

Air Pollution: Sulphur dioxide, smoke index, suspended particles, carbon monoxide, oxidants, nitrogen dioxide, lead.

1.5.8 Socio-economic Indicators

i) Rate of population above poverty line

ii) GNP per capita

iii) Food availability

iv) Literacy

v) Unemployment rate

vi) Working conditions

vii) Housing.

viii) Health care provision: availability, accessibility, quality, utilization

ix) Health status: LBW (Low Birth Weight), nutritional status, disability prevalence, morbidity

Other Indicators

i) ***Social Indicators***

Learning and educational services, housing, public order and safety, time used in leisure and cultural activities, social stratification.

u) ***Basic Needs***

a) Calorie consumption

b) Access to water

c) Life expectancy

1.5.9 Health Care Delivery Indicators

i) Provision of health care

ii) Equity of distribution

iii) Doctor population ratio

iv) Doctor Nurse ratio

v) Population bed ratio

vi) Population per centre

vii) Population per TBA

1.5.10 HFA Indicators

i) **Health Policy**

- Political commitment

  Resource allocation
- Equity of distribution
- Community involvement
- Organised framework

ii) **Socio-economic Indicators**

- Rate of population growth
- GNP
- Working conditions
- Literacy
- Housing

- Food availability

Health care provision : availability, accessibility, quality, utilization

iii) Health Status

- Low birth weight
- Nutritional status
- IMR
- MCH indicators
- Disability prevalence
- Morbidity

Indicator	Goal HFA 2000	All India
IMR	<60	74
Perinatal Mortality (93)	≤30	49.1
CDR	9	9
< 5 Mortality (93)	10	33.3
MMR (92)	< 2	3.624
ELB ♂ (93)	60	61.3
♀ (93)	60	66
CBR	21	28.5
CPR (93)	60	45.8
NRR	1	2.3
Annual Growth Rate	1.2	1.93
Family Size	2.3	4.0
Pregnant ♀ – ANC	100	73.6
TBA Delivery	100	73.4
TT for ♀	100	77.4
UIP	85	51.7 (DPT) 53.4 (Polio) 77.4 (BCG) 85.5 (DT)
Typhoid	85	65.5
Leprosy (% Arrested Cases)	85	24.4
Blindness Incidence	0.3	1.4
No. of Medical Colleges (1997)	148	

Number of Hospital and Beds

	Hospitals	Beds
Government	4235	365696
Private and Vol. Organisations	9437	230507
Total	13692	596203
Population Served per bed (1993)		1412
Hospitals Beds/ Lakh Population (93)		70
No. of Doctors (92)		4, 10,875
Dr/Lakh Population	48: Pop./Doctors – 2439: Pop./ Nurses – 3333	

Indicator	Norm	Achievement
Pop./SC 1996	(3 – 5) 000	4737
Pop./PHC 1996	(20 – 30) 000	28755
Pop./CHC 1996	1 lakh	2.6 lakh
1996 SC : PHC : CHC: 2,424.	1,32,730 21,854	

BR . 28.311000 DR : 911000 IMR: 7411000 U – 49/1000 R – 80/1000	
Average growth rate	2.24%
Sex ratio	927♀/1000♂
Population with access to Health services (1995) Safe Water (1996) Sanitation (1996)	 85 81 29
Literacy	52.2 – 64.1♂ / 39.3♀
Adult Literacy Rate	64.1♂ and 36.1♀
India's GDP (1995)	$420
Daily Cal. Supply/Capita (1992)	2395
Children Not Reaching GR5 (1995)	38%
Population living <.1 $ 1 day	53%
Population without access to health services Least Developed Countries	 51%
Developing Countries	20%
Mothers Breastfeeding at 6 months	75%

Class	Population	No. of Cities	% Urban Population
I	I lakh or more	3000	64.91
II	50,000 – 99,999	345	10.95
III	20,000 – 49,999	944	13.30
IV, V, VI	< 20,000		11.00

Global Causes of Death (1996)

Sl. No.	Causes of Death	Developed World	Developing World
1.	Infectious Parasitic Diseases	1.2	43
2.	Diseases of Circulatory System	45.6	24.5
3.	Cancer	21	9.5
4.	Disease of Respiratory System	8.1	4.8
5.	Perinatal and Neonatal	1	9.1
6.	Meternal Causes	0	1.5
7.	Others and Unknown causes	23.1	7.7

1.5.11 Indices

Indices are prepared by considering a few indicators after giving weightage to each of them. Clubbing of a few indicators helps in producing a more holistic and realistic picture. For Instance two countries may have the same MMR but their TFRs may be different. The woman on an average will have more children and thus has an increased chance of dying to pregnancy or related causes than a woman from the area where the TFR is lower (despite the fact that MMR is the same). Thus lifetime risk gives a better picture and is a more useful index for international comparison.

Human Development Index

Human Development Index was released for the first time by the **UNDP** for 30 countries of the world in 1990. The UNDP has defined human development as the process of enlarging people's choices. Income is one of those choices but it does not cover the totality of human life. Health, education, a good physical environment and freedom of action and expression are just as important. The Human Development Index (HDI), therefore, combines indicators of national income, life expectancy and educational attainment to give a composite measure of human progress.

Human Development Index for Selected Developed and SAARC Countries

HDI Rank	Name of the Country	Life Expectancy nt Birth 1995	Adult Literacy Rate (%) 1995	Life Expectancy Index	Education Index	GDP Index	Human Develop- Index (HDI) Value
	Developed Countries						
1	Canada	79.1	99	0.90	0.99	0.99	0.960
4	USA	76.4	99	0.86	0.98	0.99	0.943
8	Japan	79.9	99	0.91	0.92	0.99	0.940
14	UK	76.8	99	0.86	0.95	0.99	0,932
15	Australia	78.2	99	0.89	0.92	0.99	0.932
19	Germany	76.4	99	0.86	0.93	0.99	0.925
72	Russian Federation	65.5	99 F	0.68	0.92	0.99	0.769
	SAARC Countries						
139	India	61.6	52.0	0.61	0.53	0.21	0.451
147	Bangladesh	56.9	38.1	0.53	0.38	0.21	0.371
155	Bhutan	52.0	42.2	0.45	0.39	0.21	0.347
95	Maldives	63.3	93.2	0.64	0.86	0.55	0.683
152	Nepal	55.9	27.5	0.52	0.37	0.17	0.351
138	Pakistan	62.8	37.8	0.63	0.39	0.34	0.453
90	Sri Lanka	72.5	90.2	0.79	0.83	0.53	0.716
	World	63.6	77.6	0.64	0.72	0.95	0.772

Gender Related Development Index'

The Genderrelated Development Index (GDI) measures achievements in the same dimensions and'variables as the HDI, but captures inequalities in achievement between women and men. It is simply the HDI adjusted downward for gender inequality. The greater the gender disparity in basic human development, the lower a country's GDI compared with its HDI.

Gender Empowerment Measure

The Gender Empowerment Measure (GEM) reveals whether women can take active part in economic and political life. It focuses on participation, measuring gender inequality in key areas of economic and political participation and decision making. It tracks the percentages of women in Parliament, among administrators and managers and among professional and technical workers and women's earned income as a percentage of men's. Differing from the GDI, it exposes inequality in opportunities in selected areas.

HDI Rank	Developed Country	Gender Empower- ment (GEM) Rank	Seat in Parliament Held by Women (%)	Female Administ- rators and Managers (%)	Female Professio- nai and Technical Workers (%)	Women's Share of Earned Income (%)	GEM Value
	Developed Countries						
1	Canada	7	21.2	42.2	56.1	38	0.72
4	USA	11	11.2	42.7	52.6	40	0.68
8	Japan	38	7.7	8.9	43.3	34	0.47
14	UK	20	11.6	32.4	44.2	38	0.59
IS	Australia	12	20.5	43.3	25.5	40	0.66
19	Germany	8	25.5	25.8	49	35	0.69
72	Russian Federation	–	–	–	–	–	–

HDI Rank	Developed Country	Gender Empower-ment (GEM) Rank	Seat in Parliament Held by Women (%)	Female Administ-rators and Managers (%)	Female Professio-nal and Technical Workers (%)	Women's Share of Earned Income (%)	GEM Value
	SAARC Countries						
139	India	95	7.3	2.3	20.5	25	0.228
147	Bangladesh	80	9.1	4.96	34.7	23	0.305
155	Bhutan	–	–	–	–	–	–
95	Maldive	76	6.3	14.0	34.6	35	0.341
152	Nepal	–	–	–	–	–	–
138	Pakistan	100	2.6	3.9	19.5	21	0.179
90	Sri Lanka	84	5.3	16.2	19.4	36	0.286
	Total	–	**11.8**	–	–	**33**	–

Source: Human Development Report, 1998 (UNDP)

– Not Available

Human **Poverty Index**

Human poverty is denial of choices and opportunities for living a tolerable life. Around a third of the world's population lives on less that $1 a day. The human poverty index increases deprivation in basic human development in the same dimensions as HDI. The variables used are the percentage of people expected to die before age 40, the percentage of adults who are illiterate, and overall economic provisioning in terms of the percentage of people without access to health services and safe water and the percentage of underweight children and lack of maternal means. Graphic representation of HPI is as given below:

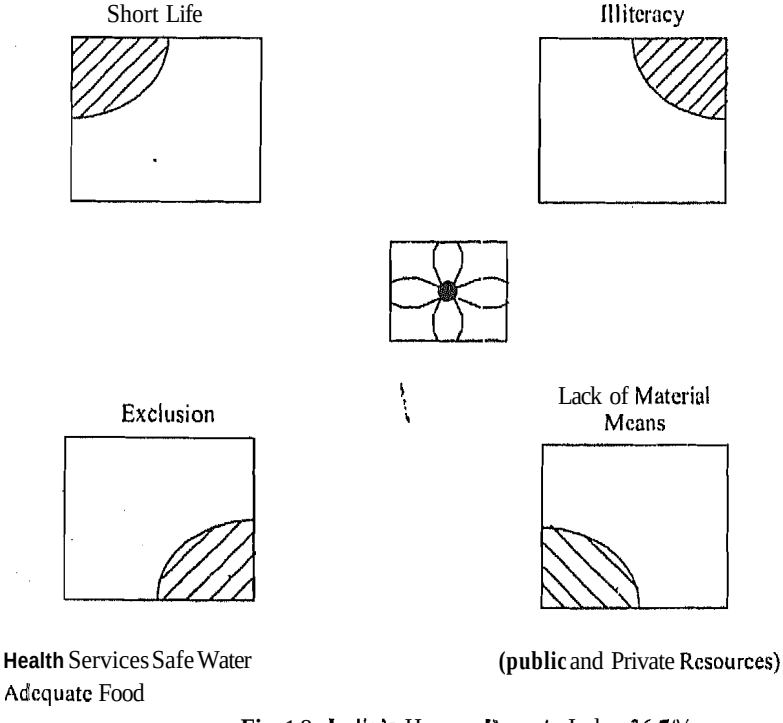

Fig. 1.8: **India's** Hurnan **Poverty** Index 36.7%

Life Time Risk (LTR)

The risk of a woman dying from pregnancy or child birth during her lifetime based on maternal mortality and fertility, (Total Fertility Rate)

The LTR in,

South Asia	–	1 in35
Bangladesh	–	1 and21
India	–	1 in37
Nepal	–	1 in 10
Pakistan	–	1 in38

Disability **Adjusted Life Year (DALY)**

The UNDP, jointly with the World Health Organisation, in 1993, brought out the concept of measuring the global burden of disease (GBD) by combining – (a) Losses from premature death which is defined as the difference between actual age at death and life expectancy at that age in a low mortality population and (b) loss of healthy life resulting from disability. The GBD is measured in units of disability adjusted life year (DALY). World-wide 1.3 billion DALY were lost in 1990. Premature deaths were responsible for 66% of all DALY lost and disabilities for 34%. In the developing world 67% of all DALY loss was a result of premature death; in the developed world this figure was 55%. The three categories of disease used are the group of communicable disease, non-communicable diseases and injuries.

The results of research on GBD challenge the belief that the war against infections and parasitic diseases has been won. The burden of these diseases is substantial in India (28%). It is contributed to mainly by tuberculosis. STDs and HIV, diarrhoea vaccine preventable childhood infections, malaria, worm infections, respiratory infections, maternal and perinatal causes.

Cost effectiveness of interventions are also measured in terms $ per DALY gained.

DALY gained for:

1)	The universal immunizationprogramme	–	$8
2)	Treatment for RTIs/STIs	–	$10–15
3)	Early cure of cervical cancer	–	$150–250
4)	Provision of referral care for complicated pregnancies	–	$2
5)	Urban pregnancies with little complication	–	$18
6)	Neonatal care for perinatal condition	–	$60
7)	Rural pregnancies with little complication	–	$100

Check Your Progress 2

1) Name some common mortality indicators for monitoring MCH programme.

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2) Indices art: more useful than indicators for international comparison comment;

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1.6 EPIDEMIOLOGICAL SURVEILLANCE

Surveillance is an important epidemiological activity in the field of public health. This term may be used in two ways:

In the broader sense, surveillance has been equated with the routine health information system which gives idea about the total health situation.

In the narrower sense, it is used to refer to specific information system pertaining to specific disease or any other health related event.

1.6.1 Definition of Surveillance

So how do we define surveillance?

The simplest definition could be "Surveillance is data collection for action". It is however defined as:

- the systematic collection and use of epidemiological information for planning, implementation and assessment of disease control (World Health Assembly, 1968).
- the ongoing and systematic collection, analysis and interpretation of health data in the process of describing and monitoring a health event. This information is used for planning, implementing and evaluating public health interventions and programmes. Surveillance data are used to both determine the "need" for public health action and to assess the "effectiveness" of programmes (CDC, 1988).

So what do these definitions suggest? The key characteristics of epidemiological surveillance could be listed as:

i) It is a systematic, regular, ongoing and continuous activity.

ii) It involves collection, consolidation/analysis, interpretation and timely dissemination of information.

iii) The information should be used for different types of action,

So surveillance may be quite simply defined as "Ongoing scrutiny, generally using methods distinguished by their practicability, uniformity and rapidity rather than by complete accuracy. Main purpose is to detect changes in trend or distribution of diseases in order to initiate investigative or control measure.

Surveillance is an essential prerequisite to the rational design and evaluation of any disease control programme.

The ultimate objective of surveillance is prevention.

1.6.2 Purpose/Use of Surveillance

The purpose of the surveillance is:

- assessing magnitude of problem
- monitoring implementation of health programmes
- understanding local epidemiology of the problem
- assessing changes in the trend of diseases or its distribution
- identifying specific population groups at risk
- enabling predictions about the pattern of occurrence of disease
- assessing the impact of the programme intervention for control of diseases.

Effectiveness of surveillance system depends to a great extent on the quality, completeness and regularity of the reporting.

1.6.3 Methods of Surveillance

Different methods are adopted for collection of data for surveillance as no single method of surveillance can be used with equal reliability for all diseases or events. The commonly used methods are:

a) **Passive Surveillance**

It is the routine reporting of the cases of diseases reaching dispensaries/hospitals/ institutions for treatment or service.

b) Active Surveillance

This special search is done for finding cases in the community mainly through door to door surveys, e.g. malaria.

c) Sentinel Surveillance

It is a reporting system based on selected institutions or individual that provide regular, complete reports on one or more diseases occurring ideally in a defined attachment. It also provides additional data on cases.

d) Criteria for Selection of Institutions for Sentinel Surveillance

i) Large attendance of patients with target disease

ii) Capability for reasonably accurate diagnosis

iii) Availability of good recording and reporting facilities

iv) Easy accessibility to population (especially rural)

v) Treatment facility not too expensive or specialized as to exclude some people

vi) Willingness of staff to provide reports

vii) Availability of reasonably developed control programme in the area to enable follow up action on reports.

e) **Case/Outbreak Investigation**

Epidemiological investigation of diseases during outbreaks that even though are adhoc in terms of frequency can provide detailed epidemiological data on the disease. In-depth investigation of epidemic also helps in determining the factors responsible for the occurrence of the epidemic which can help in taking control and preventing action

f) **Case/Events** Investigation

In-depth investigation of specific events/cases, e.g. investigation of each maternal death or each case of Acute Flaccid Paralysis, each infant death, each case of neonatal tetanus etc. The pupose is to identify the situations and circumstances that led to the occurrence of the event under question so that appropriate action can be initiated. Verbal autopsy is the term used for such investigation of deaths.

g) Surveys and Special Studies

Sample surveys for specific disease when periodically repeated at regular intervals can provide more accurate community based epidemiological information about the disease in terms of magnitude and contributory factors in the non-epidemic situation for any particular disease.

h) Vital Registration System

Herein public and, private health care providers report births and deaths etc.

i) Census

It is a count of persons including question about health habits, diseases etc.

1.6.4 Epidemiological SurveillanceSystexn

The steps for the development of an epidemiological surveillance system are as described below:

i) Decide the disease/condition on which surveillance is to be undertaken

ii) Specify the objective/purpose of surveillance

iii) Use standard case definition as well as inclusion criteria

iv) Decide what information need to be collected

v) Select method of surveillance

vi) Develop data collection proceduresltoolslformats

vii) Prepare list of reporting units.

viii) Obtain the data on the condition/disease as to suspected/probable/diagnosed or confirmed cases regularly from the reporting units along with the line listing as required.

Suspect: Diagnosis made on the basis of history by paramedical personnel or tlie members of the community, e.g. rice water stools in cholera.

Probable/Presumption: Diagnosis made on typical history and clinical examination by medical officers e.g. shooting stars under dark field microscopy in cholera.

Confirmed: Clinical diagnosis by a medical officer and/or positive laboratory identification.

ix) Collect and transport laboratory specimens if necessary for diagnosis.

x) Compile accumulated data for the reporting person.

xi) Decide how often and to whom to report as well as channel of flow of report.

xii) Monitor receipts of report for its timeliness and completeness as well as correctness.

xiii) Analyse data to determine the magnitude/changes in frequency and distribution pattern.

xiv) Interpret data ana take action accordingly.

1.6.5 Limitations of Surveillance

The following are the limitations of surveillance:

- Labour intensive activity
- Tabulation and analysis are time consuming
- Limited to a few key indicators
- Several years of data collection necessary to identify trends
- .Difficult to assess impact if no control group or if population is small
- Reporting of surveillance data is often incomplete

Check Your Progress 3

1) In the school health programme, the Chief Medical Officer of the district conducts a thorough medical check up of all the school going children in the district. Will it constitute surveillance?

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2) How can census be considered a method of surveillance?

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1.7 LET US SUM UP

In this unit you have learnt that the preliminary interaction of the disease process starts in the environment (pre pathogenesis). The course of the disease in man is called as the period of pathogenesis and together they form the natural history of disease.

You have also learnt that the health, its maintenance and falling ill is governed by a multifactorial amalgamation of various determinants. Some of the important determinants are genetic, environment, socio-cultural, economic, provision of health services and political commitment.

Further you have learnt that prudent interventions may prevent the occurrence of the disease or limit its grave course. Preventing the disease before it occurs in man is known as 'Primary Prevention'. Early treatment of the patient is 'Secondary Prevention' while limiting the disability and rehabilitating the person in 'Tertiary Prevention'.

In this unit you have also learnt that the order to assess the scale of burden of disease and the need for intervention, indicators are needed that capture the important components contributing to it.

Towards the end you have learnt that surveillance of diseases helps in detecting changes in trends or distribution of diseases in order to initiate investigative or control measures. It is essential for the rational design and evaluation of any disease control programme. The effectiveness of a surveillance system depends to a great extent on the quality, completeness and regularity of the reporting. The common methods of surveillance are passive surveillance, active surveillance, sentinel surveillance, investigation of outbreaks, events, surveys and special studies, vital registration system and census. The steps for the development of a surveillance system along with its limitations have been discussed.

1.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) Secondary Prevention – Early diagnosis and prompt treatment

b). Primary Prevention – Specific protection

c) Tertiary Prevention– Rehabilitation

d) Secondary Prevention – Early diaagnosis and prompt treatment

Check Your Progress 2

1) Indicators of MCH Care are:

- Maternal Mortality Rate
- Infant Mortality Rate
- Neonatal Mortality Rate
- Postnatal Mortality Rate
- Perinatal Mortality Rate
- 1-4 Years Mortality Rate

2) Indices are arrived at by combining a few indicators and by comparing the figures of the index we are in fact comparing those indicators together.

By comparing the HDI we can compare the relative development between different countries. In fact, we are comparing the combined effect of national income, life expectancy and educational attainment – the three, key indicators of development in a multidimensional approach.

Check Your Progress 3

1) No, the medical check up of the school going children will not be considered as surveillance because it is not a regular, ongoing and continuous activity, However, if the medical check ups are done regularly say yearly, the findings analysed and the information used for action, it will constitute surveillance.

2) Census is a method of surveillance because:

   i) It is a systematic, regular, ongoing and continuous activity.

   ii) It involves collection, consolidation/analysis, interpretation and timely dissemination of information.

   iii) The information is used for different types of action.

UNIT 2 HEALTH FOR ALL AND PRIMARY HEALTH CARE

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- discuss the background of the development of the concept of Health For All By The Year 2000AD;
- define and discuss the components of the Primary Health Care;
- discuss the role of hospitals in Primary Health Care;
- identify your role in delivery of Primary Health Care.

2.1 INTRODUCTION

In this unit you will learn about the infrastructure for health care delivery in the country. You will also learn about the concept of 'Health For All', its vision and definition. Further you will learn about primary health care, its definition, components and principles. Towards the end you will learn about the role which hospitals can play in primary health care delivery. After going through this unit yau should be able to identify your role in delivery of primary health care.

2.2 CONCEPT, SCOPE AND VISION OF HFA

India is the largest democracy in the world. It presents a unique case in terms of sheer size of its population characterized by heterogeneity in respect of physical, economic, social and cultural conditions. India's population rose from 361.1 million in 1951 to 864.3 million in 1991 and to 96.9 million in 2000. On 2.4% of the land area only India supports more than 16 per cent of the population of the world. 74.2 per cent of India's population lives in villages.

The Republic of India has a federal structure consisting of 25 States and 7 Union Territories. The Constitution of India envisages the establishment of new social order based on equality, freedom, justice and the dignity of the individual. It aims at elimination of poverty, ignorance and ill-health and directs the States with regards to raising the level of nutrition and the standard of living of the people, securing the health and strength of workers, men and women, and especially ensuring that children are given opportunities to develop in a healthy manner. Constitutionally while public health, sanitation, hospitals and dispensaries are the responsibilities of the States, population control and Family Planning, drugs, prevention of food adulteration are concurrent subjects.

The delivery of Primary Health Care is the foundation of rural health care system and forms an integral part of the national health care system. For developing vast human resources of the country, accelerating the socio-economic development and attaining improved quality of life, Primary Health Care is accepted as one of the main instruments of action.

The program of establishing Primary Health Centres in each Community Development Block having a population of 60,000 to 80,000 was launched as an integral part of the Community Development Program on October 2,1952. Each Primary Health Centre Complex consisted of the main center with 6 beds located at the Block Head Quarters, and 4 subcentres. The staff consisted of 1 Medical Officer, 1 Sanitary Inspector, 4 Midwives (ANMs) and 2 Anciliary personnel. The Centre was to bc supported by district organization for referral consultation, laboratory, medical, surgical nursing and administrative services.

Health for All

During the Thirtieth World Health Assembly meeting in 1977 it was decided that the main social goal of all the countries and WHO should be the attainment by all the people of the world of a level of health that would permit them to lead a socially and economically productive life. Subsequently, WHO and UNICEF jointly organized an international conference on Primarily Health Care at Alma Ata, USSR, from 6-12 September, 1978. A momentous decision was taken in this conference:

- That health is a fundamental human right
- And that the attainment of the highest level of health is a most important social goal, whose realization requires the action of many other social and economic sectors in addition to health.
- "International Conference on Primary Health Care Alma-Ata 1978" – The Conference was attended by delegations from 134 governments and by representatives of 67 UN organisations and non-government organisations (NGOs).

This in nutshell means that HFA (2000 AD) should be achieved through a multi-pronged strategy mobilizing the support of other socio-economic sectors as well, or we can say All for Health (AFH) approach.

The goal of Health for All by the year 2000 still continues to be a Vision founded on social equity, on the urgent need to reduce the gross inequality in the health status of people in the world, in development and developing countries and within countries. It is a vision based on the principles that health and development are closely interlinked. It is a vision whose range of view encompasses fundamental change in the way health is perceived, promoted, projected and delivered.

And these changes, which represent a fundamental shift in values, include:

- Change in how people, individually, take greater responsibility for the protection and promotion of their health;
- Change in the way people participate collectively in health, organizing themselves into action groups and enhancing self-reliance;
- Change in the perception and value system of the health providers – in which the health professionals have to be socially concerned, de-mystify health, involve people, empower

them so that they may assume greater responsibility for their own health. They also have to broaden their understanding of health, no longer confined mainly to medical care or traditionally defined preventive health care services;

- Change in the organization administration of the health system, going beyond the physical design involving redefinition of objectives of the principal institutions, reallocation of responsibilities and even of the pawer structure; getting health closer to the people by decentralizing and delegating authority, by revolutionizing the health care delivery system, emphasizing bottom-up planning and forging linkages, and by bringing other health-related sectors into closer alliance;

- Finally, change in the attitudes and perception of policy makers in which health has to be seen and pursued as an integral part of development emphasizing a greater concern for social equity, bolstered by the courage to choose healthcare systems which are affordable, which give preferential attention to the under-privileged and vulnerable, and which provide rational means for deploying resources,

The perspective of Health for All assigns new values to health. "Health" is no longer just the availability or the access to health services but rather a state of personal well being going beyond the absence of medical problems. It means promoting healthy life-styles and ameliorating the environment in which we live; preventing illness, accidents and disability with all the means at our disposal; and providing care and cure to all using relevant technology. "For All" means that health is to be brought within reach of everyone. It emphasizes equity, social justice and cooperation.

Central to these new values is that health is a fundamental human right and a worldwide social goal, it is an integral part of development; and, people have a right and the duty to participate individually and collectively in the planning and implementation of their health care and thus they must be encouraged and prepared to become self-reliant.

Definition: Health for All is defined as the enjoyment of health as one of the fundamental rights of every human being. The vision incorporates the value of health as human right, equity, solidarity and ethics.

The basis for organization of health services in India was laid by the recommendations and guidance provided by the "Health Survey and Development Committee" (Bhore Committee) in 1946. Bhore Committee recommended basic health care approach which subsequently changed to primary health care approach. Over the last five decades, the health services organizations and infrastructures have undergone extensive changes and expansion in stages following review by a number of expert committees (Mudaliar 1961, Chadha 1963, Mukherjee 1966, Jain 1967, Kartar Singh 1973, Srivastava 1975, Alma Ata Declaration, 1978, National Health Policy 1983 and various five year plans). You will learn in detail about the recommendations of various committees and National Health Policy in Block 2 of this course.

Government of India subsequently announced a "new and restructured 20-point program" for national development in August 1986. This included "Health For All" and "Two Child Norm" as two separate points in the 20-point program. It further stated the sub-objectives of each of these two important points.

Health for All	Two Child Norm
3 Improving quality of primary health care.	i) To bring about voluntary acceptance of two child norm.
ii) Fighting leprosy, tuberculosis, malaria, goiter, blindness and other major diseases.	ii) To promote responsible pnrenthood.
iii) Providing immunization for all infants and children.	iii) To reduce infant mortality.
iv) Improving sanitation facilities in rural areas specially for the females.	iv) To expand maternity and child care facilities.
v) Paying special attention to program of rehabilitation of the handicapped.	

It will be worthwhile to emphasize that the quality of both the primary health care and the reproductive and child health are crucial to the success of both Health for All and the Two Child Norm. The quality of these services from the rural health infrastructure has come under repeated criticism and question mark.

2.3 PRIMARY HEALTH CARE AND COMPONENTS

In the previous section you learnt that Alma Ata Declaration identified Primary Health Care as the key to attain health for all.

Primary health care is defined as essential health care, which is based on practical scientifically sound, socially acceptable methods and technology, made universally accessible to people through their full participation and at a cost, which the community and country can afford to maintain in a spirit of self-reliance.

This essentially means a holistic approach, which is low cost and appropriate to local people and conditions.

The Alma Ata Declaration states that the primary health care should at least have the following eight-components:

i) Education of people regarding prevailing health problems and methods of preventing and controlling the same.

ii) Promotion of food supply and proper nutrition.

iii) Adequate supply of safe water and basic sanitation.

iv) Maternal and child health and family planning.

v) Immunization against major infectious diseases.

vi) Prevention and control of locally endemic diseases.

vii) Appropriate treatment of common diseases and injuries.

viii) Supply of essential drugs.

Check Your Progress 1

1) What has been the basis for organisation of health services in India?

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2) Define Primary Health Care.

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2.4 PRINCIPLES OF PRIMARY HEALTH CARE

The conference on Primary Health care in Alma Ata gave the PHC philosophy a political dimension with five underlying principles:

- Equitable distribution
- Community involvement

  Focus on Prevention
- Appropriate technology
- Multi-sectoral approach

them so that they may assume greater responsibility for their own health. They also have to broaden their understanding of health, no longer confined mainly to medical care or traditionally defined preventive health care services;

- Change in the organization administration of the health system, going beyond the physical design involving redefinition of objectives of the principal institutions, reallocation of responsibilities and even of the pawer structure; getting health closer to the people by decentralizing and delegating authority, by revolutionizing the health care delivery system, emphasizing bottom-up planning and forging linkages, and by bringing other health-related sectors into closer alliance;

Finally, change in the attitudes and perception of policy makers in which health has to be seen and pursued as an integral part of development emphasizing a greater concern for social equity, bolstered by the courage to choose hcalthcare systems which are affordable, which give preferential attention to the under-privileged and vulnerable, and which provide rational means for deploying resources.

The perspective of Health for All assigns new values to health. "Health" is no longer just the availability or the access to health services but rather a state of personal well being going beyond the absence of medical problems, It means promoting healthy life-styles and ameliorating the environment in which we live; preventing illness, accidents and disability with all the means at our disposal; and providing care and cure to all using relevant technology "For All" means that health is to be brought within reach of everyone. It emphasizes equity, social justice and cooperation.

Central to these new values is that health is a fundamental human right and a worldwide social goal, it is an integral part of development; and, people have a right and the duty to participate individually and collectively in the planning and implementation of their health care and thus they must be encouraged and prepared to become self-reliant.

Definition: Health for All is defined as the enjoyment of health as one of the fundamental tights of every human being. The vision incorporates the value of health as human right, equity, solidarity and ethics.

The basis for organization of health services in India was laid by the recommendations and guidance provided by the "Health Survey and Development Committee" (Bhore Committee) in 1946. Bhore Committee recommended basic health care approach which subsequently changed to primary health care approach. Over the last five decades, the health services organizations and infrastructures have undergone extensive changes and expansion in stages following review by a number of expert committees (Mudaliar 1961, Chadha 1963, Mukherjee 1966, Jain 1967, Kartar Singh 1973, Srivastava 1975, Alma Ata Declaration, 1978, National Health Policy 1983 and various five year plans), You will learn in detail about the recommendations of various committees and National Health Policy in Block 2 of this course.

Government of India subsequently announced a "new and restructured 20-point program" for national development in August 1986. This included "Health For All" and "Two Child Norm" as two separate points in the 20-point program. It further stated the sub-objectives of each of these two important points.

Health for All	Two Child Norm
i) Improving quality of primary health care.	i) To bring about voluntary acceptance of two child norm.
ii) Fighting leprosy, tuberculosis, malaria, goiter, blindness and other major diseases.	ii) To promote responsible parenthood.
iii) Providing immunization for all infants and children.	iii) To reduce infant mortality.
iv) Improving sanitation facilities in rural areas specially for the females.	iv) To expand maternity and child care facilities.
v) Paying special attention to program of rehabilitation of the handicapped.	

It will be worthwhile to emphasize that the quality of both the primary health care and the reproductive and child health are crucial to the success-of both Wealth for All and the Two Child Norm. The quality of these services from the rural health infrastructure has come under repeated criticism and question mark.

2.3 PRIMARY HEALTH CARE AND COMPONENTS

In the previous section you learnt that Alma Ata Declaration identified Primary Health Care as the key to attain health for all.

Primary health care is defined as essential health care, which is based on practical scientifically sound, socially acceptable methods and technology, made universally accessible to people through their full participation and at a cost, which the conununity and country can afford to maintain in a spirit of self-reliance.

This essentially means a holistic approach, which is low cost and appropriate to local people and conditions.

The Alma Ata Declaration stales that the primary health care should at least have the following eight-components:

i) Education of people regarding prevailing health problems and methods of preventing and controlling the same.

ii) Promotion of food supply and proper nutrition.

iii) Adequate supply of safe water and basic sanitation.

iv) Maternal and child health and family planning.

v) Immunization against major infectious diseases.

vi) Prevention and control of locally endemic diseases.

vii) Appropriate treatment of common diseases and injuries.

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Check Your Progress 1

1) What has been the basis for organisation of health services in India?

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2) Define Primary Health Care.

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2.4 PRINCIPLES OF PRIMARY HEALTH CARE

The conference on Primary Health care in Alma Ata gave the PHC philosophy a political dimension with five underlying principles:

- Equitable distribution
- Community involvement
- Focus on Prevention
- Appropriate technology .
- Multi-sectoral approach

This political philosophy has dominated discussions about primary health care since the late 1970s, and it is distinguished from the original narrow definition of PHC by being referred to as the primary health care approach.

The meaning of the five principles, which provide the framework of the primary health care approach, can be summarized as:

Equitable Distribution

Health services must be more equally acces'sible, not neglecting rural and isolated population or peri-urban dwellers.

Community Involvement

Active participation by the community in their own health decisions is essential.

Focus on Prevention

Preventive and promotive services rather than curative services should be the central focus of health care.

.Appropriate Technology

The methods and materials used in the health system should be socially acceptable and relevant.

Multi-sectoral Approach

Health must be seen as only part of total care; nutrition, education, water supplies and shelter are also essential minimum requirements to well-being.

2.4.1 A New Course of Action for Health

The Primary Health Care (PHC) approach thus constitutes a qualitative break with the past, a new course of action for health. Far from being just the addition of yet another layer to the health service – at the bottom, in the communities, using community resources – PHC implies a reordering of priorities that should permeate all levels of sectors concerned with the promotion of health. Such a reordering has, above all, three main applications.

2.4.2 Implications of the Primary Health Care Approach

First, in terms of understanding health problems, the PHC approach stresses that health promotion involves a set of issues much wider than those, which health services have conventionally tried to tackle. Therefore, the PHC approach is qualitatively different. It involves political action and the efforts of many sectors other than health.

Second, the PHC approach emphasizes the use of certain policies to translate that understending into practice. These policies include other relevant socio-economic issues which develop a framework for inter-sectoral action; they emphasize the need for an integrated approach to health care within the health service itself; they encourage a progressive shift from centralized planning and decision making to decentralization and active involvement of people in health matters.

Thirdly, the PHC approach calls for shifts in the allocation of resources to give greater emphasis to the preventive and promotive health activities and to the underserved and disadvantaged population groups.

It should be clearly understood that it is the primary health care approach, which is being promoted internationally as the key to attaining the goal of health for all by the year 2000. The approach advocates that health care be brought as close as possible to where people live and work. It stresses that primary health care be an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It therefore requires a strong political will and support at both national and community levels reinforced by a firm national strategy.

2.4.3 Distribution of Primary Health Care Centres

The Comprehensive National Health Policy created a model of health care service, with the objective of providing Health for All by 2000 AD. A working Group of the Ministry of Health of the Government of India recommended integration of the promotive, preventive and curative aspects at all levels of primary health care. Keeping in view the local topography, density of population, transport system etc., the following model of health services structure was recommended. Each state/union territory was expected to undertake careful exercises to review the available structure and to adopt the recommended model with local variations as required, to adequately meet the requirements. The health facilities will be fully utilized and equipped to implement the national programs.

Each district: A District health centre with specialized curative services and public health experts.

Each **sub-division:** (approximately 5 lakh population). A sub-divisional health centre with epidemiological wing attached to it.

Each block: (one lakh population). A Community health centre – having specialists offering medical care services in Gynaecolgy, Paediatrics, Surgery and Medicine. There will be four non-specialists doctors (general duty). One of these may be drawn from any of the locally accepted 5 traditional systems of medicine, and one should be frons the public health stream. Community health center will have 30 beds. It serves as a referral centre for four PHCs.

***For* 30,000 population** (or 15,000-20,000 in the case of hilly, tribal, sparsely populated or desert areas). ***Primary* Health Centre (PHC)** is the first contact point between village community and the medical officer. A PHC is manned hy a medical officer supported by 15 paramedical and other staff. It acts as a referral unit of six stah-centres. It has 4-6 beds. A PHC will be fully equipped to render preventive, promotive and curative services. Existing rural dispensaries will be upgraded with additional funds, equipment and expansion of staff building,

Staff *for New* Primary Health Centre

1)	Medical Officer	1
2)	Pharmacist	1
3)	Nurse midwife	1
4)	Female Health worker (ANM)	1
5)	Health educator	1
6)	Male health assistant	1
7)	Female health assistant (LHV)	1
8)	Upper Division Clerk	1
9)	Lower Division Clerk	1
10)	Lab technician	1
11)	Driver	1
12)	Class IV	4
	Total	**15**

For *5,000* population (or 3,000 population in the case of hilly, tribal, sparsely populated or desert areas) **Sub-Centre** is the most peripheral contact point between the primary health care system and community. One sub-centre, will have one MPW (Female), MPW (Male) and one part time attendant. It will provide antenatal, natal and post-natal care for pregnant women.

For each **village/1000 *population*** (or 500 population in the case of hilly nnd tribal areas or sparsely populated or desert areas). A decentralized, participatory approach involving the community intimately in the planning, implementation and maintenance of the health services was recommended.

A village health guide was appointed for population of 1000 peoples. She was trained for a period of three months and was equipped with a manual of instructions and a medicine kit. A stipend of Rs. 2001- was given during training and thereafter a stipend of Rs. 50/- p.m. was given. It was started as a 100 per cent centrally sponsored program in 1977 but in 1979, states

were requested to pay for 50 per cent of the expenses. In 1981, the scheme was again made 100 per cent centrally sponsored, with the provision that only female health guides will be appointed. If female workers not available male health guides may be appointed with preference given to ex-servicemen, freedom fighters and persons known for social service. The village health guide was meant to be a link between the community and health functionaries to ensure community participation. The scheme is under review at present.

Check Your Progress 2

1) Enumerate the principles of Primary Health Care.

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2) Give the staffing pattern of a PHC.

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2.5 ROLE OF HOSPITALS IN PRIMARY HEALTH CARE

According to Dr. H. Mahlar (former Director-General WHO), there are those who believe that hospitals and Primary Health Care are incompatible subject, arguing that every dollor spent on a hospital is one less for primary health care. According to this school of thought, we enhance the position of primary health care at the direct expense of hospitals. There are still others who see hospitals'as the repository of the best that medical care has to offer and, as such see it as a waste of time and energy for hospitals to deal with other aspects of health care. They would keep primary health care as separate and not allow it to interfere with the life of a hospital.

Commenting on the managerial implications of the role of hospitals in primary health care, Dr. Kawaye Kamanga, Head and Social Secretary, Lusakaa, Zambia said, "almost immediately acceptance of primary health care approach – universally – was largely d e to the impression that it offered a chance for the fulfillment of same political promises, dreams aspirations by means not demancling extra resources".

But, primary health care concept challenged the status quo, required new money and resources and demanded new management outlook in health services.

Many of the difficulties with the establishment of primary health care are concerning the management and the reorientation of the already existing services. In many ways, the hospitals and the primary health care were seen as either/or – mutually exclusive alternatives. What is needed is a management exercise to improve this relationship.

The WHO Expert Conunittee on the Role of Hospitals at the First Referral Level met in Geneva from 9 to 17 December 1985. The meeting was opened by Dr. T A Lambo, Deputy Director-General, on behalf of the Director-General. Dr. Lambo emphasized the timeliness and importance of the task before the Expert Committee and reminded the Committee that it was, in fact, the first WHO Expert Committee on hospitals since 1968, and the first since 1959 to review the role of the hospital in the broader context of a health system.

2.5.1 Hospitals Versus Primary Health Care: A False Antithesis

Hospitals represent, throughout the world, the main concentration of health resources, professional skills, and medical equipment. How can they give more help to the' field of primaryhealth care? That question is being asked increasingly by hospital policy makers who want to contribute to the health care revolution that is now taking place. It is also being voiced with equal urgency by those involved in organizing and promoting community health care who recognize the need for the kind of support (technical skills, scale and depth of resources, etc.) that only hospitals can provide.

Hospitals and community health services have often been seen as separate entities, and as rivals, The apparent antithesis is a false one, it is common and of long standing. Moreover, it has enough semblance of the truth to be thoroughly dangerous. However, as the demand for universal health care coverage intensifies, and constraints on resources increase in almost all health-care systems, it is clear that what is done within hospitals must be closely interrelated with health activities going on outside in the community.

Successful cooperation between hospitals and other local health services has often been hindered by differences in tradition, principles, and skills. These differences are real and in many respects valid, but both types of services are needed for a comprehensive approach to health care.

The hospital is traditionally concerned with individual patients, and with acute curative care. Such care is resource intensive, and requires modern techniques and well-trained professional manpower. The hospitals tend to define performance in terms of the quality of individual care for those who are seriously ill, and of the use of sophisticated methods. The main problems encountered are those arising from doctor-patient relationships and the interaction of treatment methods and individuals.

By contrast, the primary health care approach (which is just as relevant to hospitals as to other local health services) advocates promotive and preventive activities as well as treatment, and is oriented to the needs of entire populations. It seeks to maximize the impact of available resources in relation to all health needs by the use of appropriate technology and a broad range of health personnel including community health workers. The success of such an approach is defined not only by the quality of individual care but also by improvements in the health status of populations, and in terms of more equitable use of available health resources, wider coverage of the population, and greater personal responsibility for health. The main problems encountered are those arising from the interaction of health systems and populations, and resource allocution.

The philosophies behind these two different approaches also differ. In the hospital approach, the improvement of health is often viewed as being beyond the power of the individual, it being regarded as the realm of the specialized providers of medical care; the service is thus professionally oriented. The trained professional, who has invested substantial amounts of time and money in developing technical skills, is seen as the most valuable instrument in a system that focuses on nurture and development. The health provider's role is more that of a "facilitator".

Differences in the underlying philosophies of the two approaches may result in conflict when they are brought together. However, health professionals both within and outside hospitals can and should find common ground in a comprehensive view of primary health care, despite their differences in tradition and orientation.

2.5.2 The Need for Hospital Involvement

No local health system based on the primary health care approach can work without the involvement and support of a hospital, and an efficient system of referring patients who need more specialized care than can be given outside the hospital. However, it is equally important that the hospital does not offer treatment that can be provided by other levels of the health service, if it does it will become overloaded and unable to provide proper support to the community.

In many countries there is a deep-rooted impression that the higher levels of the health service, provide the bebt care. Therefore, strong links are essential between the hospital and the community in order to reassure people that they will receive specialized hospital treatment if it is truly needed.

Primary health care does not simply mean community health services or primary medical care in a'conventional sense. It can be looked at in several different ways:

As a range of programs adapted to the patterns of health and disease of people living in a particular setting;

- As a level of care (the exact definition depending upon the country concerned) backed up by a well-organized referral system;
- As a stsategy for reorienting the health system in order to provide the whole population with effective essential care, and to promote individual and community involvement and intersectoral collaboration; and
- As a philosophy, based on the principles of social equity, self-reliance, and community development.

Whichever way primary health care is looked at, hospital involvement is essential. If primary health care is regarded as a range of programs, it requires the back up of hospitals in promotive and preventive activities, as well as curative and rehabilitative services. If it is regarded as a level of care, primary health care will not work unless there is effective hospital support to deal with referred patient, and to refer patients who do not require hospital attention back to one of the other primary health care services. If it is regarded as a strategy, it will not work without an adequate investment of skills and finance, which, at present, are mainly in the hospital sector. Moreover, the philosophy of primary health care is just relevant to what goes on within hospitals, as to what happens outside them.

2.5.3 Role and Functions of the Hospital at the First Referral Level

Typically, hospitals are extsemely busy places, doing the best they can for individual patients, whether they present for emergency treatment, an outpatient consultation, or inpatient care. Rarely can staff stand back from their work and consider the hospital's role in conceptual terms.

One way to analyze the hospital's role in the model of primary health care illustrated in Fig. No. 1 is as part of a dynamic system with inward and outward flows of people, materials, requests, reports, ideas, etc., from the home, the community, or the health center to the hospital, or vice versa. Some examples of these flows are given below:

Inward Flow: Patients, problems, requiring resolution, people for training, reports, data for evaluation, requests for consultations, equipment needing repair and maintenance, and requisitions for supplies.

Outward **Plow:** Patients, instructions, analyses of reports, training and supervisory activities, consultation reports, requests for information about the periphery, new ideas and techniques, equipment, and supplies.

Such intersactions (which differ according to local circumstances) do not take place in a vacuum; the hospital at the first referral level must relate to all the other levels of the health service, including secondary and tertiary referral levels. Moreover, the hospital's relations with other public services (intersectoral collaboration) are vital, as is the social and political context of the community, which it serves. The inward and outward flows are thus moulded in a particular setting by such forces as population density, economic development, the attitude of the medical profession, and the degree of decentralization and integration of the political system.

Another way to address the question of the hospital's role is by considering its contribution, in terms of clinical care and functional support (for example, manpower development and management activities), to specific primary health care programs (for example, immunization) in relation to the contributions made by other levels of the health service. In effect, this approach is the same as extracting a series of program "slices" from the multidimensional model shown in Fig. 2.1 in order to review who does what, and where the gaps or overlaps may be?

Both approaches can lead to a definition of the hospital's role in terms of patient referral, health program coordination, education and training, and management and administrative support. The Committee discussed each of these subjects in turn, and then considered their organization implications.

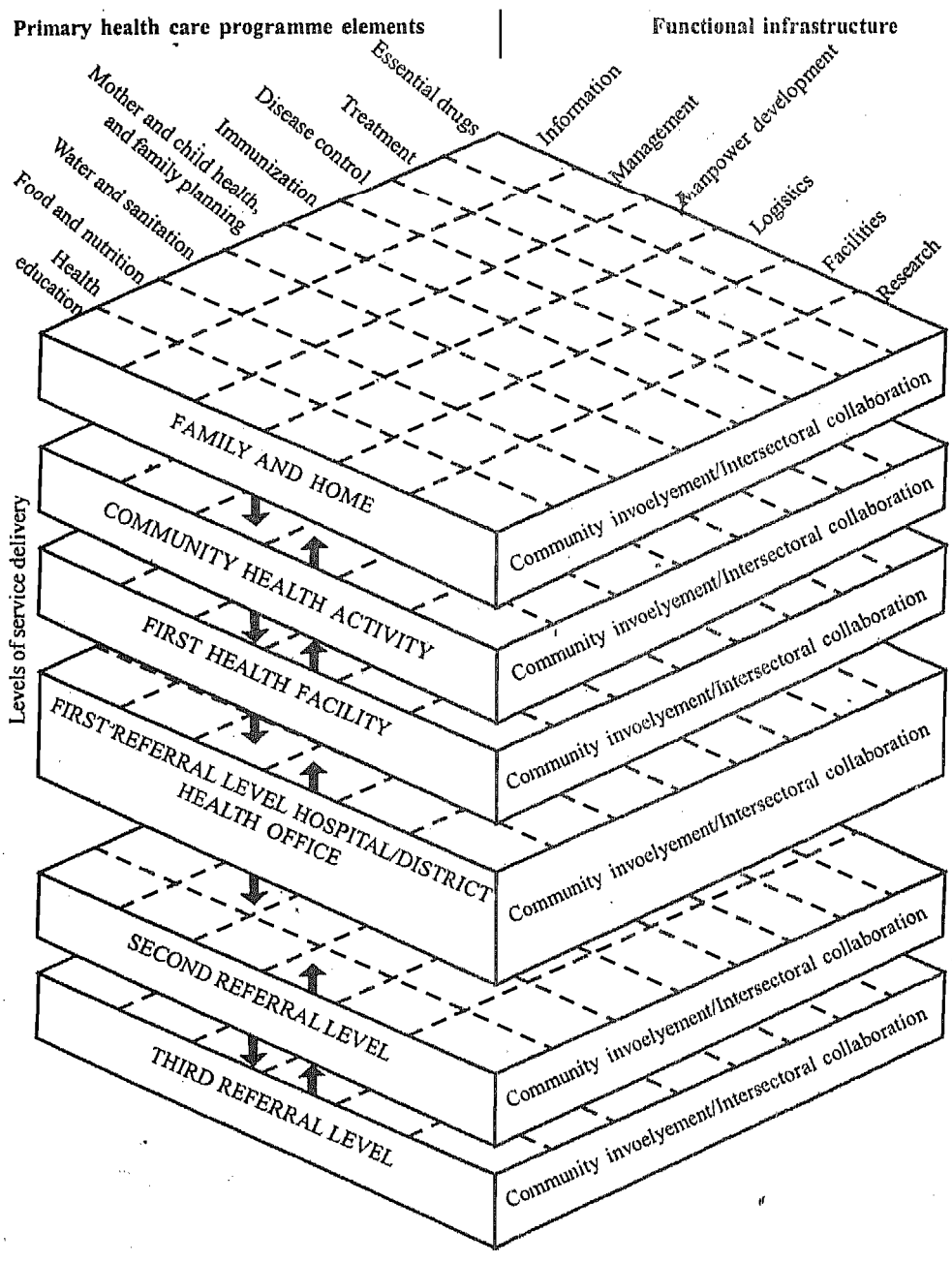

Fig. 2.1: A Conceptual Model of a Comprehensive Health System Based on the Principles of Primary Health Care

Patient Referral

Some patients present direct to the hospital, through emergencies and self-referral, while others are referred by a physician, nurse, or the health care worker. In any of these instances the hospital's job is to treat the patient as best it can, discharge him or her as soon as it is consistent with appropriate care, and explain to the referring practitioner or health care worker its findings and the further care required.

In theory this sounds simple, but it is not always so in practice. For example:

- The hospital may be almost overwhelmed with patients (through self-referral and through poorly judged referral), so that adequate care is difficult to achieve;
- Referred patients often do not arrive at the hospital or arrive only after an undesirable delay because the journey to the hospital is too long, or because of lack of transport or of financial problems;
- People may have very little confidence (sometimes justifiably) in the care that they would receive outside the hospital, and therefore go directly to the hospital; and

- The flow of information to and from the hospital is generally inadequate. Evidence presented to the Expert Committee (based on one, not untypical, study) suggested that at least half the letters of referral to hospitals were inadequate, and that most discharge reports and summaries were either defective or late, or both.

2.5.4 Issues in Role of Hospital i-n Primary Health Care

The WHO Expert Committee has raised the following issues which the hospitals should consider with regard to their role towards primary health care:

- defined coverage of population by the hospital.
- service to the population outside its walls.
- identification of problems, resources and needs of the covered population.
- liaison with other health agencies.
- defining the prevalence and distribution of specific health problems and planning the type of services (Indoor/Outdoor).
- development and maintenance of an information system for evaluation.
- participation in health manpower development.
- provision of logistic support to PHC.
- development of effective referral system.
- review & increased resources allocation to PHC proportionately.
- quality wise evaluation of hospital services and extension of same to PHC.
- consideration of essential functional and organizational changes to accommodate PHC.
- evaluation PHC activities (supported by the hospital) as a component of total evaluation of the hospital performance.
- changed its role to join with community representatives to generate support for PHC.

The Expert Committee emphasized the fact that a general hospital cannot work in isolation and it must be a part of a social and medical system that provides complete health care. While accepting that curative medicine is the principle function of hospitals, the Committee agreed that preventive activities should be developed, and that the training of health personnel and research (both biomedical and social) were other indispensable functions of any general hospital. The organization of a regional system of hospitals, and the development of extra-mural activites for a defined population, were strongly recommended as a way to achieve integration of preventive and curative medicine.

It can be said that the hospitals should support and encourage the Primary Health Care and establish sound linkages with the rural health infrastructure.

Check Your **Progress 3**

1) Is there any antithesis between Hospitals and Primary Health Care?

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2) List the issues raised by the Expert Committee.

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2.6 HEALTH FOR ALL IN THE TWENTY-FIRST CENTURY

At the end of the 20th Century, it is beconling clear that the goal of Health for all by the year 2000 has not been achieved. Two major factors are held responsible for this failure.

These include:

a) biased and poor socio-econonlic development in the regions where it was needed most, and

h) discriminatory policies due to age, gender and ethnicity thus preventing access to health care surveillance.

In order to realize the goal of HFA in the 21st Century, WHO has come forward with a outline of visions, goals and objectives and targets to achieve it in the very near future. Health has to be made central to hunian developments and this presupposes, a commitment to developmental policies and economic strategies, so well outlined in the HFA 21st century document.

The implementation of new global health policy "Health for All in 21st Century" will be guided by global targets. Specific indicators will bc developed to assess progress at all levels.

2.6.1 Targets

Ten global targets are identified to guide the implementation of HFA policy in the 21st century. These can be broadly classified into three groups. However, regions and countries should sets their own targets based on local conditions and priorities.

i) Those related directly to health outcomes and are quantifiable directly (1–4)

ii) Those requiring intersectional action and enhancement of intervention in the field of health promotion (5–6)

iii) Those reflecting the significance of building sustainable health systems (7–10)

Target 1: Improve health equity By 2005, health equity indices will be used within and between countries as a basis for promoting and monitoring equity in health. Child growth will be initially used as a quantitative target for equity as follows. "The percentage of children under five years who are stunted should be less that 20 per cent in all countries and in all specific subgroups within countries by the year 2020". Height for age is considered a good indicator for monitoring child growth because it can measure the long-ten11cuniulative deficiencies in growtli. Presently 38% children in developing countries and 34% worldwide are stunted.

Target 2: Increase survival By 2020, the target agreed at World Conference for maternal mortality Rate, under five mortality rate and life expectancy would be met.

Maternal Mortality Rate < 100 per 1,00,000 live births

Child Mortality Rate < 45 per 1000 live births

Life Expectancy at birth > 70 years for all countries

Target 3: Reverse Global trends for five major pandemics: By 2020, the worldwideburden of disease will be substantially decreased, This will be achieved by implementation of sound disease control programs aimed at reversing the current trends of increasing incidence and disability caused by tuberculosis. HIV/AIDS, malária, tobacco related diseases and violence1 traume.

Target 4: Eradicate and eliminate certain diseases. The following table presents a clear picture:

Disease	Target	Strategy
Measles	Eradication by 2020	Immunization, surveillance, training
Lymphatic filariasis	Elimination by 2020	Vector control, community treatment

Disease	Target	Strategy
Chagas's disease	Interrupt transmission by 2010	Vector control, blood screening
Leprosy	Elimination by 2010	Multi-drug therapy, surveillance, research, awareness
Trachoma	Elimination by 2020	SAFE strategy Surgery, antibiotics, facial cleanliness and environmental improvement
Vitamin A and Iodine deficiency	Elimination by 2020	Dietary improvement, fortification of fats or sugar or salt, supplementation program

Target 5: Improve access to water, sanitation, food and shelter By 2020, all countries should make major progress in providing safe drinking water, adequate sanitation, food and shelter in sufficient quality and quantity. This can be achieved by

- Targeting the high risk population first
- Emphasizing on community participation and management of facilities, and

  Increasing the awareness of politicians and decision–makers concerning the health risks of insufficient water and sanitation facilities.

Target 6: Promote health enhancing life styles By 2002, all countries will have introduced and be actively managing and monitoring strategies that strengthen health-enhancing life-styles and weaken health damaging ones through a combination of regulations and economic, educational , organizational and community based programs. The target advocates a healthier public policy, and support environment, community action, personal skills und health services. For achieving the goal, indicators related to both health enhancing (for example, physical activities, nutrition, personnel relationship) as well as health damaging (substance use, violence, unsafe sex etc.) life-style needs to be developed.

Monitoring will be focused on changes in (i) health behavior (ii) health determinants, (iii) regulatory, fiscal, economical and environmental policies, and (iv) capacity building programs and participation of individuals communities, schools, work places, media and other sectors.

Target 7: Develop, implement and monitor national HFA policies By 2005, all member states will have operational mechanisms for devetoping, implementing and monitoring policies that are consistent with these HFA policies. Each country should select the best mix of policies to achieve HFA depending on its needs, capacities and priorities. Policies should then be translated into action with the help of a strong strategic management expertise and local framework.

Target 8: Improve access to comprehend essential quality health care By 2010, all people will have access throughout their lives to comprehensive, essential, quality healthcare, supported by essential public health functions. This target incorporates the concept of a life span approach to health promotion, prevention and care.

Target 9: Enhance health information and surveillance system By 2010, appropriate global and national health information, surveillance and alert system will be established with best use of resources.

Target 10: Support research for health By 2010, research policies and institutional mechanism will be operational at global, regional and countiy level. All countries need to define their research priority, ensure that research is funded, managed, ethical principles applied and capacity development is support.

The current mismatch between the burden of diseases and resources allocated for research on these diseases should be eliminated. Research efforts should be directed towards areas where substantial health gain is needed.

2.6.2 Primary Health Care Infrastructure

The Primary Health Care infrastructure has been developed as a three-tier system and is based on the following population norms:

Centre	Population Norms	
	Plain Area	Hilly/Tribal Area
Sub Centre	5000	3000
PHC	30000	20000
CHC	120000	80000

Sub-centres

It is the most peripheral contact point between the Primary Health Care system and the community, It is manned by one Multi-purpose Worker (Male) and one Multi-purpose Worker (Female)/ANM. Only 97,757 Sub Centres are funded by Department of Family Welfare, out of a total number of 1,37,271 Sub Centres functioning in the country as on30.06.1999. The rest are being funded under the State Minimum Needs Program/Basic Minimum Services Program.

It has been decided during 1997 that the states will have the choice of opening new sub-centres out of the funds provided to them under the BMS Program.

Primary Health Centres (PHC's)

PHC is the first contact pomt between village community and the Medical Officer. These are established and maintained by the State Government under the Minimum Needs Program (MNP)/Basic Minimum Services Program. A PHC is manned by a Medical Officer supported by 14 paramedical and other staff. It acts as a referral unit for 6 Sub-ccntrcs. It has 4-6 beds for patients. The activities of PHC involve curative, preventive, prornotivc and Family Welfare Services. As on 30.06.1999, 22,975 PHCs arc functioning in the country.

Community Health Centres (CHCs)

CHCs are being established and maintained by the State Government under MNP/BMS. It is manned by four medical specialists i.e. Surgeon, Physician, Gynaecologist and Paediatrician supported by 21 paramedical and other staff: It has 30 in-door beds with one OT, X-ray, Labour Room and Laboratory facilities. It serves as a referral center for 6 PHCs. As on 30.06.99, there were 2935 CHCs functioning in the country.

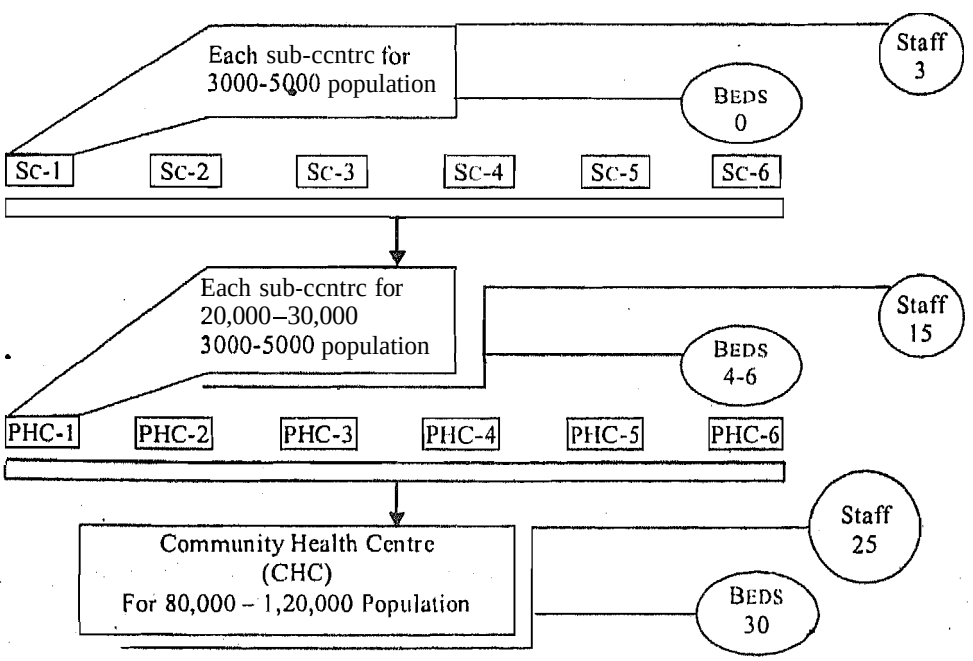

Fig. 2.2: Population Norms of Community Health Centre, PHC and Sub-centre

Primary Health Care Infrastructure

The number of health centres in India and other levels of achievement are shown below: (as on 30.6.1999, Bulletin on Rural Health Statistics in India, Ministry of Health & Family Welfare, New Delhi)

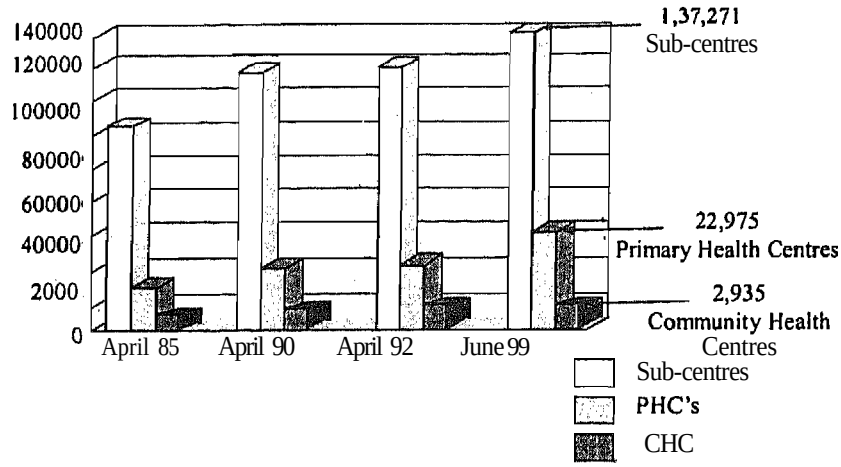

Fig. 2.3: **Existing** Health Centre Facilities in **India** as on 30.6.1999

This by no means is a small health infrastructure that the country has, but the quality of services from them or their utilization in general is rather poor. Therefore, the existing health infrastructure needs to be consolidated and made vibrant so as to address to the felt needs of the rural/tribal community, specially the disadvantaged group of the society. In fact, the success of health and family planning programs depends on (a) good teamwork among the various categories of health workers. The leader of this team is normally a doctor. Today, all studies suggest that the leadership role played by these doctors, particularly in the mral health infrastructure is disturbing. They need to be given serious management training especially in the behavioral/attitudinal aspects.

We should not forget that HFA is the destination, and leadership is the cutting edge of change and the driving process to get to the destination.

Check Your Progress 4

1) Summarise the Primary Health Care infrastructure as on June, 1999.

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2) Discuss the vision of the Government for HFA in the 21st Century.

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2.7 LET US SUM UP

In this unit you have learnt that nearly all health systems, hospitals are too dominant and consequently too little attention is paid to the links between the hospital and Primary Health Care and workers in the field.

You have also learnt about the concept, scope and vision of Health for All. Further you learnt the definition and components of primary health care. Subsequently you learnt the role of hospital in primary health care and achieving the targets of health for all.

Towards the end of the unit you learnt about the availability of primary health care infrastructure in the country. Today's health planners and adminstrators must take a note of this disturbing trend and make all efforts to correct this kind of enforces.

2.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Health Survey and Development Committee, 1946. (Bhore Committee, 1946)

2) Primary health care is essential health care, which is based on practical scientifically sound, socially acceptable methods and technology, made universally accessible to people through their full participation and at a cost, which the community and country can afford to maintain in a spirit of self-reliance.

Check Your Progress 2

1)
- Equitable distribution
- Community involvement
- Focus on Prevention
- Appropriate technology
- Multi–sectoral approach

2) Staffing pattern of a PHC:

Medical Officer	1
Pharmacist	1
Nurse midwife	1
Female Health worker (ANM)	1
Health educator	1
Male health assistant	1
Female health assistant (LHV)	1
Upper Division Clerk	1
Lower Division Clerk	1
Lab technician	1
Driver	1
Class IV	4
Total	15

Check Your Progress 3

1) Hospitals represent, throughout the world, the main concentration of health resources, professional skills, and medical equipment. How can they give more help to the field of primary health care? That question is being asked increasingly by hospital policy makers who want to contribute to the health care revolution that is now taking place. It is also being voiced with equal urgency by those involved in organizing and promoting community health care who recognize the need for the kind of support (technical skills, scale and depth of resources, etc.) that only hospitals can provide.

Hospitals and community health services have often been seen as separate entities, and as rivals. The apparent antithesis is a false one, it is common and of long standing. Moreover, it has enough semblance of the truth to be thoroughly dangerous. However, as the demand for universal health care coverage intensifies, and constraints on resources increase in almost all health-care systems, it is clear that what is done within hospitals must be closely interrelated with health activities going on outside in the community.

2) The WHO Expert Committee has raised the following questions which the hospitals should consider with regard to their role towards primary health care:

- defined coverage of population by the hospital.
- service to the population outside its walls.

  identification of problems, resources and needs of the covered population.
- liaison with other health agencies.
- defining the prevalence and distribution of specific health problems and planning the type of services (Indoor/Outdoor).
- development and maintenance of an information system for evaluation.
- participation in health manpower development.
- provision of logistic support to PHC.
- development of effective referral system.
- review & increased resources allocation to PHC proportionately.
- quality wise evaluation of hospital services and extension of same to PHC.
- consideration of essential functional and organizational changes to accommodate PHC.
- evaluation PHC activi'ties (supported by the hospital) as a component of total evaluation of the hospital performance.
- changed its role to join with community representatives to generate support for PHC.

Check Your Progress 4

1) Existing Health Centre Facilities in India as on 30.6.1999:

   - 1,37,271 Sub-centres
   - 22,975 Primary Health Centres
   - 2,935 Community Health Centres

2) In order to realize the goal of HFA in the 21st Century, WHO has come forward with a outline of visions, goals and objectives and targets to achieve it in the very near future. Health has to be made central to human developments and this presupposes, a commitment to developmental policies and economic strategies, so well outlined in the HFA 21st century document. '

   The implementation of new global health policy "Health for All in 21st Century" will be guided by global targets.

UNIT 3 BASICS OF EPIDEMIOLOGY AND BIOSTATISTICS

Structure

3.0 OBJECTIVES

After going through this unit, the students should be able to:

- comprehend the significance and describe the concepts of epidemiology;
- apply the principles of epidemiology to logical reasoning about the causes of health problems and derive practical solutions to them;
- conduct various epidemiological studies;
- forecast an epidemic and manage it if it occurs;
- use the knowledge of screening in prevention and management of diseases; and
- understand and apply common biostatistical tests.

3.1 INTRODUCTION

In this unit you will learn about the epidemiological principles and concepts. You will also learn about various epidemiological methods including descriptive and analytical epidemiological studies. Further you will learn about the various pattern of epidemics, forecasting of epidemics and its management. This unit also covers that concept of screening

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of diseases. Towards the end of the unit you will learn about basic concepts of biostatistics including the tests of significance.

Epidemiology is primarily based on two assumptions, i.e. human disease does not occur at random and that human disease has casual and preventive factors that can be identified through systematic investigation of different population or sub-groups of individuals within a population in different places or at different times.

Epidemiology has not evolved as a science recently. In fact, it is as old as medicine itself. As early as the 5th century BC, Hippocrates considered that the development of human disease might be related to the external as well as the personal environment of an individual.

Recognition by John Graunt in London in 1662 about the value of routinely collected data on births and deaths in providing information about human illness forms the basis of modern epidemiology. William Farr, later in 1839, in England and Wales established a tradition of careful application of vital statistical data to the evaluation of health problem of the general public.

John Snow during 1849-1854, used his clinical knowledge as well as observations to formulate and test the causal hypothesis for cholera epidemics, This approach was applied primarily to outbreak of infectious diseases throughout the 19th and early 20th centuries. Thus, the term epidemiology was originally used almost exclusive to mean the study of epidemics of infectious diseases. The patterns of mortality in developed countries and to a large extent in developing countries have changed markedly with chronic diseases assuming increasing importance. Accordingly, the concept of an epidemic has become much broader and more complete, thus necessitating more advanced methods of investigation.

Control of infectious diseases characterised by relatively short latency periods between exposure and onset of illnesses, by improvement in nutrition, housing, water supply and sanitation coupled with methods of treatment, immunisation etc., in developed countries has led to emergence of chronic-diseases, characterised by long latency periods of 10-22 years or more as a major cause of mortality. This change in mortality pattern for developed countries had far reaching implications for epidemiology. First, the priority population group on which public health activities were focussed got shifted from infants and young children to middle aged people with the aim of preventing premature death from chronic conditions like **CHD** and cancer. Second, the term epidemic is broadened to include any disease-infectious or chronic occurring at a greater frequency than usually expected. Third, the increased importance of chronic diseases has necessitated the development of new methodologies because while investigating etiologies, the exposure of interest in case of chronic diseases might have occurred many years prior to the onset of illness (as compared to an investigation of a disease like measles or diphtheria). The major development are the design of studies and-techniques for collecting and analysing data to facilitate evaluation of risk factors for chronic diseases through case control and cohort studies. More recent development has the application of epidemiologic principles and methods to the design, conduct and analysis of intervention studies like clinical trials wherein the investigators manipulate the human environment like the basic researchers control conditions in the laboratory.

Contribution of Epidemiology

The results of basic laboratory and animal research may differ from those that apply to human beings and may become irrelevant to humans i.e. applicability of findings from a particular species of animals to humans cannot be predicted. Similarly, there are variation in dosages as well as routes of administration of agents in animal and human experiments and hence reliable quantitative estimates of risks in humans is difficult. Thus, while basic research may add to our biologic understanding of why an exposure causes or prevents disease, only epidemiology allows the quantification of magnitude of the exposure disease relationship in humans and offers the possibility of altering the risk through intervention. Therefore, epidemiological studies (i.e. on human population) can provide strong and reliable evidence on which the base policy and ultimately decisions affecting the health of the general public.

3.2 CONCEPT OF EPIDEMIOLOGY

Definition of Epidemiology

A modem definition, internationally accep ted is: Study of the distribution and determinants of health-related states and events in populations, and the application of this study to control health problems. The phrase "health-related" – relates to phenomena like physical fitness, pregnancy, eating habits etc., which are not diseases. The final clause in the definition is there because there is no sense in studying the distribution and determinants of problems without doing something to control at and evaluate the control measures (John. M Last, 1988, Journal of Public Health Policy, Vol. 9, No. 2).

Epidemiology is the most powerful tool for the diagnosis, monitoring and evaluation of a community's health.

Basic purpose of epidemiology is to obtain, analyse, interpret and use health information to promote health and reduce disease.

Epidemiology does not represent a body ofknowledge like 'anatoniy' but it represents a philosophical method of studying a health problem.

Epidemiology is actually logical reasoning about causes of health problems based on information gathered through observations and measurements.

Epidemiology is an applied discipline which is concerned with practical solutions to problems, and it depends on other disciplines like clinical medicine, biostatistics, microbiology, pathology, demography, behavioural sciences, etc.

Information for epidemiological studies are derived from the following questions:

What?	What is the problem,. disease condition? What are its manifestations and characteristics?
Who?	Who is affected with reference to age, sex, social class, occupation, heredity, personal habits, etc?
Where?	Does the problem occur in relation to place of residence, geographical distribution?
When?	When does it happen in terms of days, months, season or years?
How?	How does it occur and what is its association with specific conditions, agents, vectors, sources of infection, susceptible groups, and other contributing factors?
Why?	Why does it occur in terms of reasons for its persistence or occurrence?
So What?	What interventions have been implemented as a result of the information gained and what was their effectiveness'? Have there been any improvement in health status?

Epidemiological skills are crucial for health managers to obtain and interpret health information for preparing plans, for guiding allocation of resources, for monitoring the implementation of different health programmes, for assessing their access and coverage as well as effectiveness by measuring changes in the health status. Thus, the main function of epidemiology is to handle/manage various types of data either already generated by health and other service facilities routinely as a part of the health service procedure or newly generated through specific survey procedures, for the purpose of enabling technical and managerial decision making for improving health service delivery and thereby tlie health of community. The important feature of epidemiology is that the bulk of data which are available are analysed and converted into meaningful indicators of measurement of different aspects of health problems and services and interpret them to relate to the community from where the data are generated so that appropriate decision are taken to benefit the community.

3.3 IMPORTANT EPIDEMIOLOGICAL PRINCIPLES AND CONCEPTS

3.3.1 Natural History of Disease

In this carlier unit you have already learnt that every disease will follow a natural course. It includes a pre-pathogenic phase, where the interaction of agent, host and environment takes place and once the balance is in favour of the agent the disease process starts i.e. the pathogenic phase begins. In this phase there is the incubation period followed by the emergence of clinical manifestation of signs and symptoms, development of progressive disease process including complications, disabilities and the ultimate outcome of either recovery, with or without sequel or death. In some cases in some diseases where the host nearly overcomes the disease processes initiated by the agent there is a sub-clinical phase which is most diseases are missed by the clinicians.

3.3.2 Epidemiological Triad

The agent alongwith the secondary factors determine the occurrence of the disease i.e. theory of multiple causation. These causal factors may thus relate to the etiological agent itself, to the host and to the environment in which both agent and host exist. The interaction among these three i.e. the agent, host, and environment is the epidemiological triad. The tilt of the equilibrium in favour of either the agent or the host will ultimately decide if the disease occurs or not.

3.3.3 Levels of Prevention/Intervention

Depending upon the knowledge about the stages of the natural history of the disease and availability of technological inputs/strategies, different levels of prevention/interventions can be applied as follows:

Prepathogenic phase: Primary prevention i.e. health promotion and specific protection.

Pathogenic phase: Secondary prevention i.e. early diagnosis and prompt treatment and tertiary prevention i.e. disability limitation and rehabilitation.

For details of these you may refer to unit on Concepts in Community Health (Unit 1 in this Block).

3.3.4 Risk Approach in Health Care

Risk approach in health care is an effective management tool to ensure rational and more efficient use of resources. Important assumption underlying this approach is that risk factors which predispose persons to higher chances of suffering from undesirable outcomes of diseases or death, are known and that individuals can be grouped under high, moderate, low risk categories as well as specialised care can be provided to those who need them by directing the allocation of Iimited resources particularly for this purpose. Prior knowledge1 ascertainment of risk factors through epidemiological studies (with analytical studies which have proved the hypothesis establishing the association between the risk factor under question with the disease) is an essential prerequisite in this regard.

Application of risk approach in health care are evident in case of MCH services, Coronary Heart Diseases (CHD), Cancer etc.

3.3.5 Measurement

A prerequisite for any epidemiological investigation is the ability to quantify the occurrence of disease. The most basic measure is the simple count of affected individuals. This will give the actual load of disease in a community which would enable proper allocation of resources to tackle that problem. However, conclusion in epidemiology are generally based on comparisons. Such comparisons are based onstudying the relative frequency of the event in a population against the frequency of the same event in another population. The basic tools of measurement in epidemiology are rates, ratios, and proportion. Rates are a way of comparing the frequency of an event in population.

Measures of disease frequency used in epidemiology fall into two broad categories i.e. Prevalence and Incidence.

Prevalence quantifies the proportion of individuals in a population who have the disease at a specific instant;

$$P = \frac{\text{Number of existing cases for a disease}}{\text{Total population at a given point of time}}$$

In contrast to prevalence, incidence quantifies the number of new events or cases of disease that develop in a population of individuals at risk during a specified time interval.

$$I = \frac{\text{Number of new cases of a disease during a given period of time}}{\text{Total population at risk}}$$

Check Your Progress 1

List the uses of epidemiology?

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3.4 EPIDEMIOLOGICAL METHODS

Knowing that human disease does not occur at random, the next step is to try to find the causal factors for human disease through systematic investigation. Statistical association is then determined between the causal factor suspected and the disease before drawing inferences for its use in the prevention and control of diseases.

3.4.1 Descriptive Epidemiological Studies

They describe the general characteristics of the distribution of disease in relation to person, place, and time.

Indices of person include:

- demographic factors like age, sex, occupation, marital status, race, life-style variables like food habits, drug use etc.
- characteristics of place refer to geographic distribution of diseases including variation among countries or within countries such as urban and rural areas etc.
- time characteristics refer to seasonal patterns of disease, onset, trend of disease over years etc.

Sources of data for descriptive studies may be:

- case reports kept by clinicians.
- routine disease surveillance reports.
- cross-sectional surveys,

Cross-sectional surveys on any disease would help in quantifying the disease for that time of survey, prevalence, and also in describing the disease in relation to various parameters.which might include some risk factors also. However, since data on the disease and the risk factor is obtained at the same point in time, it is difficult to distinguish whether the risk factor proceeded the development of the disease or not (which is important in establishing a causal association).

The information obtained from these studies can lead to formulation of epidemiological hypothesis regarding causation or prevention of disease. It also helps planners to allocate resources and to plan effective prevention and education programmes.

3.4.2 Analytical Epidemiological Studies

Since analytic studies aim at testing hypothesis related to the exposure factor and disease, the investigator assembles groups of individuals for systematically determining whether or not the risk of the disease is different for individuals exposed or not exposed to the factor of interest. Comparison between two groups is explicit in such studies.

There are two types of analytical studies i.e.

a) Observational, and b) Interventional

Observational studies can be: Case control and Cohort

Decision to use a particular study is determined by:

- the features of exposure,
- the features of disease,
- the current state of knowledge, and
- logistic considerations like time available, resource availability.

Case Control Study

In this, subjects are selected on the basis of whether they do (cases) or do not (controls) have a particular disease under study. The groups are then compared with respect to the proportion having history of exposure or characteristic of interest.

Selection of Cases (affected individuals)

- First define the disease or the outcome of interest
- Establish diagnostic criteria to ensure inclusion of homogenous entity of disease.
- Selection of cases from different courses i.e. from medical care institution is from the general population.

Selection of Control

Controls are necessary to allow the evaluation of whether the frequency of an exposure observed in the case group is different from that which would have been expected among those who do not have the disease. Controls could be from medical care institutions (suffering from some other diseases), general population controls, special groups like friends, relatives, etc.

Information about Exposure: To be obtained from the study subjects, both cases and controls, either by interview or questionnaire and if available, from records.

Analysis: Basically a comparison between cases and control with respect to the frequency of an exposure whose aetiologic role is being evaluated. Comparison is made by estimating the relative risk/odds ratio, e.g.

Cigarette Smoking	Lung Cancer		Total
	Cases	Controls	
Yes	70 (a)	300 (b)	370
No	30 (c)	700 (d)	730
Total	100	1000	1100

$$\text{Odds Ratio} = \frac{ad}{be} = \frac{70 \times 700}{30 \times 300} = 5.4$$

$$\text{Relative Risk} = \frac{a/(a+b)}{C/(c+d)} = \frac{701370}{301730} = 4.6$$

RR = 1.0 indicates that the incidence rates of disease in the exposed and non-exposed groups are identical and thus that there is no association observed between exposure and disease. In a case control study, since participants are selected on the basis of disease status, it is difficult to calculate the rate of development of disease incidence. Yence, the relative risk

- can be estimated by calculating the ratio of the odds of exposure among cases to that of control, i.e. Odds Ratio.

A value of RR more than 1 indicates a positive association or an increased risk among those exposed to the risk factor.

Strengths and **Limitations** of Case **Control** Studies

Strengths

Relatively quick and inexpensive compared to other analytic designs. Particularly well suited to the evaluation of diseases with long latent periods. Optimal for evaluation of rare diseases can examine multiple etiological factors for a single disease.

Limitations

Inefficient for the evaluation of rare exposures, unless the a'ttributable risk percent is high.

Cannot directly compute incidence rates of disease in exposed and non-exposed individuals, unless study is population based.

In some situations, the temporal relationship between exposure and disease may be difficult to establish.

Particularly prone to bias compared with other analytic designs, in particular selection and recall bias.

Cohort Studies

Here groups of individuals are defined on the basis of presence or absence of exposure to suspected risk factor for a disease. At the time of defining **the** exposure status, subjects must be free from the disease under investigation. Participants are then followed over a period of time to assess the occurrence of that outcome/disease.

Selection of Exposed Population/Cohort

For life-styles like smoking, alcoholism etc, individuals with that particular life-styles can be included in the cohort, or for environmental factors, people from specific geographic locations or if the exposure is related to a particular occupation, people engaged in that-occupation can be included as "exposed cohort".

Selection of **Comparison** Group

Appropriate comparison group of non exposed individuals are to be selected. This group should be as similar to tlie exposed group with respect to all factors related to the disease except the determinant factor under investigation.

During follow up, complete, comparable, unbiased information on tlie health experience of every individual in both groups will have to be collected. The basic analysis of data from' cohort studies involve the calculation of rates of the incidence of a specified outcome among tlie cohort under investigation which will be compared between the exposed and the non exposed. Both relative and attributable risks can be estimated from this type of study.

If the frequency of occurrence of the disease/outcome is significantly higher in the exposed group, then the association is said to be established i.e. tlie hypothesis indicating the association between a disease and its causal factor will be accepted.

Strengths **and** Limitations of **Cohort** Studies

Strengths

Of particular value when the exposure is rare

Can examine multiple effects of a singie exposure

Can elucidate temporal relationship between exposure and disease.

If prospective, minimises the bias in the ascertainment of exposure.

Allows direct measurement of incidence of disease in exposed and non exposed group

Limitations

Inefficient for evaluation of rare diseases, unless the attributable risk percent is high.

If prospective can be extremely expensive and time consuming.

If retrospective, requires the availability of adequate records.

Validity of results can be seriously affected by loss of follow up.

Intervention Studies

In intervention studies the individuals are included on the basis of exposure to a factor, which invariably should be some beneficial factor, and aie followed over a period of time for the occurrence of the outcome. The investigator allocates the exposure. Common examples for epidemiological intervention studies are clinical trials for new treatment procedures, or vaccine trials, or introduction of some service package like provision of iodised salt., It may also be the introduction of a preventive safety device like helmets or car belts while driving or wearing of lead aprons while conducting radiological procedures.

The first step in conducting intervention study is the selection of the study population where tbere should be an experimental group and a control group. This allocation in the, experimental and control group should be through randomisation of avoid bias. Randomisation is the hallmark of an honest trial.

The investigator may be aware of the groups being experimental or control, but the recipients will not know if they are receiving the drug or the placebo. These are single blind trials. In double blind trials neither the investigator nor the recipient will come to know the experimental and control groups.

In triple blind studies not only the investigator and the participant but also the data analyser do not know the experimental and the control groups,

The second step is the allocation of the treatment regimens intervention. The next step is the maintenance and assessment of compliance. This could be by ensuring the availability of iodised salt or good quality helmets and assessing the population actually consuming iodised salt and wearing helmets while driving in the experimental groups. The last step is the ascertainment of outcome. The results are statistically tested using the tests of significance. If the results are significantly better in the experimental group, the drug or the vaccine may be recommended for use. The process of enacting legislation may be initiated like in case of iodised salt and wearing of helmets.

Check Your Progress **2**

You are a paediatrician in a district hospital. You observe that over the past few years the incidence of bronchial asthma has increased specially amongst the children coming from the district headquarters. You feel that it is because of pollution both vehicular as well as from generators. How will you test your hypothesis'?

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3.5 EPIDEMIC MANAGEMENT

The very mention of the word 'epidemic' brings to the mind a scenario, seen in a movie or read in a book, of a town affected by a dreaded disease like plague with the people fleeing in panic leaving their loved ones dying unattended. A brave young niissionary with a heart of gold and a true Christian spirit rolls up his sleeves and literally snatches the people back from Yama's hands. Situations have changed with time but epidemics still do occur though in a milder form.

Now what is this epidemic? Epidemic is a derivation of two Greek words epi (upon/among) and demos (people). It is the unusual occurrence in a comniunity or region of a disease or specific health related events "clearly in excess" of the "expected occurrence". Thus any disease, which occurs in numbers more than the expected occurrence constitutes an epidemic. It includes not only the communicable diseases but also the non-communicable diseases like coronary heart diseases or even the psychosomatic disorders. Health-related behaviours like smoking, drug addiction and health-related events like accidents also fall into the category of epidemics. Then to determine an epidemic the major question is how to define the "expected occurrence" so as to call the disease frequency as an epidemic one.

There is no constant number for the expected occurrence of a disease. It varies from place to place, region to region. A few hundred cases of yellow fever in a district of a country like Nigeria or Ethopia, where the disease is endemic, shall be called as the expected occurrence of the disease in that area. On the contrary in a district of an equal population in India, where the disease is non-existent, tlie expected occurrence shall be zero. So the basis of defining an epidemic is the defining of an endemic.

An endenlic is defined as the constant presenceof a disease or infections agent within a population in given geographical area without importation from outside. It may also refer to tlie usual prevalence of a given disease within an area.

The incidence clearly in excess of this expected occurrence or the endemic frequency shall constitute an epidemic. A few cases of yellow fever in a district in India shall constitute an epidemic whereas a few hundred cases of yellow fever in a district in Nigeria shall not become an epidemic. Now let us take tlie example of sniall pox. Forty years from today small pox was rife in the country. It was thus an endemic disease. Now it has been eradicated from the world. It is no more an endemic disease. The expected occurrence of sniall pox is zero. A single case of small pox will, therefore, be clearly in excess of the expected occurrence and have would be now considered as an epidemic of small pox. So a disease, which was endemic once, may cease to be so and a single case may be taken as an epidenlic.

A disease may be both endemic and epidemic depending on the frequency. In some districts of Rajasthan water becomes scarce in summers and may result in getting polluted. Therefore, water-borne diseases like infectious hepatitis and typhoid may be common. To illustrate, in a hospital with a relatively fixed catchment area eight to ten cases of typhoid and infectious hepatitis occur in the month of June and in November, when the situation of water eases the number of cases drops down to two or three. Now in a given year, nine cases of typhoid in June will constitute an endemic but nine cases in November shall constitute an epidemic.

The difficulty generally arises as to when to label the disease to have assumed epidemic proportion in a region where it is normally endemic. In an area where malaria is endenlic when do we say that epidemic of malaria has broken out. For instance, a disease like hepatitis 'A' is endemic in district X. When shall we say that an epidemic of Hepatitis 'A' has broken out in the district. The decision is slightly arbitrary. If tlie number of cases are more than two standard errors from the endemic frequency it will be called an epidemic, Keeping a track and diagnosing a disease taking an epidemic dimension at the earliest is the hallmark of an efficient health adniinistrator.

3.5.1 Patterns of Epidemics

The epidemics generally follow a pattern depending on the geographical and environmental conditions, the distribution and characteristics of the host population and their socio-cultural behaviour. If there is no intervention or change in these conditions, those epidemics tend to repeat themselves. Therefore, knowing about the various kinds of epidemics and the conditions in which they occur can thus be of immense help in managing them.

The various types of epidemics normally occur are described below:

a) **Common** Source Epidemics

These epidemics originate from a single source of infection or the disease producing agent - the two common source epidemics are:

i) ***Point Source or Single Exposure Epidemic***

The agent responsible for the causation of disease is exposed to the agent population at risk atone point of time and only once. For instance, a marriage party may experience an epidemic of food poisoning due to eating of contaminated food, the point source of the epidemic. The cases will occur within one incubation period. It normally has one spurt which rises abruptly and declines equally fast (Fig. 3.1). The time after which half the number of cases occur is known as the median incubation period. A single exposure epidemic may also be caused by a chemical (Bhopal Gas Tragedy) or a pollutant (Chernobyl nuclear holocaust).

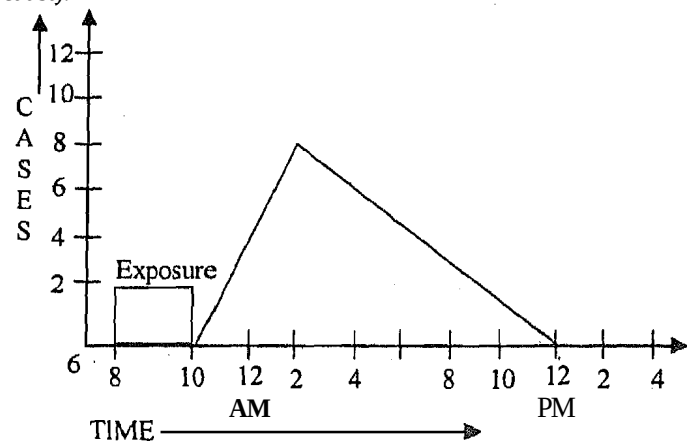

Fig. 3.1: **Epidemic Curve** of Exposure to Staphylococcal Contaminated Food'

ii) ***Continuous or Multiple Exposure Epidemic***

The source of infection for the causation of an epidemic may be continuous. In such a case the epidemic shall not cease to exist till the source is removed. A well with contaminated water becomes a regular source of infection to the people using it and the epidemic may continue till the time the water is treated and made potable. Similarly a cook who is a typhoid carrier may keep on infecting the diners in the restaurant till he is treated and made non-infectious.

b) **Propagated** Epidemics

The propagated epidemics are generally of infectious origin and the transmission of infection is from person to person. Vector or vehicle transmission may also be there in diseases like malaria, cholera, gastroenteritis, etc. The speed of spread depends on herd immunity, secondary attack rate and opportunities for contact.

c) Seasonal Epidemics

Infectious diseases and some non-infectious diseases tend to have a,. increased incidence during certain seasons or months. Gastrointestinal infections have an increased incideace during the summer month and respiratory infectious during the winter months. Road traffic accidents are more frequent in rainy months and asthma in spring.

d) Cyclic Epidemics

Some epidemics tend to occur in cycles which repeat itself in weeks, months or years. Measles tend to present in epidemics in a cycle of 2-3 years (in an unimmunized population). Certain behaviour related events like road traffic accidents occur in cycle form during the weekends due to a spurt in drunken driving.

e) Epidemics of Non-Communicable Diseases

The sedentary and affluent life-style has resulted in a marked rise in diseases like ischaemic heart diseases and diabetes mellitus. The slow growth of the numbers has perhaps concealed the size and the gravity of the epidemic.

3.5.2 Epidemic Forecasting and Management

An able hospital administrator using the knowledge of epidemiology can anticipate or forecast an epidemic, make preparations to handle the epidemic in advance and manage it if the epidemic unfortunately occurs.

Early forecasting of an epidemic may be possible by methodical surveillance. Prompt intervention on the basis of the surveillance reports may even abort or at least contain the epidemic before it reaches its peak. Surveillance has already been discussed in the uni: on. Concepts in Community Health (Unit 1 of this Block). The best of administrators may not be able to 'forecast' an epidemic and may start action only after it has occurred. It shall however be a crisis if the administrator becomes aware of the epidemic after it is in full swing. Surveillance, thus, is of paramount importance in epidenuc forecasting and its management,

Techniques of Forecasting

The major techniques of forecasting of epidemics is based on the trend analysis of the particular disease over a period of time. In order to have a correct trend analysis you will have to undertake the following measures.

a) Tabulation of the data on monthly basis and yearly basis for at least three years on the following parameters for immediate cornparison and identifying the deviations.
   - Disease
   - Sex
   - Age group
   - Incidence/prevalence rate of the disease for the same months of the past three years.
   - Regional, state and national incidence/prevalence rates or ratios of past years.

b) Comparison of monthly and yearwise data based on available rates/ratios.

c) Plotting different graphs for total, sex-wise, age group-wise incidence and prevalence for the past few vears.

d) Preparing spot maps to detect regional variations.

e) Comparing for seasonal and cyclic variations with respect to specific disease.

Preparedness to Meet the Epidemic

There is a saying in the army 'the more you sweat in peace, the less you bleed in war'. The same holds true for epidemics. The more the organisational preparedness for an epidemic the less is the mortality and morbidity during an epidenuc. A contingency plan must be prepared in collaboration with the administrative structure of the catchment area. The contingency plan consists of two parts, the first concerning logistics regarding the inventory or resources both existing and required and the second being the technical consisting of the preparations of investigation and control plans for the most probable epidemics in the region.

Managing the Epidemic

The investigation and management for the epidemic will be the prime responsibility of the district authorities. As an hospital administrator you can help them by:

i) Verifying the diagnosis i.e. confirming the cases. ***Suspect*** is a case with clinical signs and symptoms compatible with the disease but no laboratory evidence e.g. passing rice water stools (cholera).

Presumptive Case is one when the laboratory evidence is suggestive of infection but does not prove it conclusively e.g. shooting starts seen in dark field microscopy (cholera).

Confirmed Case is based on lab'oratory evidence conclusive of current infection e.g. stool specimens on culture showing vibrio cholera (cholera).

ii) Informing the district epidemiologist and helping him in the' investigation of the epidemic.

iii) Advising the line of management for the patients

iv) Providing specialist services

This support provided by the hospital is of immense help to the district.epidemiologist in managing an epidemic.

Check Your Progress 3

You are reviewing the statistics of the diseases for the month of January 2000 of a dispensary which are as follows:

a)	-ARI	–	56
b)	Scabies	–	14
c)	Gastroenteritis	-	10
d)	Hyper emesis gravid arum	–	6
e)	Injuries	–	6
f)	Viral Hepatitis	-	4

i) Was any disease reaching a s epidemic proportion?

You further review the previous records. They are as follows:

Disease	January 1997	July 1998	January 1999	July 1999
ARI	52	22	50	20
Scabies	13	14	12	18
G.E.	3	32	2	34
Hyperemesis	4	4	5	3
injuries	5	7	5	4
Viral Hepatitis	3	9	0	10

ii) Did any disease reach epidemic proportions?

iii) If yes, why?

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3.6 SCREENING

Screening as you must be knowing is the presumptive identification of unrecognized disease or disability by the application of tests, examinations or other procedures. A screening test is not intended to be diagnostic.

It serves to sieve out population which has certain known risk factors for particular diseases and thus helps to be able to make a diagnosis during the early stages of disease. A decrease in the disease specific mortality will be a direct benefit. Any change in morbidity of the disease due to the application of screening tests is difficult to assess.

Screening in public health is an epidemiological tool when applied to population at large.

Mass **Screening**

A knowledge of the natural history of the condition is essential in order to evaluate the benefit obtained from a screening test, since the test is designed for early diagnosis and prevention. It should be possible to apply the test rapidly to differentiate between those who are well and those probably affected by the disease or disability. It should be fairly specific and should be inexpensive, as it is to be applied on a large scale. The test must not require great expertise.

Screening will therefore be useful wherever an improvement in prognosis by early detection is clearly established e.g. in early detection of breast cancer. It is also needed to make decisions about undertaking certain lines of action such as abortion in prenatal screening for some congenital abnormalities.

The WHO states that the development of screening tests has been the most important recent contribution in preventive medicine.

The criteria for assessment of a screening test are:

i) Sensitivity Validity
ii) Specificity
iii) Repeatability
iv) Predictive value

Validity

It is the ability of a screening test to correctly identify those individuals who actually have the disease and those who do not. It has two components:

Sensitivity

This is the ability of the test to identify correctly those who *have* the disease. The more sensitive the test, the less number of false negatives.

Specificity

This is the ability of the test to identify correctly those *who do not have* the disease, leading to as few false positives as possible.

This is best illustrated by a 2 × 2 contingency table:

Screening Test	Reference Test		Total
	Positive	Negative	
Positive	True positive (a)	False negative (c)	(a+b)
Negative	False positive (b)	True negative (d)	(c+d)
Total	(a+c)	(b+d)	(a+b+c+d)

$$\text{Sensitivity} = \frac{\text{True positives}}{\text{True positives} + \text{False negatives}} = \frac{a}{a+c}$$

$$\text{Specificity} = \frac{\text{True negatives}}{\text{True negatives} + \text{false positives}}$$

$$= \frac{d}{b+d}$$

True positives are cases identified as positive by both the screening and reference tests. True negatives are persons declared negative by both tests.

Predictive Value

The positive predictive value is the likelihood that a person with a positive test has the diseases. A negative predictive value is the likelihood that a person with a negative test has not got the disease.

$$\text{Positive predictive value} = \frac{\text{True positives by screening}}{\text{Total positives by screening}} \times 100$$

$$= \frac{a}{c+b} \times 100$$

$$\text{Negative predictive value} = \frac{\text{True negatives by screening}}{\text{Total negatives by screening}} \times 100$$

$$= \frac{d}{c+d} \times 100$$

Predictive value helps us to compare the various screening tests which have been developed for a specific condition.

As the prevalence of a disease increases, so does the predictive value of the screening test. The incidence of any condition is directly proportional to the predictive value of a test till a certain limit. Beyond this limit there is little gain in predictive value from a higher prevalence.

Repeatability

Once a screening test has been proved to be of value, it will be put into practice as a routine measure in many health institutions all over the world. That means that it will be repeated many times over. The greater the accuracy on repeating the test, the more reliable it is.

The factors affecting repeatability are:

a) subject variation
b) observer variation
c) technique variation
d) circumstances of the test
e) manufacturers' variation

Cost Benefit **of** Screening

The proceedings of the technical discussion of the World Health Assembly in 1971 hold well even today. It was stated that indiscriminate mass health screening is not a useful preventive tool as it often results in counter productive health effects, is costly and it is wiser to limit it to high risk groups and high risk periods of life based on epidemiological knowledge.

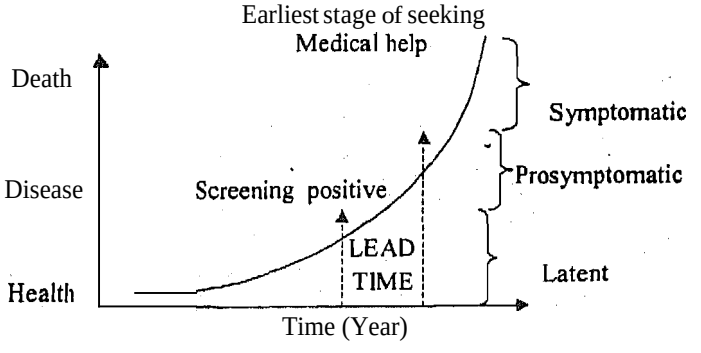

Fig. 3.2: Progression of a Disease from Onset to Death, Assuming No Medical Intervention

If no screening programme is in place for a condition, then tlie symptomatic stage is the earliest stage of seeking medical help. If screening is available and made use of, a condition can be detected much earlier before it reaches the symptomatic stage. This tinie gained by early diagnosis is the lead time and would make available more time for treatment, thus improving prognosis.

To be able to lead to effective economics of health manpower, critical evaluation of the yield of screening is essential. Yield is the amount of previously unrecognised disease which can be diagnosed as a result of screening, It is very useful in determining whether screening for a particular health condition should be undertaken in the community, when it ought to be started and when stopped. Yield depends on:

a) sensitivity of the screening test.
b) prevalence of unrecognised disease.
c) prevalence of recognised disease.
d) expert to which screcning has seen.previously undertaken.
e) acceptance of the screcning programme by tlie population.

The yield and cost effectiveness of screening tests can be improved by restricting them to high risk group.

Whenever screening is undertaken at a single point in time for various conditions it is known as multiphase screening.

For screening programmes to bc successful, the condition for which screening is undertaken should be an important health problem. There should be an accepted treatment for those with tlie recognised disease. Facilities for diagnosis and treatment sliould be readily available and accessible. There sliould be recognisable latent and early symptomatic stage of the disease. There should be a suitable screening test at hand and it must be acceptable to the population. The natural history of the condition should be adequately known. Screening for the condition must be cost effective.

Check Your Progress 4

Sou observe that in a particular slum in the age group 35-40 there are a large number of persons are diabetics and many are HIV positive. For which disease would you start a screening programme and why'?

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3.7 BIOSTATISTICS

There was a joke that those students who didn't like mathematics took up medicine. Now when you have finished medicine and taken up a job you have to study statistics. But now you'll appreciate how the basic knowledge of bio statistics will help you in planning and monitoring your job as an administrator better,

Statistics may be defined as the collection, presentation, analysis and interpretation of numerical data (Croxt and Conden). To the above stages organisation (classification) and forecasting may be added. Biostatistics is that branch of statistics that studies biological events.

3.7.1 Sampling

A drop of blood after testing suggests us the haemoglobin status of the whole blood. Sampling aims at learning about the universe on the basis of the sample chosen from it to

make generalization. The process of sampling involves the following elements viz. (a) the selection of process, (b) collection of information, and (c) drawing of conclusion about the population.

All the three elements should be studied as one and not in isolation from one another because each one has an impact upon another. The entire theory of sampling is based upon two important laws namely – (i) law of statistical regularity, (ii) law of inertia of large numbers.

What are the essentials which a sample must possess if the study or survey has to have a worthwhile meaning'? The sample should be:

a) Adequate

b) Representative

c) Independent of selection i.e. selection of one item does not effect the probability of selection of another.

d) Homogeneous i.e. all the units of the universe are of a similar nature.

Methods of Sampling

There are several methods of samples which are depicted in the following line diagram and discussed below in brief.

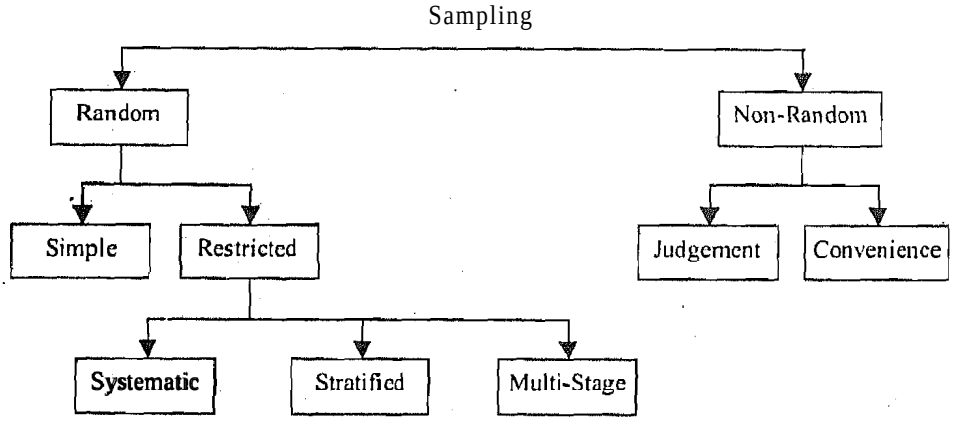

Fig. 3.3: Sampling Methods

a) ***Random Sampling***

1) *Simple Random Sampling*

It,is a technique in which the sample is so drawn that each and every unit in the population has an equal and independent chance of being included in the sample. It may be done by the drawing of lots or using the table of random numbers.

2) *Restricted Random Sampling*

This technique of sampling suits more where the population is of heterogeneous nature with respect of the characteristic under study. More efficient results can be obtained here because the population is divided into groups or sub-groups possessing similar characteristics.

Systematic Sampling: All the terms are arranged in a systematic order – alphabetic, chronological, geographical or arithmetic. The sampling interval is then determined by dividing the size of the universe with the sample size. The first sample unit is selected at random and the remaining items in a definite sequence ai equal spacing by adding the sampling interval.

Stratified Random Sampling: Stratification is done in units which are homogenous as far as possible with no over-lapping. It is normally done on the basis of sex, occupation, income, educational qualifications, geographical distribution etc. Simple random sampling is then done in each strata. Stratified random sampling is highly effective when the distribution is of highly skewed nature.

Multi-stage Sampling: Sampling is done in more than one stage. Suppose 1000 households have ta be studied in a state. The states would be divided into districts and some districts selected randomly. Some blocks would be selected randomly from the selected districts and some villages randomly from the selected blocks. Households would then be selected randomly from the selected villages.

b) ***Nun-Random Sampling Methods***

1) ***Judgement Sampling***

The basis of selection of sample is based on the judgement or discretion of the investigator. No planning is required and item selected or rejected on the criteria laid down by the investigator. Though away from the principles of sampling theory, it is useful. when the number of sampling units in the universe is small. It may in all likelihood include those important elements in the sample which might have been missed under sample random selection.

2) ***Convenience Sampling***

The criteria adopted here is that of convenience. If the dietary habits of slum dwellers have to be studied, the investigator may select the slum nearest to his hospital. Though the method is convenient the results could be alarming being prone to bias and not repiesentative enough.

Sample Size

"What is the size of the sample which one should study'?''Is the question which comes to the mind of every researcher? He wants the sample to be small enough to make the study feasible and large enough to make it scientifically or statistically valid. Then what is the "optimum" sample.

Statistics is based on a lot of presumptions and they should be considered in detail before determining the sample size.

i) What is the reasonable estimate or expected proportion or average 'p' in the study? If not known take 50% as proportion or 0.5.

ii) How far can you allow the sample estimate to deviate from the true value in the population. This has to be decided by the researcher. For high degree of accuracy with smaller the error to be tolerated, the larger is the sample size required.

iii) How confident do you want to be (Z) so that the sample estimate is as accurate as you wish. Normally for 95% confidence level Z = 1.96 and for 99% confidence level Z = 2.64.

Estimation of Sample Size (n) for proportion

$$n = \frac{Z^2 pq}{d^2}$$

Estimation of Sample Size (n) for mean

$$n = \frac{Z^2 S^2}{d^2},$$

where, p = prior estimate of percentage
q = 100 – p
Z = Standard normal variate corresponding to stated confidence level
d = error to be tolerated in the sample estimation
S^2 = measure of variation in the population (standard deviation)

3.7.2 Measures of Central Tendency

A very important objective of statistical analysis is to arrive at one numerical measure that reveals the inherent characteristics of the entire mass of unwieldy data. It is called central value or average. An average is a measure which condenses a huge unwield set of

numerical data into one numerical value which is representative of the entire distribution. An average is a gist of the entire numerical data. It is a single value which represents the group of values.

Arithmetic Mean

It is a widely used measure which represents the whole data by one value. It is known as average in layman's language. It is obtained by dividing the total of all the observations by the number of items. Computing mean in case of individuals observation (without frequency) is done as

$$8 = \frac{X_1 + X_2 + X_3 + X_4 \ldots\ldots X_n}{N}$$

or, $$8 = \frac{\Sigma N}{N}$$

8 =Arithmetic Mean

S = Sum of all the values of variables

Median

Median is a positional average, the value of which depends on the position occupied by a value in the frequency distribution, Unlike arithmetic mean it is not affected by extreme values. The term position refers to the place of a value in a series. It is the value of that item in a series which divides the series into equal parts, one part consisting of all values less and the others all values greater than it. If the values of its items are placed side by side in ascending or descending order of their magnitude, the value of the middle item is the median.

$$M = \text{Size of } \left(\frac{N+1}{2}\right) \text{item}$$

M represents the median; N represents the number of items

Partition Values

The values which divide the series into a number of equal parts are called partition values,

Quartiles: This is the value of the item which divides a series into four equal parts. When a series is arrayed and the median divides it into two halves each of the lower and the upper halves can also be divided into two equal parts. The value of the item dividing the lower half is called First Quartile and is denoted by the symbol Q, and the value of the item dividing the upper half is called the third quartile – Q3. The second quartile is median.

Mode

In case of a frequency distribution mode is the value of the variable corresponding to the maximum frequency. It is that value which occurs most often. Mode may prove representative where data is distributed unevenly. It is not suitable for further mathematical treatment and not much used in medical science.

3.7.3 Correlation

In the measures of central tendency only one variable was used for the purposes of comparison and analysis. But in real life we come across certain series where each item of the series may assume the values of two or more variables like the hsight and weight of individuals. There may exist some relationship between the ages of husband and wives, promiscuous behaviour and HIV infection. The theory by means of which qualitative connection between two sets of phenomena are determined is called the theory of correlation. In a bivariate distribution, an attempt is made to find out if there is any relationship between the two variables under study. The correlation is a statistical tool which studies and explores the relationship between two variables.

Types of Correlation

Below are given important ways of classifying correlation:

1) ***Positive atrd Negative:*** Correlation is positive (direct) or negative (inverse) would depend upon the direction of change of the variables. If the values of two variables change in the same direction i.e. increase or decrease in the values of one variable is associated with an increase or decrease in the values of the other, the correlation between them is positive. Generally correlation about heights and weights of individuals, income of families and expendihire on luxury items is positive.

When the variables deviate in the opposite direction i.e. an increase (or decrease) in the values of one variable resulting on an average in a corresponding dectease (or increase) in the values of the other variable, correlation is said to be negative or inverse.

2) ***Linear atrd Noti-Litrear:*** The basis of this division is the constancy of the ratio of change between the variables.

If corresponding to a unit change in one variable, there is constant change in the other variable over the entire range of values, the correlation is said to be linear, e.g.,

X:	2	3	4	5	6
Y:	4	5	7	9	13

Correlation would be non-linear (or curvilinear) if the degree of change in one variable does not bear a constant ratio to the amount of change in the other variable.

Methods of Studying Correlation

There are various methods of ascertaining correlation between the two variables. Some of these are discussed here:

1) *Scatter Diagram Method*

It is one of the simplest ways of diagrammatic representation of a bivariate distribution. A dot chart is prepared on a graph paper where the data are plotted. A dot is put for each pair of X and Y values, which gives us as many points as the number of observations. A look at the scatter diagram gives an idea whether the variables are related or not. Some points are given below for better interpretation of a scatter diagram.

When all the points lie on a straight line starting from O on the graph and go upwards towards the right hand top, the variables are said to be positively correlated perfectly. Conversely, if all the points lie on the straight line beginning from the left-top and falling down to the right bottom, the variables are negatively correlated perfectly. The following figures will make the point clear. All the points in Fig. 3.4 (a) rise from O upward to the right hand corner and move in the same direction. A higher degree of positive correlation is found here.

The points in Fig. 3.4 (b) show a downward trend from the upper hand corner. There is high degree of negative correlation,

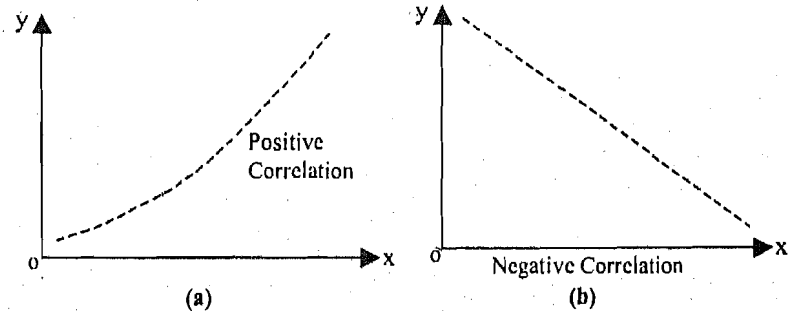

Fig. 3.4

2) *Graphic Method*

Under this method the individual value of the two variables are plotted on a graph paper. Since there are two variables there will emerge two curves, one for X variable and other for

Y variable. If both the curves move in the upward direction the correlation will be positive, and it will be negative if they move in the opposite direction.

The correlation graphs are merely suggestive of a fact of a possible relationship between two variables.

3) Karl Pearson's Coefficient of Correlation

Pearsonian method of measuring correlation was suggested by Karl Pearson (1867-1936) which is most widely used in practice all over the world. His method measures the intensity or the magnitude of linear relationships between two variable series, X and Y, denoted by r, or r (X,Y) or rxy. He defines it as the ratio of the covariance between X and Y, to the product of the standard deviations of X and Y.

3.7.4 Regression

Literally the term regression means stepping back or returning to the average value. This term was first used by Sir Francis Galton in his studies of Inheritance of Stature in 1877. He studied the heights of 1078 sons and their fatliers and published tlie results in a paper "Regression towards Mediocricity in Hereditary Stature." His studies revealed that:

i) Tall fathers tend to have tall sons and short fathers have short one.

ii) The average height of the sons of a group of tall fathers was less than that of tlie fathers and the average height of the sons of a group of short fathers was more than that of the fathers.

The line describing the tendency to regress or going back was termed by Galton as "Regression Line". This term is still used by statisticians but not in tlie old implication of "stepping back". Now the term used by them is 'Estimating Line'. Galton's conclusion was that if the average height of a certain group of fathers is 'a' cm above (below) the general average height then average height of their sons will be (a × r) cms. Above (below) the general average height where r is the Correlation Coefficient between the heights of the given group of fathers and their sons. The correlation will be positive. Below are given some definitions of regression.

I) "Regression is tlie measure of the average relationship between two or more variables in terms of the original units of the data." – M.M. Blair

2) "The term regression analysis refers to the methods by which estimates are made of the values of a variable from a knowledge of the values of one or more other variables and to the measurement of the errors involved in this estimation process." – M. Hamburg

The word regression is used in a much wider sense today. It means estimation or prediction of the unknown value of one variable from the known value of the other variable. The variable which is used to predict the variable of interest is called the independent variable and tlie variable to be predicted is called the dependent variable. The analysis used is called the simple linear regression analysis. This analysis has become synonymous with prediction or estimation which is used extensively in all social and physical sciences. Pharmaceutical companies use regression for studying the effect of new drugs on patients by way of experimentation.

Regression is not the imagination of a day-dreamer. It is a reality with which various shades of people come across in their daily life. The regression analysis confined to the study of only two variables at a time is termed as simple regression.

It cannot be said with certainty that there exists some cause and effect relationship between two dependent or the independent variables. What is meant is simply that estimates of values of the dependent variable Y may be obtained for given values of the independent variable from a mathematical function involving X and Y. It is quite likely that one variable may or may not cause changes in the other variable. They may be opposites also who knows.

Linear Regression

When the bivariate data is plotted on a graph, the points in the scatter diagram will be found concentrating around a curve which is known as the 'curve of regression'. This curve is often confusing and complicated and is difficult to understand. If this curves is in the form of a straight line, the regression between the variables under study is said to be 'linear'. In this case the values of a dependent variable changes in a constant absolute amount for a unit change in the value of the independent variable.

Non-Linear Regression

In cases where the curve of a regression is not a straight line, the regression is called ,'non-linear regression'.

Comparison of Correlation and **Regression**

Both the analyses – Correlation and Regression - are constructed under different assumptions. The experimenter is often clear regarding the selection of a measure which he should cause in a given problem situation because they furnish different type of information. The points of difference of both of these two are given below:

1) The regression analysis is studied with the objective of studying the nature of relationship between the variables so that the experimenter may be able to predict the value of one on the basis of another. Correlation Coefficient on the other hand, is a measure of degree of co-variability between X and Y.

2) Correlation is used to ascertain the degree of relationship between two variables. It. therefore, cannot be said with any amount of certainty that one variable is the cause and the other the effect. But in a regression analysis one variable is taken as dependent while the other is independent. The study of cause and effect relationship becomes possible here.

3) There can exist a meaningless or nonsense correlation between two variables which is a matter of chance but there can be no nonsense regression.

3.7.5 Standard Error of Sampling Distribution

The concept of standard error is of fundamental importance in testing hypothesis. By standard error is meant the standard deviation of the sample distribution. It emphasises that variation among sample means is clue to sampling errors. It measures the sampling variability due to random forces. To understand standard error it is necessary to explain a sampling distribution. Suppose we select a number of independent random samples of a definite size from a given population and calculate mean or standard deviation from each sample, we shall obtain a series of values of all of these statistics. These values can be arranged in the form of frequency distribution which is called sampling distribution or the probability distribution. It means that if we draw 50 random samples from a given universe and calculate their means, we shall get a series of 50 means which would form a frequency distribution. It will be known as the sampling distribution of the means.

It is quite relevant here to study the universe distribution, in the absence of which the study of sampling distribution will remain incomplete. This study is also useful in showing the relationship of universe distribution and sample distribution and showing the relationship of these two with the sampling distribution.

Universe distribution: When the statistician is out to study each and every item of universe and has full knowledge of its mean and standard deviation, there emerges universe distribution. The mean of the universe is symbolised by μ and its standard deviation by σ.

significance of **Standard Error**

1) It is an important tool in testing a given hypothesis, Ordinarily the hypothesis are tested at 5% level of significance. If the difference between observed mean and the expected mean is mofe than 1.96 S.E., it is significant and it does not support the hypothesis at 5%

level. If this difference is less than 1.96 S.E., it is not considered as significant. This result does not provide any evidence against the hypothesis.

2) Standard error gives us an idea about the unreliability of a sample. The greater the standard error the greater is the unreliability of the sample because greater is the departure of actual frequencies from the expected ones. The reciprocal of S.E., i.e., 1/S.E. is a measure of reliability of the sample.

3) The study of the standard error helps us in determining the limits within which the parameter values are expected to lie. It becomes possible because of large samples, sampling distributions tend to approximate a normal distribution. Standard error can be calculated by the formula –

$$SE = \frac{SD}{\sqrt{n}}$$

3.7.6 Significance Testing

It is natural for sample estimates to vary from sample to sample. This makes us think:

i) Is the difference between the sample value, and the population value actual or significant'?

ii) Is the difference between the mean of the two samples very much different'? These questions can be answered by significance testing. For this, it is essential to form a hypothesis and test it. A hypothesis is merely a supposition which has been made the basis for reasoning. In the words of Morris Hamburg, "A hypothesis in statistics is simply a quantitative statement about a population."

Testing **Procedures**

Steps involved in genera! hypotheses testing are given below:

1) ***Setting up a Hypothesis:*** The first step in this direction is to set up a hypothesis about a population parameter. Then the sample data is collected, sample statistics produced to use this information to decide how likely it is that our hypothesized population parameter is correct. It'is conventional to construct two different hypotheses about the parameter. Both these hypotheses must be mutually exclusive so that if one hypothesis is accepted the other one is rejected.

   The two hypotheses are:

   a) Null Hypothesis
   b) Alternative Hypothesis

   The Null hypothesis is considered as a very useful device in testing the significance of difference. The word 'Null', means invalid or void, tells that there is no true difference in the sample and the population in the matter under enquiry.

   The Alternate hypothesis specifies the values which the-researcher believes to be true. This hypothesis is a wider one which embraces the whole range of values and not a single point.

2) ***Setting up a Suitable Significance Level;*** The next step is to test the validity of both the hypotheses at a certain level of significance. The significance level is expressed as a percentage such as 5% or 1%.

3) ***Setting a Test Criterion:*** Construction of test criterion involves an appropriate probability distribution for a particular test. The investigator must employ an appropriate probability distribution. In case where only a small information is available, it would be inappropriate to use the normal distribution.

4) ***Computation:*** When a statistical list has been completely designed, the investigator proceeds to perform various computations from a random sample of size. Calculations made include the testing statistic and the standard error of the testing statistics.

5) ***Making Decisions***: As a last step, we may draw statistical conclusions and take decisions either to reject or to accept the null hypothesis. It depends on whether the calculated (computed) values of a test criterion falls in the area of rejection or that of acceptance.

Errors in Hypothesis Testing

There are two types of errors in the testing of hypothesis:

Results of the Test	H_0 true	H_0 false
Reject	Wrong	Correct
Don't reject	Cdrrect	Wrong

If the hypothesis is true and our test rejects it, it is type I error = a. If the hypothesis false and our test accepts it, it is type II error = β.

As the process of testing hypothesis goes, the investigator aims at reducing both the types of error, but it is not possible to do so because of fixed sample size. The probability of making type I error can only be reduced if we are prepared to increase the probability of making the type II error. It can be said very clearly that it is more dangerous to accept type II error (false hypothesis) than to reject type I error (correct one), at a certain level, known as the level of significance. In most cases the probability of accepting a true hypothesis is 95%.

Some Important Conclusions

The study of the significance testing reveals that:

a) Both these types of errors are inter-related. A decrease in the possibility of type I means an increase in the probability of type II.

b) Whenever a sample size increases α and β get reduced simultaneously.

c) The size of the area of rejection and the probability of committing a type I error can always be reduced by adjusting the value of type I error.

d) When the Null hypothesis is false, type II error is a maximum. The greater the distance between the true value and the hypothesised value, type 11 error will be smaller.

3.7.7 Tests of Significance

When we are comparing sample estimates (means or proportions) it is essential to rule out the possibility that the difference is due to chance. The tests of significance are statistical tests which measure the probability of chance occurrence of such differences.

Standard Error of the Difference between Two Means

If the observed difference between two means from two samples is more than twice the standard error of the difference between two means, it is said to be significant at 95% confidence limit. In other words the probability of the difference of the means of the two samples to occur by chance is less than 5%.

SE of difference between means is:

$$\sqrt{(SE_1)^2 \times (SE_2)^2} = \frac{\sqrt{(S_1)^2}}{\sqrt{n_1}} \times \frac{(S_2)^2}{\sqrt{n_2}}$$

't' test is an accurate method to test the significance of difference between two means in small samples.

Standard Error of Difference between the Proportion

If the observed difference between two proportion is more than twice the SE of difference of proportion, it is significance at 95% confidence limit. In other words the probability of difference of proportions of two samples to occur by chance is less than 5%.

SE of difference in proportion $= \frac{\sqrt{p_1 q_1}}{n_1} \times \frac{p_2 q_2}{n_2}$

Chi Square Test

It is one of the most important test of significance. It was developed by Karl Pearson. The major uses for it arc:

1) To find out if the difference between two proportions is real or by chance.
2) To find any association between 2 attributes occurring together.

The first step in the application of the test is the formulation of the null hypothesis, which is the assumption of no association between the aspects being tested:

Secondly, a contingency table is made based on the number of events and groups. For e.g. if there are only 2 events and 2 groups, it becomes a 2 × 2 contingency table. In case of 3 events and 2 groups, it is a 3 × 2 Contingency table.

	Columns ↓	↓	Total
Rows →	a r_1 c_1	b r_1 c_2	a + b
→	c r_2 c_1	d r_2 c_2	c + d
Total	a + c	b + d	a + b + c + d

a, b, c and d are the observed frequencies.

For r_1, c,, square, the number of expected frequencies is $\frac{(a+c)(a+b)}{a+b+c+d}$

For $r_1 c_2$, expected frequencies is $\frac{(a+b)(b+d)}{a+b+c+d}$

$$r_2 c_1 = \frac{(a+c)(c+d)}{a+b+c+d} \qquad r_2 c_2 = \frac{(b+d)(c+d)}{a+b+c+d}$$

Now we calculate the x^2 (chi square)

$$x^2 = \frac{(O-E)^2}{E}$$

Now we calculate the degrees of freedom (d.f)

d.f = (r – 1) (c – 1)

i.e. (no. of rows – 1) (no. of columns – 1)

To find the significance of the calculate x^2 value, we refer to the x^2 table and find the tabulated x^2 value corresponding to a given probability like 0.05 or 0.01, against the appropriate degrees of freedom.

If the calculated value of x^2 is higher than the tabulated x^2 value at the selected probability level (usually 5% or 1%), the null hypothesis is rejected. Similarly, if the calculated x^2 value is lower than the expected value, the null hypothesis is accepted,

Chi square test is applied to actual numbers and not to percentages.

3.8 LET US SUM UP

In this unit you have learnt that epidemiology is the study of the distribution and determinants of health-related states and events in population, and the application of this study to control health-related problems. The phrase 'health-related" – relate to phenomena like physical fitness, pregnancy, eating habits etc. which are not diseases. You have also learnt that epidemiology is primarily based on two assumptions that human disease does not occur at random, and that human disease has causal and preventive factors that can be identified through systematic investigation of different population or sub-groups of individual within a population in different places or at different times. The basic purpose of epidemiology is to obtain, analyse, interpret and use health information to promote health and reduce disease. Epidemiology as you mush have understood is actually logical

reasoning about causes of health problems based on information gathered through observations and measurements. It is an applied discipline which is concerned with practical solutions to problems. Therefore, epidemiological studies can provide strong and reliable evidence on which to base policy and ultimately decisions affecting the health of the general public.

You have also learnt that descriptive epidemiological studies describe the general characteristics of the distribution of disease in relation to person, place, and time. However, since data on the disease and the risk factor is obtained at the same point in time, it is difficult to distinguish whether the risk factor proceeded the development of the disease or not.

Further, in case control studies, the subjects are selected on the basis of whether they do (cases) or do not (controls) have a particular disease under study. The groups are then compared with respect to the proportion having history of exposure or characteristic of interest. Comparison is made between the cases and controls by estimating relative risk and odds ratio. In cohort studies the individuals are defined on the basis ofpresence or absence of exposure to suspected risk factor for a disease. At the time of defining the exposure status, subjects must be free from the disease under investigation. Participants are then followed over a period of time to assess the occurrence of that outcomeldisease.

You also learnt that epidemic is the unusual occurrence in a community or region of a disease or specific health related event "clearly in excess" of the "expected occurrence". The epidemics may be common source, propagated, seasonal or cyclic. Surveillance helps in forecasting an epidemic. Preparation of a contingency plan helps in being prepared to meet the epidemic.

Thereafter you learnt about screening which is the presumptive identification of unrecognized disease or disability by the'application of tests, examinations or other procedures. Screening in public health is an epidemiological tool when applied to population at large. For screening programmes to be successful, the condition for which screening is undertaken should be an important health problem. The disease should have a recognizable latent and early symptomatic stage of the disease, should have an accepted treatment and the facilities for diagnosis and treatment should be readily available and successible.

Towards the end of this unit you learnt about some of the basic concepts of biostatistics, Statistics is the collection, presentation, analysis, and interpretation of numerical data and biostatistics is that branch of statistics that studies biological events. You also learnt about sampling which aims at learning about the universe on the basis of the sample chosen from it to make generalization. The selection of an appropriate/adequate sample size makes the study scientific. Further you learnt about the measures of central tendenly, an average is a measure which condenses a huge unwilling set of numerical data into one numerical value which is representative of the entire distribution. Arithmetic mean is obtained by dividing the total of all the observations by the number of items. It is known as average in layman's language.. Median is a positional average or the value of the middle item. It is not affected by extreme values. Mode is the value of variable corresponding to the maximum frequency.

About correlation you learnt that it is the qualitative connection between two sets of phenomena, It is a statistical tool which studies and explores the relationship between two variables. Regression is the estimation or prediction of the under own value of one variable from the known value of the other variable. The variable which is used to predict the variable of interest is called the independent variable and the variable to predicted is called the dependent variable,

In the end of the unit you learnt about various tests of significance which are able to tell you whether the result obtained are scientifically or statistically significant or not,

3.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

Epidemiology is actually logical reasoning about causes of health problems based on information gathered through observations and measurements. It is concerned with practical solutions to problems. It provides strong and reliable evidence on which to base policy and ultimately decisions affecting the health of the general public.

Check Your Progress 2

Case Control Study

Problem	Bronchial Asthma		Total
+ At district hcadquartcr	a	b	a+b
– Away from district hcadquartcr	c	d	d+d
©	a+c	b+d	a+b+c+d

Your hypothesis is correct if –

$$\frac{ad}{bc} > 1$$

It can be further confirmed by a cohort study.

Check Your Progress 3

i) On the basis of the statistics of January, 2000, it is difficult to comment if any disease reached epidemic proportions in January, 2000.

ii) Yes, gastroenteritis

iii) In January, 1997 there were 3 cases of GE and in January, 1998 there were 2 cases of GE. Therefore, 10 cases of GE in January, 2000 are clearly in excess of normal occurrence.

Check Your Progress 4

Diabetes: There is a treatment and hence a screening programme followed by treatment would result in the improvement in the health status of the community. Screening and diagnosis of HIV positives with the present knowledge of the disease will not help the community.

UNIT 4 OCCUPATIONAL HEALTH

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- define Occupational Health;
- identify the occupational hazards;
- relate the health problems due to industrialisation;
- give examples of occupational and work-related diseases;
- sunimarise the prevention of occupational diseases;
- outline the occupational health scenario in India; and
- interpret the impact of occupational health in 21st century.

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4.1 INTRODUCTION

The process of industrialisation is an important and effective means for socio-economic development of any country, particularly the resource-rich developing countries. These countries have set up their industries with indigenous technology or imported high-tech know-how within a short span of time for economic growth. But hazard control, safety and occupational health aspects have not been tackled adequately. Particularly in India, the concept of occupational health is relatively new. The industrial scenario of our country has changed during last 50 years, but the country is not prepared to cope up with the emerging situations in the field of health. Occupational health is still a far cry. In the field of occupational health, we have not been able to keep pace with the international community, due to many reasons; but we cannot afford to neglect it any further. Occupational health cannot develop in isolation and has to be integrated with total health care. Hence, while dealing with health management, occupational health management cannot be lost sight off.

In this unit you will learn about relevance of occupational health in the context of health management. Occupational health being a specialised service for the working population, the health management systein should be directed towards the industrial workforce and allied occupation. Health influences work and work influences the health of an individual, You will learn the concept, purpose, aim and scope of occupational health in this unit. Further you will learn the effect of industrialisatioiion health, occupational hazards, impact of hazards on health, occupational and work-related diseases and their prevention. Further, application of methods of occupational health management in our country during this century and beyond will also been visualised. You will appreciate that occupational health needs to be studied through an integrated approach to health particularly in relation to nature of work, work methods and work environment.

4.2 DEFINITION AND SCOPE OF OCCUPATIONAL HEALTH

4.2.1 Definition

The Joint ILO/WHO Committee on Occupational Health at its first meeting in 1950 formulated this definition.

"Occupational Health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adopted to his physiological and psychological ability, and to summarise: the adaptation of work to man and of each man to his job".

If we examine this definition closely, it becomes evident that occupational health is a multi-disciplinary activity and co-ordinated team-work to be undertaken by a health team. The definition also makes it clear to some extent that it is a preventive health care service and more health-oriented than disease-related. Other preventive health services such as public health or community health are more related to the general population or community as a whole whereas occupational health is a specific service offered to the industrial or similar workforce at their place of work. Occupational Health (previously known as industrial health; industrial hygiene, etc.) is to be practised in an organisdd manner through need-based occupational health services (OHS) as recommended by ILO, other statutory bodies and professional organisations. In American and European countries, the name is changed to "Occupational and Environmental Medicine".

4.2.2 Scope

The scope of occupational health is very wide. It is not only utilises medical sciences but also relevant aspects of many other art and science topics to bring out a synthesis of the

complex nature of health at work in a broad perspective. The functions of OHS are so designed that not only the workers are benefited alone, but also tlie management, tlie industrial community and the nation as a whole derive optimum benefit. It is not an expenditure to meet the statutory provisions, but it promotes health and welfare of tlie employees and harmony in industrial relationship. Investment on OHS gives rich dividend directly and indirectly. WHO prepared a document applicable to "Health for All by 2000" strategy. (WHO - EURO Publication No. 26). The five principles are:

i) protecting workers' health against hazards at work (the protection and prevention principle);

ii j adapting work and work environment to the capabilities of the workers (the adaptation principle);

iii) enhancing physical, mental and social well-being of workers (the health promotion principle);

iv) minimising the consequences of oocupational hazards, accidents and injuries and occupational work-related diseases (the cure and rehabilitation principle); and

v) providing total health care to the workers and their families, both curative and preventive, at the work place or from nearby facilities (the general primary health care principle).

Similarly ILO also adopted many conventions and recommendations during these years based on the above guidelines which are in the different state of implementation in developed and developing countries.

In addition to this, International Commission on Occupational Health (ICON) adopted a code of ethics for occupational health professional in 1992 for application of occupational health to three target groups – individuals, exposed groups and to all workers as a part of the population.

Today Occupational Health is widely practised in industrialised developed countries. Earlier occupational health was identified with hazards and occupational diseases – of late the total health care concept has been introduced and the scope of occupational health has been extended to the well-being of the workers and their family members, Occupational health today embraces the preventive, curative, promotive and rehabilitative medical services of the industrial and allied workforce and their family members.

Check Your Progress 1

1) Write the salient features of definition of occupational health.

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2) Mention the broad principles of occupational health practice as per WHO guideline.

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3) What is the modem concept of Occupational Health ?

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4.3 HEALTH PROBLEMS DUE TO INDUSTRIALISATION

Earlier in industries and mines the hazardous/dangerous jobs were not carried out by the common men but by the slaves, prisoners or criminals. Working in industries and mining operations was considered as a punishment and hence the health of the workers was practically given no importance. Many of them were dying due to accident!, serious occupational diseases or uncared for ill health till sixteenth and seventeenth centuries. The eighteenth century brought great technological changes, inventions and new factory systems during the industrial revolution in Europe. The industrialisation became prominent all over the world during the nineteenth century raising socio-economic status of many of the developed and developing countries of today. However, the benefits of industrialisation although brought economic improvement, it posed certain problems to the working population due to profit motive of the factory owners. In absence of appropriate statutory provisions, the workers had to work for long hours for low wages, they had to work in hazardous and unclean workplaces, they had to live in poor sanitary conditions without good housing, water and environmental sanitation facilities. The health care facilities were far from satisfactory. Even then, in many countries including India, the people migrated from rural areas to the industrial cities to earn their living inspite of odd conditions because they had practically no means of livelihood in the villages. Although the process of industrialisation started in some cities in India during 19th century in a restricted manner, the industrialisation was extended and intensified during mid-fifties of this century.

India being an agricultural country and the farmers had to depend on monsoon for raising crops, in most of the years they suffered due to cyclone, flood, draught or insects which were damaging the crops for successive years. Many of them left the villages in search of employment in urban areas and industrial towns, even with low wages. They did not care for thehazards in industries and accepted the poor living conditions around their industries. They managed to stay in slums mostly away from the families. Over growing of population, scarcity of employment, low income and scarce infrastructure facilities prompted many of the migrated workers to make compromises with whatever they could earn even after hard work. Thus, the condition of the miners, textile workers, jute workers and many workers engaged in metal works, chemical plants or rubber industries during this century were really precarious. Neither the employees nor the government could do much for them. Many workers got organised in mid century through trade unions and started placing their demands for monetary benefits from the industrialists. Many new concepts like strike, dharna, gherao, work-to-rule, etc, emerged out in the industrial work culture. In the beginning, housing, education, health and recreation for the industrial workers being of low priority partly due to poor socio-economic conditions and predominantly due to attitude of the factory owners, the slums developed around the industries in-out-of proportion and civic amenities were tampered unauthorisedly to meet the day to day requirement of the slum dwellers. The outbreak of epidemics were also there in these areas from time to time. Subsequently, due to growth of many types of industries in most of the states of our country demand on urban housing, electricity, water supply, sanitary facilities; waste disposal requirements grew out of proportion causing congestion, overcrowding, traffic problem, environmental pollution and outbreak of epidemics which affected not only the industrial workforce, but also the entire urban community. The resources available for a limited population had to be shared by many under compulsion and hence there, was a scarcity everywhere, be it food, space, transport, schools, hospitals, medicines or other consumable amenities. Even today, the problem has not been solved fully although there is some improvement seen around certain industries.

Tbe indiscriminate growth of industries in this country saw another change. Due to increased awareness about the environment and ecology the older industries had to face the wrath of the community as source of pollution. Enactment of multiple laws for factories, mines and environment protection forced many industries to shift to a remote and less populous area away from the residential locations. It is a dilemma for many industries whether to shift or to close down and go for clean technologies (if available). The organised labour force, powerful trade unions, stringent statutory provisions and social-conscious group all around

are compelling the industrialists to invest on certain provisions which they were neglecting so far. The scenario is becoming more complicated day-by-day due to multi-pronged attack.

The generation of huge quantities of waste materials both hazardous and non-hazardous in nature out of various industrial operations and community waste coming out of residential area in industrial towns have posed serious problems recently. Most of the industrial effluents are discharged into the water course being untreated as many industries are located on the river banks. Similarly, solid industrial wastes are not disposed off in a sanitary manner and dumped here and there. Till recently there was no control over this. Recently, central and state pollution control boards are trying to exercise their control to prevent pollution of air, water and soil. Industries have been forced to manage their waste. Many statutes have been enacted recently to impose statutory control and compel the occupiers to recycle or sanitary disposal of the waste generated by various industries. Guidelines have been issued and monitoring is done by the statutory authorities to deal with industrial waste problems. Health hazards arising out of improper waste generation, storage, handling and disposal is posing a threat to the community health.

The impact of industrialisation thus encountered must bc solved and there is no other go. Industries will exist but their functioning has to be modified to meet the socio-political situation of the country. Therefore, health hazard arising but of industrial operations should be mutigated by adopting adequate preventive and control measures.

4.4 OCCUPATIONAL HAZARDS

A hazard is defined as a situation of risk or danger to health and safety. Occupational hazards are the outcome of the process of industrialisation. In most of the industries – new or old – the occupational hazards exist in some form or other. These hazards present in the workplace should be prevented and controlled so that the exposed workers do not have any disease or health impairment. The commonly encountered hazards are physical, chemical, biological or psycho-social in nature. These hazards produce certain impact on health causing occupational and work-related diseases.

4.4.1 Physical Hazards

A hazard is defined as a situation of risk or danger to health and safety. The physical agents like heat, noise, vibration, radiation and pressure etc, that are capable of affecting the biological mechanism of human body and producing changes on the health conditions are categorised under physical hazards. The mechanical and ergonomic hazards encountered in the work place also come under this category.

Heat

Most people function efficiently only within a very narrow range of body temperature, i.e. 37°C ± 1°C and their performance is affected in extremes of temperature: When the body temperature rises this core temperature due to work, metabolism or environment heat load, the body tries to lose heat by producing sweating to maintain a body heat balance. Therefore, sweating occurs while working in hot environment. The work environment becomes comfortable depending on air temperature, humidity and air circulation in the workplace. Comfort zone'varies widely depending on the season of the year, dry and wet bulb temperature, globe temperature, ventilation, amount of clothes worn, quantity of body water reserve and socio-cultural habits of the workers. The heat is gained or lost by the body due to conduction, convection, radiation or metabolism and lost by evaporation only. Therefore, evaporation of heat caused due to sweating is a protective phenomenon while working in hot environment. The heat balance equation of the body may be depicted as:

$$M \pm Cv \pm Cd \pm R - E = 0,$$

where,

M = metabolic heat,
Cv = convection,
Cd = conduction,
R = Radiation,
E = Evaporation.

In other words, to maintain the body heat balance, heat gain = heat lost.

An industrial worker may suffer from heat disorders while exposed to excess heat at the workplace, particularly during summer season. Heat hazard may be encountered in steel plants, cement plants, metal processing industries, textile mills, paper mills and construction work. The acute heat disorders vary from slight faintness to unconsciousness and the condition are: heat stroke, heat exhaustion, heat cramp or heat rash. Exposure to radiant heat directly may cause cancer of skin in the long run.

Cold

Hazards due to cold is not very common in our country except in areas where the environment temperature becomes very low during winter. In some industries such as freezer plants, ice factories, meat processing and packing units, cold storage, etc. the workers are exposed to excess cold. In such work places, the workers should be well protected by warm clothes/garments so that their body is not exposed to excess cold. Skin is affected first due to cold and, therefore, must be well protected. The cold disorders may be localised (frost bite or chilblain) or generalised (hypothermia). Exposure to chill wind, contact with wet surface or cold metal, inadequate clothing, extremes of age (children or old), poor health condition of the individual and associated skin disease aggravate or precipitate the cold disorders. The common diseases are: cold stress, frost bite, trench foot and chilblain.

Hypothermia: It is a generalised condition caused due to exposure to cold environment. When the air temperature falls below 10°C the symptoms like uncontrollable shivering, feeling of cold fall in body temperature rapidly, low heart rate, weak pulse and fall in blood pressure appear and hypothermia is caused. Speech disturbance, memory loss, drowsiness, irregular breathing, cold skin, tiredness and exhaustion follows when the condition is advanced.

Cold exposure may cause some vascular and neurological disorders, itching and burning sensation over the ends of fingers and toes due to abnormalities of blood circulation, blue coloration of feet or hands due to reduction of haemoglobin in the blood, blockage of arteries of the limbs particularly among diabetics and tobacco smokers and elderly persons. Emergency situation arises due to cold exposure.

Pressure

The increase or decrease in atmosphere pressure, produces immediate but transient (for a short while) effect on the human body. Some times, the consequences may be long lasting and damaging to health. The effect of pressure changes in the working environment is mostly felt by the lungs.

Raised air pressure (Hyperbaric condition) is experienced when the work is performed in a water-tight structure (Caisson chamber) as during tunnel making or bridge making under water where compressed air or gas is used under high pressure. The workers have to remain inside the chamber during the work period. Human beings can withstand large pressures provided there is free air entry into the lungs, sinuses and middle ear, If the pressure distribution is not uniform, tissue damage and sickness may be doused due to sudden pressure change. The workers suffer while entering into the chamber (compression stage) or while coming out of it (decompression stage) if there is sudden pressure change. The teeth, air sinuses, ears and lungs are affected due to decompression sickness (Caisson disease). Sudden decompression releases nitrogen gas dissolved in the blood in the form of large bubbles which get lodged in the joints and under the muscles causing severe cramps. The alveoli of lung bursts causing death. The blockage of the blood vessels by small gas bubbles may cause paralysis of the limbs, rupture of ear-drum, temporary or permanent hearing loss, swelling or bleeding into the eye ball and drowsiness. To prevent this, decompression is carried out gradually and in stages and deep-sea divers are supplied with under water breathing apparatus containing the mixture of helium and oxygen.

Noise and Vibrntion

Noise is a form of vibration conducted through solids, liquids or gases and usually termed as a sound that is unwanted by the listener and unpleasant to the ears. No instrument can

distinguish between a sound and noise, but the human reaction can. A pop music may be pleasant to somebody but may be a noise to another person. Due to industrialisation and increasing mechanisation in almost all industries and in many trades, noise is produced due to mechanical vibration. High and sustained noise levels within the workplace and even outside the works area cause noise hazard. Excess noise causes auditory and non-auditory effects in human beings. Therefore, abatement of noise by adopting appropriate preventive and control measures is essential.

The sound pressure is'measured as decibel (dB), frequency of sound as Hertz (Hz) and intensity (I) which is related both to sound pressure level and frequency. The human beings can hear sounds between 20 Hz to 20000 Hz and they are sensitive to high frequency sound. Noise is measured in decibel (dB) which is a logarithmic scale. Sound level of some common sounds are given in Table 4.1.

Table 4.1 : Levels and Source of Some Common Sounds

Sound Pressure Level (dB)	Source **of** Sound
0	Threshold of hearing
20	Whisper
30	Recording studio
35	Quiet room
40	Residential area
50	Quiet Office
60	Conversional speech
70	Outdoor traffic noise
80	Noisy office room
90	Factories
95	Machine Shop, Textile Mills
100	Motor House, Diesel Generator
110	Air Compressor House
120	Forge Shop and Revetting, Pneumatic drive
140	Jet Plane take off sound, threshold of pain

It is desirable to keep the workplace noise level at 85 to 90 dB so that hearing of the exposed workers is not affected. It should be remembered that decibel being a logarithm Scale, the loudness of sound is doubled with increase of every 5 dB.

Workplace noise is measured by using a sound level meter and the frequency of noise is measured by an octave band analyser. Integrated sound level meters contain both these instruments. The measurement should be done in dBA scale of the sound level meter. To assess the noise exposure of any individual, a noise dosimeter is used.

Noise produces temporary or permanent hearing defect (auditory) among the exposed individuals. If a person is exposed to high noise (above 90 dB) at the workplace or elsewhere, the hearing loss occurs at the level of 4 KHz frequency to start with and extends to other frequencies due to further exposure. The deafness is called as Noise Induced Hearing Loss (NIHL). The disease is not curable and does not reduce even if noise exposure is stopped. The diagnosis can be confirmed by audiometry. NIHL is reportable as well as a compensable disease in India.

Non-auditory effect of noise are such as annoyance, ringing in the ear, sleep disturbances, tension headache, lack of concentration, reduced performance, constant discomfort, raised blood pressure, etc.

The best way to prevent noise hazard at the workplace is to take steps at the design stage if excess noise is anticipated. Once the process is in operation, it becomes difficult to control noise satisfactorily, but it can be minimised to a great extent. While adopting the control measure, the source of noise, path through which it is transmitted and the receiver

(employee) have to be identified. The degree of noise reduction required to bring it to the acceptable level without causing damage to health and loss of production have to be adopted to achieve the goal to keep the noise within admissible limit. The workers should be encouraged to wear ear plug and car muffs while working in noisy area. In every industry, where noise is a hazard, hearing conservation programme to be launched for the exposed employees.

Vibration

Vibration is an oscillatory motion occurring in different occupations such as vehicle (truck, tractor, dumber, dozer) operators, workers working in ships and shipyards, construction workers(tunel, bridge making), miners (drillers, blasters, crushers, chipping hammer etc.), aircraft and helicopter maintenance engineers.

The vibrations are mainly two types:

i) ***Hand-transmitted Vibration:*** The vibration of frequency 1000 Hz or more enters the body through the hands when someone holds the vibrating tool firmly. Disorders of hands and fingers are caused due to this.

ii) ***Whole-body Vibration***: When the body is supported on a vibrating surface (vibratmg platform or floor) whole body vibration passes into the body in different directions. The frequency range of this vibration is usually low (0.5 Hz to100 Hz). Prolonged and regular exposure of the fingers or hand to vibration affects blood circulation, bones, joints, muscles and nerves. Vibration-induced white finger and hand-arm vibration syndrome are the common disorders. The vibration disorders can be prevented by isolating the person from vibration, adjusting the exposure time, proper upkeep and maintenance of vibrating equipment and preventing cold exposure of hands and fingers while working with vibrating tools. The prevalence of vibration disorders in our country is not very significant.

Radiation

The common form of radiation energy produced due to electromagnetic phenomenon are: Iight, infrared, radio and television waves, X-rays and gamma rays. The radiation may be non-ionising or ionising in nature. Radiation energy in different forms are used in many industries. The specific use depends on their frequencies starting from electro-power systems to microwave and satellite communication,

Radiation dose of above *6* Sievert (sv) is fatal. The health hazards of ionising radiation are:

- discolouration and pealing of skins and skin bum.
- acute radiation syndrome causing nausea, vomiting and weakness after 2-4 days of exposure.
- blood changes, leukaemia, sterility and cancer of other exposed organs.
- damage to the intestine and central nervous system,
- genetic changes in body cells.

Health effects of non-ionising radiation are:

- Acute due to direct exposure or chronic due to prolonged exposure.
- The effects are restricted to eyes and skin.
- Immediate skin changes such a pigmentation and damage to the epidermis, squamous cell carcinoma or ocular changes may occur.

Ergonomic **Hazards**

Ergonomics is inter-disciplinary approach to the interface between worker, the workplace and equipment. The objective of ergonomics is to fit the man to the work so that he/she can perform the assigned job comfortably without any hazard. Many of the machines and methods adopted in industrial operations in our country are not suitable for Indian workers.

Therefore, mechanical and environmental hazards exist in many industries. The height of machines, control panels, work bench, furniture and lights etc. pose some hazard for the workers which could be avoided otherwise. Repetitive strain injury and musculo-skeletal disorders may be caused due to ergonomic hazard.

Check Your **Progress** 2

1) What are the major health problems arising out of industrialisation?

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2) Name various physical hazards in the workplace.

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3) Write the heat balance equation of the body.

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4) What is decompression sickness?

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5) Name one occupational disease each caused due to noise, vibration and radiation.

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4.4.2 Chemical Hazards

The chemical hazards in the workplace arises due to excessive concentration of dusts, fumes, vapours, mists and solid particulate matter in the work atmosphere. Exposure to solvents, machine oils, cleaning agent and various other organic or inorganic chemicals used in industrial processes may produce harmful effect on health. Although the number of industrial chemicals are quite large, some of them produce toxic effects on the human body and, therefore, these toxic chemicals are potential hazards, The use of chemicals is increasing. Newer and complex chemicals are being added to the list almost every day not only in industrial operations, but also in our day-to-day life. Particularly in chemical plants the hazards become prominent. In addition to this, in metal processing industries particulate material pose specific hazards.

Particulate Matter

Dusts and fumes constitute the particulate matter. Dusts are particles of variable size (0.1 m to 30 m or more) generated due to mechanical action of crushing, grinding, pulverising, sandblasting and shake out operations in industries and mines. Fumes consist of extremely fine particles, Fume is generated due to combustion, condensation and sublimation of material.

When these particulate are inhaled, they cross the respiratory barrier and get deposited in the alveoli of the lungs. Due to mechanical and fibrotic reaction and enhanced activities of the microphages the alveolar walls are damaged and fine opacities develop in the lungs. The opacities are radio-opaque and may increase in size or join together, for praducing large opacities. This disease condition of the lungs is termed as "Pneumoconiosis" or "dusty

lungs". The signs and symptoms of the disease are: shortness of breath, chest pain, feverish feeling, weakness and impaired lung function. The diagnosis of pneumoconiosis can be done by chest X-ray (large film or minimum 70 mm film and not by odelca film), lung function test and prolonged exposure to respirable dust (0.5 m to 5 m) or fumes. The'pneumoconiosis being a general term, it is specified by the causative dust such as silicosis (silica), anthrocosis (coal dust), asbestosis (asbestos fibre), bylsinosis (cotton fibre), siderosis (iron dust), bagossosis (cane sugar fibre), baritosis (barium) or stannosis (tin).

Some toxic dusts like lead, manganese, mercury, arsenic, antimony or cadmium enter into the blood stream after being ingested, inhaled or directly absorbed through the skin and produce diseases of the target organs. Manganese (affecting CNS), mercury poisoning causing mental illness and tremor, lead colic, lead palsy, chrome ulceration, arsenic poisoning and mesothelioma of the pleura due to asbestos have been well documented. Metal fume fever, occupational asthma and toxic jaundice and allergic alveolitis are some of the occupational diseases caused due to particulate matter.

Toxic Gases and Vapours

The toxic gases and vapours can be classified as irritants, asphyxiants, narcotics and anaesthetics depending on their effect on human body. The physiological response of these toxic material depend on their concentration in work atmosphere and duration of exposure. Most of these gases although produce acute effects and even death in high concentration, chronic effect due to low concentration may also be produced. Irritant gases may produce acute effect on upper respiratory tract (ammonia, sulphur dioxide, formaldehyde, acrolein) or may cause irritation of the bronchioles and alveoli (nitrogen dioxide, phosgene). Simple asphyxiant gases interfere with oxygenation of the tissues and cause suffocation. Common examples arc: carbon dioxide, ethane, methane, hydrogen, nitrogen and helium. Chemical asphyxiants like carbon monoxide, hydrogen sulphide and hydrogen cyanide, etc. cause asphyxia due to their chemical action on the blood or respiratory centre in the brain. They may cause instantaneous collapse, unconsciousness or death when inhaled in high concentration. Carbon monoxide poisoning in steel plants and coke ovens occur frequently due to leakage of the gas.

Anaesthetic and narcotic gases like ethyl and prophyl alcohol, acetone, acetylene, hydrocarbons and ethers produce anaesthetic effect, unconsciousness and accidental death in high concentration.

Cardiac sensitisation (due to volatile hydrocarbons), neurotoxicity (due to solvents, mercury and manganese vapours) and cancer (due to carcinogenic substances) also occur.

Solvents and other Toxic Chemicals

A good quality of solvents are used in industries, particularly in chemical plants. Many of these solvents are toxic in nature. When the solvents come in contact with the skin, they get absorbed and produce complex and variable effects. Some organic substances are inhaled during handling and affect the central nervous system. Depending on the degree of exposure the solvents produce effects from drowsiness to death. Exposure to solvents'not only occurs at the workplace, but also in our day to day. Their effect should be recdgnised and necessary precautions should be adopted while handling them. Safety measures should'be adopted during transport, storage and handling of these chemicals. The potential hazard of the toxic solvents may be studied in detail if used in chemical plants and other industries. Solvents which may catch fire easily or cause explosion should be handled with care. Material Safety Data Sheet in respect of each chemical should be studied to prevent accidental exposure to chemicals.

4.4.3 Biological Hazards

Biological hazards may be encountered in many industries while handling animal or plant products. The hazard may be caused by bacteria, virus, fungus, parasites or any other living organism encountered on the workplace. In paper mills, textile mills, wool works, tanneries, diaries, sugar mills, food processing industries and seed processing units where products

from plant and animal origin are used are likely to cause biological hazards. A number of occupational diseases are also transmitted from animal to man while working with animals. Veterinary surgeons, pet shop workers, butchers, farm workers and zoo workers are likely to get diseases through animal contact. The diseases may be acute or chronic in nature. A few occupational diseases caused due to biological agents are given in Table 4.2.

Table 4.2: Summary of **Occupations** and Associated **Infectious and Parasitic** Diseases

occupation	**Diseases**
Agriculture, animal husbandry, forestry, trapping and hunting	In both tropical and teniperate arcas: anthrax, anthropod-borne viral diseases (e.g. encephalitis, plague), coccidioniycosis, fungal infections, histoplasmosis, leptospirosis, Q. fever, rabies, tickborne rickcttsiosis, tuberculosis and tularaemia. In tropical areas only: anthropod-borne viral discascs (e.g. yellow fever, haemorrhage fever), hookworm, leishmaniasis, malaria, schistosomiasis, trypanosomiasis
Construction work, land excavation, sewer work, diatching, mining	Coccidioniycosis, hookworm, histoplasmosis, Icptospirosis, tetanus, wound sepsis
Meat and fish handling and packing	Bovine tuberculosis, brucellosis, erysipeloid, fungal infection, Q. fever, tularraemia
Poultry and bird handling	Fungal infections, newcastle virus diseases, ornithosis
Work with hair, hides, wool	Anthrax, Q. fever
Veterinarians	Tuberculosis, brucellosis, fungal infections, leptospirosis, newcastle virus disease, ornithosis, Q. fever.
Physicians, nurses, dentists, laboratory technicians	Viral hepatitis, tuberculosis, other communicable infections
Work in warm, humid conditions (Kitchens, gymnasiums, swimming pools, etc.)	Fungal infections of the skin

The diseases may be transmitted from man to man in the workplace duo to close contact with infected persons. This also conies under biological hazard if proper precautions are not taken at the workplace.

The effects of biological agent niay be further increased by presence of physical or chemical pollutants in the work environment. For example, the incidence and severity of respiratory infections are enhanced by irritant gases and fumes, exposure to nitrogen oxide may increase the chances of pneumonia in human beings, tuberculosis niay spread through dust while working in dusty environment. Bio-safety measures should be adopted to reduce or eliminate these hazards.

4.4.4 Psycho-social Hazards

Due to globalisation of economy and intense competition in every sphere, the human aspect of work has been strained to a great extent. Introduction of new technology, automation, computerisation, emphasis on quality of product, competitive price and changing work environment put a lot of stress on the workers. To cope up with the emerging situation, the old workers have to bc retrained or rehabilitated, whereas the new recruits have to face a greater challenge for which they have to be prepared. This induces job stress and if a suitable coping strategy is not adopted, the workers and supervisors may suffer from psychosomatic diseases like mental illness, hypertension, insoninia and depression. This will be more pronounced in the coming decade, because the physical and chemical hazards at the workplace will be taken care to a greater extent and psycho-social hazards will take their place.

Many of the workers today are better off economically but they have to face the hazards of industrialisation particularly in large cities. The problem of transport, housing, medical

facilities, lack of amenities and such other problems are still unsolved. This causes behavioural changes among the workers such as anxiety, depression, hostility, aggressiveness and alcoholism, etc. which are responsible for poor work performance and abnormal mental health. Psycho-social ill health like fatigue, body pain, headache, peptic ulcer, hypertension and rapid ageing have been seen very frequently. Boredom, repetitive work, sedentary jobs and monotonous daily routine are some of the problems which affect the physical, mental and social well-being of the individual and their family members. This will be a major problem in future. Every industry should take care of these issues to keep the workers healthy, productive and free of job stress.

4.4.5 Prevention and Control of Hazards

You have learnt about various occupational health hazards likely to be encountered during work. You will also appreciate that work cannot be avoided and industries cannot be closed because of existence of various hazards. The work has to be performed safely and health hazards have to be preverited by adopting various control measures. Before any control measures has been adopted in any industry the following points have to be considered.

i) Finished product and intermediate products
ii) Raw materials used
iii) Equipment/machines involved
iv) Operative procedures
v) Manpower employed
vi) Automation and computerisation
vii) Prevailing statutory provisions

The control measures may be adopted at the workplace by adopting engineering and ergonomic control measures, statutory control measures during operation and maintenance and medical control measure to protect the workmen from various hazards and environmental control measures to safeguard the working environment and the environment around the factory. The occupational physician should be involved in planning, implementing and monitoring such control measure from time to time in the best interest of the workers and the industry as a whole. A few control measures are enumerated below.

Engineering Control

Appropriate engineering design, total or partial enclosure of the process, providing ventilation (air changes), changing the raw material or process, isolating or shielding the hazardous process and providing exhaust system and maintenance of the machines1 equipment.

Statutory Control

Good housekeeping, following standard operating practices, keeping the contaminants within permissible limit, periodic inspection of work and conducting hazard studies.

Medical Control

Work environment monitoring, use of appropriate personal protective equipment, periodic health check up of exposed employees conducting health education and training and organising special biological monitoring programmes for the vulnerable group of employees on various health hazards.

Environmental Control

Work environment around the factory should be improved by proper sanitation, waste disposal, tree plantation and improving ecology.

Check Your Progresss 3

1) Which of the dust particles hazardous to health?

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2) Name the common disease caused due to dust.

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3) Enlist the methods of prevention and control of hazards.

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4.5 OCCUPATIONAL DISEASES

You will agree that the incidence of occupational diseases is as old as our civilisation. The earliest observations on occupational diseases were found in the times of Pharaohs, around 4000 BC among the builders of pyramids where slaves and prisoners were engaged in building them. In Europe, mining was earliest industry and occupational diseases were observed among the Austrian and Bohemian miners and premature death among miners was very high as recorded by Paracelsus (1493-1541) and Agricola (1494-1555). The working condition in gold, silver and lead mines of ancient Greece and Egypt were so bad that the miners were the victim of many diseases.

The first book on occupational diseases and metal toxicology named "De Re Metallic" written by Agricola was published in 1556 although after his death. Bermardino Ramazzini (1633-1714), the Father of Occupational Medicine brought out a revolutionary change and devoted his entire life to the prevention of occupational diseases and to the improvement of workers' life.

During the twentieth century after the formation of International Labour Organisation, the member countries paid more attention to the workers' health and occupational diseases were identified. Although Rarnazzini laid emphasis on occupation on disease causation, many contemporary physicians did not consider it important. For the first time in 1925, ILO prepared a list of 3 occupational diseases (Convention No.18 of 1925) to which many more diseases were added making the total number to 76.

In 1989 occupational disease was defined as diseases known to arise out of the exposure to substances and dangerous conditions in processes, trades or occupations. Occupational diseases are caused due to work whereas certain diseases aggravated due to work are termed as work-related diseases.

In 1993 this was further reviewed by ILO during the Linz (Austria) Conference wherein a cause and effect relationship between the occupation and disease was established,

4.5.1 Identification and Diagnostic Criteria of Occupational Diseases

Following are some of the identification and diagnostic criteria of occupational diseases:

- The disease should have exposure-effect relationship with work, work method or work environment.
- The disease occurs among a group of individuals engaged in same type of work or occupation.
- The frequency and prevalence of the disease should be above the average morbidity of the rest of the population.
- The diagnosis should be established by clinical and pathological data, occupational back ground and epidemiological data.

The following diagnostic criteria should be adopted.

- Strong association with occupational exposure.

- Consistency: The independent research studies and reports should give similar results and conclusions.
- Specificity: The disease should depict clearly defined pattern.
- Appropriate time relationship: There should be appropriate time interval between the disease causation and exposure.
- Biological markers: There should be certain biological markers to assist diagnosis. Greater the exposure, greater is prevalence and seriousness.
- Damage-risk criteria: The risk and disorder criteria of the causative agent and the host should be established.
- Coherence: All studies and evidences should lead to same/similar conclusion.
- Quantitative and Qualitative criteria: The risk assessment should be done qualitatively and quantitatively which establishing the diagnosis.
- International/National recognition: The disease should be recognised as 'Occupational' as per international/national standards or documents legally.

4.5.2 Examples of Some Occupational Diseases

The examples of some occupational diseases prevalent in India and other industrialised countries are given below.

a) Occupational Lung Disease

Pneumoconiosis, occupational asthma, lung cancer and allergic bronchitis are some of the occupational lung diseases caused due to exposure to particulate matter and gases at the workplace. Aetiology of more and more such diseases reveal their occupational origin. Pneumoconiosis is caused due to inhalation of different types of respirable dust which get deposited in the alveoli of the lungs and produce fibrotic reaction. Silica (SiO_2) is most harmful dust which causes silicosis after prolonged exposure. The disease is common among stone crushers, miners, foundry and refractory workers. The disease produces malaise, low grade fever, breathlessness, mild pain in chest and may be confirmed by X-ray of chest and pulmonary function test. It aggravates tuberculosis if present.

Depending on the nature of dust, which is the causative agent, the pneumoconioses are named accordingly.

Table 4.3: Various Types of Pneumoconioses

Causative Agent	Type of Pneumoconiosis
Silica (SiO_2)	Silicosis
Coal dust	Anthrocosis
Iron oxide	Siderosis
Barium	Baritosis
Calcium dust	Calcosis
Tin	Stannoris
Asbestos fibre	Asbestosis
Sugarcane fibre	Baggasosis
Mouldy hay	Hay fever

Exposure to asbestos fibres in asbestos mines or industries produce mesothelioma of pleura after 15-20 years. Due to its intense toxicity use of asbestos has been banned in developed countries by regulation. In India, it is still used in abundance but many cases of asbestosis have not been reported in India,

Occupational asthma is caused due to a wide range of contaminants of occupational origin. This is emerging as an acute respiratory problem among the,industrial workers, which has to be prevented.

Allergic respiratory diseases caused due to air pollutants among the sensitive workers and in the surroundings of the industries are emerging as a problem of indiscriminate industrialisation. While diagnosing chest diseases, this should not be lost site off.

b) Occupational Dermotoses

Skin disease caused due to exposure to various substances, most of them of chemical origin, bring about a great deal of suffering among the industrial workforce. It occurs in all age groups, in any work setting and brings about personal misery and loss of productivity. The occupational dermatitis may be classified as contact dermatitis, photodermatitis, occupational acne, pigmentary abnormalities, exposure to excess beat or certain chemical substance. Most of these skin disorders can be prevented by adopting safe method while handling chemical, maintaining cleanliness and personal hygiene of the workers, using barrier creams and skin cleansers and minimising exposure to contaminants. Occupational cancer of skin may be caused due to certain chemicals.

c) Systemic Occupational Diseases

Certain substances in the work place may enter the body in sufficient concentration through inhalation, ingestion or direct absosption through tlie skin and enter the blood steam. These substances affect specific organs or organ systems of tlie body to produce occupational diseases in tlie long run. Some of the occupational diseases are given in the Table 4.4.

Table 4.4: Occupational Diseases

Causative Agent	Body System Affected	Occupational Disease
Carcinogens	Skin	Skin cancer
Chromium	Skin	Chrome ulcer
Manganese Mercury	Nervous system	Manganism (like Parkinsonism), mercury poisoning
Organic lead	Nervous systeni	Psychosis, cncephalopathy
Lead	Digestive system	Lead colic
Nitrates, aniline derivatives, chlorobcnzc, benzene, nitro & amino compounds	Blood formation system	Bone marrow depression Formation of abnormal haemoglobin (metharmoglobin) anaemia
Cadmium	Kidneys	Renal failure
Calcium		Renal failure
Asbestos, chromium	Lungs	Occupational cancer of lungs
Benzene	Blood tissue	Leukaemia
Vinyl chloride	Liver	Liver cancer
Benzedrine, Benzene	Urinary bladder	Urinary bladder cancer
Arsenic, soots, tar, mineral oils.	Skin	Carcinoma

In addition to this, certain other diseases are caused due to physical agents, e.g. Noise induced hearing loss due to excess noise, vibration white finger, steel workers' cataract and arc eye due to radiation, telegraphists cramp due to vibration, etc,

Some of these occupational diseases are notifiable under the Indian Factories Act and compensable according to Workmen's Compensation Act.

4.5.3 Notifiable Occupational Diseases

The following occupational diseases as listed in the schedule-I11 of the amended Factories' Act are to be notified to the Chief Inspector of Factories of the state under the sections 89 and 90.

- Lead poisoning, including poisoning by any preparation or compound of lead or their sequelae.

- Lead tetra-ethyl poisoning
- Phosphorous poisoning or its sequelae
- Mercury poisoning or its sequelae
- Manganese poisoning or its sequelae
- Arsenic poisoning or its sequelae
- Poisoning by nitrous fumes
- Carbon bisulphate poisoning
- Benzene poisoning, including poisoning by any of its homologues, their nitro or amido derivatives or its sequelae
- Chrome ulceration or its sequelae
- Anthrax
- Silicosis
- Poisoning by halogen derivatives of the hydro-carbons of the aliphatic series
- Pathological manifestation due to: (a) radium or other radio-active substances
  (b) X-rays
- Primary epitheliomatus cancer of the skin
- Toxic anaemia
- Toxic jaundice due to poisonous substances
- Oil acne or dermatitis due to mineral oils and compounds containing mineral oil base.
- Byssionosis
- Asbestosis
- Occupational or contact dermatitis caused by direct contact with chemicals and paints. These are of two types, that is, primary irritants and allergic sensitizers
- Noise induced hearing loss (exposure to high noise levels)
- Beryllium poisoning
- Carbon monoxide
- Coal miners' pneumoconiosis
- Phosgene poisoning
- Occupational cancer
- Isocyanates poisoning
- Toxic nephritis

4.5.4 Cornpensable Occupational Diseases

The following occupational diseases are cornpensable as per the Section 3 of the Workmen's Compensation Act, 1923 (Schedule-III) and Section 52 of the Employees' State Insurance Act, 1948.

List of Cornpensable Occupationat Diseases

- Infectious and parasitic diseases contracted in an occupation where there is a particular risk of contamination
- Diseases caused by work in compressed air
- Diseases caused by lead or toxic compounds
- Poisoning by nitrous fumes
- Poisoning by organo-phosphorus compounds. .

- .Diseases caused by phosphorus or its toxic compounds
- , Diseases caused by mercury or its toxic compounds
- Diseases caused by benzene or its toxic homologues
- Diseases caused by nitro and amido toxic derivatives of benzene or its homologues
- Diseases caused by chromium or its toxic compounds
- Diseases caused by arsenic or its toxic conlpounds
- Diseases caused by radioactive substances and ionising radiation
- Primary epitheliomatous cancer of skin caused by tar, pitch, bitumen, mineral oil, anthracene, or the compounds, products or residues of these substances.
- Diseases caused by the toxic halogen derivatives of hydrocarbons (of the aliphatic and aromatic series)
- Diseases caused by the carbon disulphide
- Occupational cataract due to infra-red radiation
- Diseases caused by manganese or its toxic compounds
- Skin diseases caused by physical, chemical or biological agents not included in other items
- Hearing impairment caused by noise
- Poisoning by dinitrophenol or a homologue or by substituted dinitrophenol or by the salts of such substances
- Diseases caused by beryllium or its toxic compounds
- Diseases caused by cadmium or its toxic compounds
- Occupational asthma caused by recognised sensitising agents inherent to the work process
- Diseases caused by fluorine or its toxic compounds
- Diseases caused by nitroglycerine or other hitroacid esters
- Diseases caused by alcohol and ketones
- Diseases caused by asphyxiants: carbon monoxide, and its toxic derivatives, hydrogen sulphide
- Lung cancer and mesotheliomas caused by asbestos
- Primary neoplasm of the epithelial lining of the urinary bladder or the kidney or the ureter
- Snow blindness in snow bound areas
- Disease due to effect of heat in extreme hot climate
- Disease due to effect of cold in extreme cold climate
- Pneumoconiosis caused by sclerogenic mineral dust (silicosis, anthraoosilicosis, asbestosis) and silico-tuberculosis provided that silicosis is an essential factor in causing the resultant incapacity or death
- Bagassosis
- Bronchopulmonary diseases caused by cotton, flax hemp and sisal dust (Byssinosis)
- . Extrinsic allergic alveolitis caused by the inhalation of organic dusts
- Bronchopulmonary diseases caused by hard metals

There are many occupational diseases which were identified years back are not prevalent today, e.g. Bursitis of the elbows among the miners, telegraphists' cramp, hatter's disease (mercury poisoning) etc. Due to change of technology and introduction of complex

chemicals and monotonous electronic devices, newer occupational diseases are appearing. Job stress leading to psycliosoniatic disorders, diseases due to continuous over work, eye strain among the VDU operators and many occupational cancers have been identified during this century. The reporting and notification of such diseascs particularly in developing and underdeveloped countries are almost negligible. Burdened with other health problems arising due to poverty, malnutrition, communicable diseases and uncontrolled life style diseases, the occupational diseases have been lost sight of. Derth in diagnostic facilities and lack of awareness among the industrial workforce and even the health professionals has resulted in low reporting of occupational diseases which is expected to improve in corning decades.

4.5.5 Prevention of Occupational Diseases

You arc aware that treatment is not available for most of the occupational diseases although most of them can be prevented. Since most of these diseases develop days or years after exposure and do not produce any acute symptoms in initial stage, diagnosis is delayed or missed invariably. The disease develops silently among the exposed workers and remains so even after cessation of employment. Won-availability of treatment, lack of laboratory facilities to clinch the diagnosis and apathy of the employers and employees are the constraints in identification, notification and prevention of these diseases. However, preventive measures should be taken by the industries, mines, plantations and agriculture sector against the occupational diseases.

As discussed earlier, engineering control, medical control, statutory control and environmental control measures have to be applied for this purpose.

It also becomes the responsibility of any treating doctor, factory medical officer or occupational physician to notify the occupational diseases detected by them to the statutory authorities. If not complied with this provision, the doctor may be penalised under the Factories Rules.

Check Your Progress 4

1) What is an Occupational disease'?

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2) What are the diagnostic criteria ofoccupational diseases'?

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3) Name two systemic occupational diseases and their signs and symptoms.

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4) Fill in the blanks:

i) ..... is caused due to exposure to benzene

ii) ..... causes liver cancer

iii) .....caused due to noise is a notifiable and coinpensable disease

iv) ..... ulcer of the skin is caused due to..... dust

v) Oil acne is caused due to ..... .

4.6 OCCUPATIONAL HEALTH SERVICES

Occupational Health Services (OHS) have been provided in industries and mines in most of the developed countries based on recommendations of ILO and WHO: But in Indian

industries, it has not yet gained a foot hold. Of late, establishment of a need-based occupational health centre in tlie industries involving hazardous processes and employing more than 200 persons has been brought under the statute in many states of India. It is expected to be adopted widely by different industries in tlie coming decades to provide health care to the industrial workforce and to keep them fit and productive.

As mentioned earlier, many occupational diseases have been identified during this century. . Earlier only workplace hazards and work injuries were dealt by OHS and it was considered as a preventive service. Subsequently, other factors related to work were studied in detail and impact of working condition, work organisation, work methods and work environment were identified as occupational diseases although many of them have not been reported today.

The statutory requirement of notification and compensation of occupational diseases called for development of occupational healtli services in most of the developed countries of the world based on the principles of the ILO/WHO Joint Committee. Subsequently, for fulfilling the above objectives, a multidisciplinary team-approach was advocated. Since, it is beyond the capacity of any single individual to provide this service, this has been developed as a multidisciplinary and multidimensional specialised team-work.

4.6.1 Role of International Organisations

ILO is instrumental in promoting occupational health services in industrialised member countries. During last four decades, ILO adopted many Conventions and Recommendations on Occupational Health for implementation by tlie member countries first being Recommendation No. 112 (1959). This recommendation gave a direction to the practice of occupational health by defining its purpose, condition for establishment, location, role, organisation and functions. The Convention No. 155 (1981) and Recommendation No. 164 (1981) further specified the responsibility of the employers, bipartite committee, national policy and statutory responsibilities. Convention No. 161 (1985) and Recommendation No. 171 (1985) on OMS made concrete recommendations on purpose, aims and objective and functions of OHS under changing world situation. These Conventions and Recommendations facilitated development of occupational health services at the place of employment. In India, some undertakings in organised sectors like coal, steel, petrochemicals, heavy engineering and some chemical industries (mostly multinationals) followed some of the reconimendations in a sporadic manner, However, as per amended Factories' Act (1987) and rules made thereunder it is mandatory to establish occupntional health centres in industries employees more than 200 persons and involving in hazardous processes as per Schedule II of the Act. Similar provisions have been reconimended for the mines. This has created an atmosphere of change in attitude of tlie occupiers and owners of industrial/mining organisations. Many organisations agreed in principle to provide optimum occupational health care for their workforce. The dearth of resource in terms of money and qualified man power was a constraint. In this context, it may be pointed out that the role of occupational physicians already employed in such organisations is very important. They should be able to sell the idea of investment on occupational health as a benefit rather than an avoidable expenditure. In these industries OIIS can be developed in stages to derive benefit in the long run.

4.6.2 Need for OWS in Industries

You will agree that the medical facilities during last half a century has undergone phenomenal changes. The different medical specialities have undergone changes by further dividing tlie specialities and super specialities into various micro specialities. The field of practices have been narrowed down into high tech, skill-intensive activities which are beyond the scope of many practitioners. A modern hospital today consists of not only highly qualified and specially trained medical professionals but also sophisticated equipment and electronic gadgets for diagnosis and user-friendly devices, Thus, medical care is becoming complicated and costlier day by day and going beyond the reach of tlie majority and thriving because of the patronage of a group of affordable few. Tlie occupational health today has branched into many sub-specialities and has become niultidimensional in nature involving a wide range of professionals and not confined to the medical discipline alone. It is a team effort, it is a group activity, it is a purposeful endeavour for achieving the objectives of total

health care at the place of work. It is not limited to the expertise of a single individual, but the excellence of well co-ordinated team-work with multipronged approach to problem solving. In fact, occupational health activities extend beyond the boundaries of human body today and have to be managed by adopting modern management principles. Based on the changing socio-cultural context of work ethics, occupational health today is considered as a health promotional activity for protecting and preserving the human resource. The OHS has a total health care approach consisting of preventive, curative, promotive and rehabilitative services to give benefit to the individuals and to the organisation. In modem times, OHS has been conceptualised as a tool for improving organisational image by increasing productivity and profit by reducing absenteeism, preserving human resource and creating a motivated and productive workforce for organisational gain. Therefore, modern concept of occupational health services is: "services established in or near the place of employment for the purpose of protecting workers against any health impairments which may arise out of their work or the conditions in which it is carried out and promoting their health in relation to work" (ILO Reconmendations No.171-1985). Occupational Health Service (OHS) may be defined as:

"Preventive, promotive, curative, rehabilitative, environment conscious, safety oriented, employer-employee friendly service which aims at health preservation and health promotion of all those who are engaged in any type of work or occupation".

4.6.3 Organisation of OHS

As indicated earlier, need-based **OHS** should be provided in every industry to cater to the health needs of the employees. The service should necessarily be a multi-disciplinary in nature. Following are some of the considerations required for organisation of OHS:

- Every large enterprise, therefore, should have a written down occupational health policy indicating the objectives, role and responsibilities of employees and the occupier.
- Every employee should read and understand this policy and should co-operate with the employer to implement this.
- Adequate infrastructure in terms of trained manpower, equipment and other physical facilities should be made available by the enterprise to put the policy into action.

  Occupational Health Centre may be established as an integrated centre with total health care approach nearer to the workplace.
- The services provided are: treatment of injured and the sick, referral facilities and well organised health education programmes.
- The different sections of the services may consist of some or all of the following: Occupational Medicine, Occupational Hygiene, Occupational Physiology and Ergonomics, Biochemistry & Toxicology, Occupational Health Nursing, Health Education, Occupational Psychology, Health Information System (HIS) and Applied Research.

4.6.4 Functions of OHS

The main task of **OHS** is health protection and health promotion of the employees. The activities should consist of:

- Identification, evaluation and control of occupational hazards likely to exist in the industry.
- Treatment of work injuries and emergency medicare..

  Conducting pre-employment, pre-placement, periodical, promotion, post-sickness and pre-retirement medical examinations of all the employees at suitable intervals and maintaining their health records in health cards/computer.
- Regular work environment monitoring and assessment of the impact of work environment on exposed workers.
- Evaluating the exposure status of the risk group with the help of dosimeters.
- Organisation of special health programmes at work site for the identified target group such as women, food handlers, high risk workers, physically handicap, ageing workers and executives.

- Identification of regular follow up and rehabilitation of disabled and chronic sick employees.
- Training employees at different levels on health matters and preparation of health education material for creating health awareness among the employees.
- Mental health assessment and counselling of special risk groups through Employee Assistance Programme (EAP).
- Conducting epidemiological studies, health surveys and applied research and publication of reports for information sharing and bench marking.
- Developing computerised Health Information System (HIS).

Advising the management on health, safety, environmental matters and statutory requirements as and when required.

4.6.5 Model Occupational Health Services for Factories and Mines

You will appreciate that in our country, Occupational Health Services in industries and mines need re-organisation. The health care for industrial and commercial establishment workers is provided through the Employees State Insurance Scheme (ESIS) as per the provisions of ESI Act. But this is limited to certain treatment-related and compensation-oriented benefits only for the insured workers and their family members. But all the workers are not covered under this Scheme and there is also a limit to the medical expenditure. Miners get treatment facilities through cess and mining welfare organisation. To give a coverage to all the. employees, the factories and mines run their dispensaries/hospitals through listed specialists. By this method only the treatment needs of the sick workers and their family members are met to some extent. But the modem concept of health aims at total health care approach for all the employees which includes preventive, curative, promotive and rehabilitative health care as mentioned earlier. Hence the thrust of occupational health has shifted from preventive to prevento-curative approach.

While designing OHS for any industiy or mines in our country, it is not necessary to adhere to the developedcountry-model. Keeping the basic principles intact, the design should be need based and modified to match the politico-socio-cultural situation of the country, As discussed earlier, even today, some factories and mines are not working with bare minimum of safety and health conditions except a few hand-counted industries and business organisations who have fulfilled the statutory requirements in the real sense. Some of them haw gone even beyond. OHS should never be considered as statutory compulsion but as an organisational commitment. A model Occupational Health Centre at the workplace should provide all the components of "total health care", i.e. emergency medicare, treatment facilities, health monitoring, health counselling, health promotional activities, disease prevention, protection from specific diseases (occupational and work-related) disability limitation, rehabilitation and health education – "all in one package".

Generally, three models of OHS are recommended to cater to the needs of factories, mines and business service or business organisations in our country. The centres should start in a small way and expanded gradually with multiple activities depending on requirement:

Model I

Category	Facilities	Manpower
Small factories, mines Occupational and service organisations having 1000 or less persons. The operations arc non-hazardous in nature even a group of small organisations may develop a centre jointly.	• Emergency medicare • Preventive, eurativc and health education • Work environment monitoring	One Physician, medical employing hygienist, Nurse, laboratory assistant and. medico-social worker.

Model II

Category	Facilities	Manpower
Organisation employing 1000 to 5000 persons and/or factories in hazardous operations as per statute	• Emergency medicare preventive, curative, rehabilitative, health education, psychology, physiology and ergonomics and computerised health information • Work environment monitoring.	Occupational Physicians, hygienist, psychologist, health educator, toxicologist, physiologist, nurse and medical social worker and computer operator

Model III

Category	Facilities	Manpower
Large industries and mines employing more than 5000 workers	• Emergency medicare, curative, rehabilitative, laboratory services. • Referral system • Specialised care on different disciplines. • The computerisation facilities for health records • Work environment monitoring • Psychological counselling	The manpower should commensurate with the size of the factory/mines. In addition to above Manpower (Model II) epidemiologist, health statistician and more doctors and nurses need to be employed.

In addition to this, industry-wise referral centres have to be developed in phases to cope up with multi-centre activities. Health Information System, Research, Consultative Services and Effective Co-ordination with local, national and international institutions/organisations should be ensured for better functioning when adequate infrastructure facilities are available.

4.7 OCCUPATIONAL HEALTH MANAGEMENT

You have already learnt in earlier courses that in large enterprises now more emphasis is given on human resourse development. To keep the employees fit and productive, the subjects like safety, health and environment are gaining more and more importance in organisational policies and practices. For efficient management of any industrial organisation, these three factors have also to be managed in the present context. The word management, according to Peter Drucker "*denotes a function but also the people who discharge it. It denotes a social position and rank but also a discipline and field of study*". For success of any enterprise or institution management techniques are applied scientifically and methodically. This is also applicable in the field of occupational health management. To start with every industry should have an occupational health policy. The provisions made in the occupational health policy of any company will not come into force as such but has to be put into practice by the managers who are also instrumental in implementing the other policies and procedures of the company. Hence, the implementation of such policies depends either on unilateral decision of the company or through the participative action depending on the prevailing organisation culture. The experience from the industrialised countries and from public sector undertakings in India indicates that a greater success through joint participation have been achieved in the area of occupational health, safety and health should not necessarily be viewed as the sole responsibility of the employer or the occupier as laid down in the statute, but the role of each of the social partners jointly in achieving the objectives of law should be encouraged. Health of the workforce in any industry should be accepted as a fundamental requirement of good management, its implementation without participation and co-operation of the employees and trade unions is quite difficult. Issues such as formulation of a health policy, identification of hazards and their impact on health, education, provision of immediate and emerging medicare facilities at the workplace, medicare for employees and their family members, training of the employees, etc. cannot be

settled unilaterally even if the management wishes to do so. As a partner of progress and industrial growth, every employee should get involved in these issues for developing better solutions to the day-to-day problems of mutual benefit. In the UK, Lord Robens stressed on the working relationship between the employer and the workers and the contribution which each should make for overall improvements in the work environment have also been identified.

4.7.1 Occupational Wealth Policy

The first step in management of occupational health in our country is formulation of a written policy depicting the management's commitment to safety and health. It should also be followed in letter and spirit. The amended Factories Act, 1987 has ernphasised the need for such a policy for every industry should be signed by the chiefexecutive and it should be circulated among each and every employee and should be understood by them clearly. The employees should also feel that the management really means what has been written down in the policy. Occupational health policy should reflect the following components in the document:

- Setting out objectives for all employees on occupational health and safety
- Arrangements for accident prevention and health care programmes and participation by the workers, trade unions and management team.
- Provision of adequate fund, infrastructure facilities and personnel for occupational health services and safety organisation at the workplace.
- Fixing reasonable responsibility and accountability at appropriate management level for implementation of the policy.
- Provision for education and training of employees of different levels.
- Periodic monitoring implementation of the policy and review at board level.

4.7.2 Organisation Structure

The second step is to set out the proper arrangements for implementation of tlie policy to achieve the goal. This calls for the appropriate organisational structure by understanding the need and multifactorial causes of the accident prevention, safety promotion, health care and rehabilitation. Therefore; qualified and experienced safety, health and personnel professionals have to be deployed by the industry to take charge of this. Although statutory provisions have been made for appointment of labour welfare officers, safety officers and medical officers in industries under the Factories Act and Rules, many management did not attach much importance to it, except employing a labour welfare officer to take care of all the three lines. While making necessary arrangements for safety, health and good work environment for the workers, the employer should not look through the narrow statutory framework, but consider certain basic requirements for effective implementation of the policy. These are:

- Distribution and decentralisation of powers, responsibility and authority.
- Dissemination of knowledge and information related to the safety and health precautions in the workplace to the managers and supervisors and trade union leaders.
- Analysis of work accident data and occupational diseases for taking preventive actions.
- Provision and use of personal protective equipment, suitable tools and instruments during work,
- Formulating and following guidelines and protocol for performance of hazardous work.
- Promoting to adopt safe operating and maintenance practices.
- Leadership quality and initiatives of the safety and health professionals.

4.7.3 Participative Approach

The third element worth mentioning is participative approach. The agreement of safety and health cannot be achieved through collective bargaining but by mutual trust and discussions. Particularly in multiple union situation in the industry, this becomes a difficult task to make every one agree to a proposal. Although the employer should take the initiative to inculcate good safety and health practices among the workers, the workforce should also realise its importance and practice the same voluntarily. All trade unions should understand that safety and health measures are essential and beneficial for their members irrespective of their ideology and any positive thinking by the management in this direction should be accepted and adopted. By participating in safety and health programmes the trade unions can bring benefits in cash and kind for their members through humanistic approach. The provisions of joint participation should include:

- Identification of suitable trade unionists with aptitude for safety and health activities.
- Assigning the roles and functions to the identified/nominated safety and health representatives.
- Formation of bipartite Safety and Health Committees and defining their roles and functions.
- Linking wage agreements with safety performance and productivity.
- Education and training of trade union leaders including as trainers.
- Translating the decisions on safety and health into action.

4.7.4 Action Plan

The fourth aspect is to prepare long-term and short-term action plans with mutual agreement of the employer and the employees. The long-term action plan may be pre-tested and modified on the basis of the success achieved through the short-term plan. With a view to promote participation in the programmes for safety and health by all workers, a model agreement may be signed with the management so that the programmes are implemented effectively. The document should contain the following:

- The short-term and long-term actions identified by microplanning
- Responsibility and implementation within a reasonable time frame spelt out clearly.
- The thrust area to be identified for initiation of action to give tangible benefits,
- Periodic review of the action plan be done.
- Good performance and performers be encouraged by appreciation or reward.

4.7.5 Duties and Responsibilities to be Fixed

The fifth factor is to recognise that the prime responsibility of safety management and overall control should rest with the emplbyer or at higher management'level. A hierarchy of responsible managers and supervisors should be created at organisational level for interfacing at different levels. The occupational health specialists'should provide expert knowledge and advice to this group as well as the top management on matters of health promotion of workforce. The occupational physician should also have regular interaction with the hospital/specialists wherever available.

4.7.6 Involvement of the Employees

The sixth element is to make the individual worker realise his presence felt in the health programmes, His obligations towards his ideologies, group and the organisation as a whole in maintaining a safe and healthy work culture. The workers should:

- take initiative and co-operate in maintaining the safety devices in the workplace and following the safe and healthy work practices.

- take reasonable care that no worker wilfully or intentionally interferes or disregards the safety devices.
- educate himself as well as the co-workers on identification and elimination of hazards and unhealthy work situations.
- motivate and train the committee members to adopt health and safety voluntarily.
- .take initiative to form safety and health groups in the departments/sections.

4.7.7 Role of Trade Unions

The seventh factor is encouraging the trade unions to develop their safety and health programmes independently by complementary to bipartite agreement. Many trade unions have recognised today that it is their responsibility to promote the health of the workmen by improving the quality of work environment by reducing the risks and creating consciousness among the workers towards health. This could be achieved through general and specialised training organised for the workers' representatives and providing them specific guidance to train others. The industries may support or sponsor such programmes. The trade unions should also develop expertise through interaction with international organisations and professional associations. If necessary, expert advice from the safety and health professionals may be sought as and when necessary to strengthen their points ofdiscussions with the management.

4.7.8 Sharing Information

There is almost an explosion of knowledge on health today. Due to free and wide discussion on health issues by the media including internet in most of the countries, the workers have the access to the latest health information. The employers have to keep track of this while dealing with the workers and their trade unions. The "right to know" clause introduced in statutes makes it almost mandatory for the occupier to share the information with the workers on health hazards and preventive measures. The safety and health professionals of the employers and trade unionists should have free access to such information either through computer network or data bank. Organising problem-oriented workshops and sharing solution through technological innovations will be beneficial.

4.7.9 Human Resource Development

Human resource development in any sphere of activity has become a necessity due to rapid technological changes and Occupational health is no exception too. To match with the changing needs one has to gather knowledge and skills through education, training and re-training. By imparting training to the individuals engaged in various jobs, the efficiency increases, output improves, errors are reduced and accidents are minimised. Designing modular health education programmes tluough audio-visual aids is the order of the day. Incorporating health management in the Corporate Policy, the hands of the entrepreneurs will be strengthened to deal with the task firmly which may arise due to changed socio-political situation, They cannot remain as silent on-lookers any more. Management strategies on safety, health and environment have to be adopted by rational thinking, clear objectives and strategic planning to achieve the desired industrial growth. It should be emphasised that safety and health factors contribute a lot for welfare of the workforce as well as the production process. If managed well, the investments will give rich dividends and generate resource. The secret of success lies with the managers and occupiers.

Check Your Process 5

In the context of Occupational Health, what do you understand by:

a) Participative approach

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b) Action Plan

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c) The role of trade unions

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4.8 OCCUPATIONAL HEALTH IN INDIA: PRESENT SCENARIO

India is becoming industrialised rapidly. Not only the industrial process but also other economic activities are expanding vibrantly all over the country. You must have observed that more and more active population from rural agricultural community are migrating into the newly developed industrial cities and towns to earn their livelihood. This produces direct and indirect impact on the industry, Although the process of industrialisation started in our country during late fifties, unfortunately it could not be done in a planned manner or organised way. The industries existed in this country at certain locations for many years and labour force was available cheap or for part time work. Acute scarcity of accommodation, transport, health care, education and other infrastructure facilities for industrial workers was not experienced. Therefore, much emphasis was not laid on occupational health. The workmen were contented with whatever they got for medical treatment. Most of them were covered by Employees' State Insurance Scheme. Emergency medical care was provided in the factory dispensary. This was the situation in industries, mines, tea gardens, ports and railways till sixties. When the huge public sector industries like steel, cement, engineering and petro-chemical complexes were established and the coal mines were nationalised the workforce got organised. Provision of medical facilities by the employer was envisaged and these industries started their hospitals and dispensaries without depending on ESI Scheme. In some industries only eniergency treatment facilities were provided by the employer as envisaged and these industries started their hospitals and dispensaries without depending on ESI Scheme. In those industries only emergency treatment facilities were provided at the workplace initially. Even in these large industries occupational health services did not develop per se.

Tata Iron & Steel Co. Ltd. (TISCO), Jamshedpur is a pioneer in developing factory medical service inside their steel works in first quarter of this century in form a "First Aid Station (Plant)". A medical teani headed by a doctor and other paramedical staff round the clock provided emergency medicare to the accident victims and workers falling sick in the workplace, The other private industries and multinational companies operating then had some make-shift arrangement at the workplace for treatment of the injured and sick by part-time or visiting medical officers.

As the Factories Act was enacted in 1948, workers were organised through trade unions. Public voice was raised for protection of human health and safety and many of the employers were awakened. They took some steps for welfare of workers as generous gesture or for statutory compulsion. Some multinationalcompanies and enlightened employers considered occupational health and safety measures as a fulfilment of statutory provisions rather than as a welfare and humanitarian approach. Many large industries and most of the public sector undertakings established their medical services exclusively for the employees and their family members. At this point, nucleus of Occupational Health Services were established in many industries at the precincts of the factory with variable facilities as first aid station, factory clinic, work surgery, plant dispensary of plant medical unit to render emergency medicare,

In mid-sixties when safety movement became more pronounced and compensation for accidental death was heavy, safety and occupational health were developed per se, not in a planned manner but haphazardly. Some organisations with a motivated Occupational Physician as a leader, developed their OHS with available manpower and resources, other managements realised its importance but hesitated to invest more capital, whereas a few undertakings considered OHS as wasteful expenditure although they spent enough money for curative services.

The major hindrance in development of occupational health in India is that the subject was not given proper attention in postgraduate medical curriculum – what to speak about the undergraduate level'? Medical education with excess curative bias and minimum preventive orientation, importance of occupational health even for the doctors working in industrial hospitals were not considered important by the medical professionals and teachers. A medical graduate was also not allured or attracted very much to take up occupational medicine as a career as job opportunity was limited. But a few motivated Occupational Physicians have performed their job very well by becoming a change agent particularly in the attitude of administrators and employees by showing their effectiveness in the field.

OHS in many large industries existed in rudimentary in many multinational companies like Lever Brothers, Imperial Chemical Industries, Guest Keen Williams Co., Union Carbide etc., established factory-level OHS in India, TISCO, augmented its services. Public sector steel plants adopted IISCO model and established plant medical units which functioned in a limited manner. In Rourkela, Durgapur, Bhilai and Bokaro Steel Plants, these services were established at the plant site which have been strengthened during last few years based on ILO recommendations. Steel Authority of India Limited has established OHS Centres in its integrated steel plants, alloy steel plants and mines along with their modern hospitnls. A National Occupational Health Services Centre for the steel industry has been functioning in Bhilai Steel Plant, Bhilai, since 1990.

In 1970s the first national level Model OHS Centre was established in Bharat Heavy Electricals Limited, Trichy, an UNDP project in ILO collaborations to cater to the needs of Engineering Industries. Particularly during the last two decades many public sector, government and private sector industries have established their own OHS in different plants and mines in India.

Employees' State Insurance Scheme. which was considered as a contributory health scheme for the industrial and commercial establishments was governed in almost all states under ESI Act, 1948. Many industries do not consider it important to establish their OHS even though ESI Scheme was mostly curative biased and there is hardly any component of preventive care for health protection of insured workers, The scheme is operating through the panel doctors of occupational ESI hospitals under the administrative control of state and central labour departments. ESI corporation has occuptional disease centres for early, defection and diagnosis of diseases, The regional centres are in Calcutta, Mumbai, Chennai, Delhi and Nagda. Health Department does not have major role to play in this scheme and, therefore, occupational health is not under the health department in any state.

Even today, there are many organised sectors in India like railways, ports and docks, petro-chemical complexes and mines where occupationnl health has not been organised in a way as it should be. Efforts made by certain individuals to organise OHS are praise-worthy but the real impact has not been felt either by the government, employers or the employees for whose benefit the services are meant.

A large number of unorganised small scale industries, cottage industries and rural occupations have not conceived the idea of health and safety of the workers engaged in production of consumer goods because of socio-economic reasons.

Agriculture, which is the main occupation'of the Indian community is also not brought under the purview of OHS. During last five decades there is enough advancement in the field of agriculture and hazard has increased due to use of mechanised tools, chemical fertilizers and pesticides. The green revolution in the country has brought about certain safety and health

problems for the agricultural rural community which was not heard before. More emphasis is now given on rural development. An integrated approach to develop safety and health aspects for this vital section of our community cannot be ignored in future.

In the field of research there is considerable improvement during last three decades. National Institutes have been established in sixties to undertake research studies through collaborative effort. National Institute of Occupational Health, Ahmedabad with regional centres at Calcutta and Bangalore, Industrial Toxicological Research Centre, Lucknow, Defence Research Laboratory, New Delhi, Central Mining Research Station. Dhanbad, etc, have made significant contribution in the field of research in occupational health and safety,

In the field of education and training country is lagging behind. Training facilities for doctors and supporting staff in various disciplines of occupational health in the national and international institutions and universities is not available adequately. Only diploma courses and certificate courses of three-months duration are available in Calcutta and Mumbai alone. Occupational medicine has not come to the main stream of medical sciences education. Medical Council of India whose function is also to promote education in different specialities of medical sciences has not shown any concern about it.

The Indian Association of Occupational Health (IAOH), professional association of doctors working in industries, mines, plantations and research institution was formed more than 50 years ago. The members of the association are trying to spread the awareness about occupational health among the employers, workmen, trade unions, doctors and statutory authorities as far as possible. The association organises conferences, workshops, training programmes in collaboration with ILO, WHO and International Commission on Occupational Health (ICOH) also co-operate and collaborate in many programmes. Medical Division of DGFASLI, Mumbai and Medical Inspectors of different states where existing, also organise some programmes for industrial workers and factory managers. Interestingly, this association was started by a handful of ex-army doctors working in the Tata Main Hospital, Jamshedpur as a Society for Study of Industrial Medicine (SSIM), whose name was changed subsequently. The association publishes a quarterly journal, regularly for last 50 years. The name of the Journal changed to "Journal of Occupational and Environmental Medicine" as per the new concept. It is heartening to note that some occupational physicians have started their consultancy in industrial cities.

The national scene although appears gloomy at present, an awareness about the health among the industrial community is growing. The safety-health-environment trio in the industrial atmosphere is gaining prominence. It is expected that occupational and environmental health issues will be integrated with industrial progress in future. The medical profession has to play its significant role in this field, particularly you as a health manager.

4.9 EMERGING OCCUPATIONAL HEALTH ISSUES IN FUTURE

Liberalisation of economy, technological changes, socio-political impact, wider export-import market and competitive trade practice will bring significant changes in the process of industrialisation all over the world. India will be no exception to this. Being a developing country, the impact will be felt more among the working population. Therefore, as a preparation for the 21st century, certain issues have to be given a relook in the context of occupational health in our country,

In the coming decades, in India, the employees of the factories will face increasing competitions with their counterparts in developed countries to stay in business, customer satisfaction, quality control, timely delivery schedule, increased production and application of appropriate technology will have to be taken care of by the entrepreneurs. Due to economic recession and dull market conditions, in certain sectors many of the large industries in this country have been recourse to manpower rationalisation (reduction), system changes, cost control, reducing wasteful expenditure, optimum utilisation of available resources, multiskill development among the existing workforce, automation and

computerisation wherever feasible. In future, the availability of limited high skilled workman have to be hired at a high salary and, therefore, the companies have to keep them healthy and fit for work. The occupiers have to adopt internationally approved practices as per the guidelines issued by ILO, WHO, International Standard Institute and Social Security Organisations. The nature and level of education of the working population will shift from general to technical in nature. The employment potential, values of life expectations at work, freedom in work and stronger trade unions will bring about a different work culture than what it is prevalent now.

Consequently, the emerging issues during the 21st century will be:

- Application of advanced technology in industries
- Need for developing new skills among the workforce
- Changing political and social situation
- Age mix and composition of workforce

  Employment of more women and elderly persons
- High expectations of the employees and surrounding community
- Workers' right to know about hazards
- Stringent statutory provisions and emergence of socially conscious groups
- Psychological stress among the younger generation due to unemployment
- Changing worker-employer relationship
- Well organised and demanding trade unions, etc.

To face the newer challenges arising out of the above issues, the employees have to be given importance and they should get along with the employers. The earlier strategy of "hire and fire" will not apply any more and participative approach has to be adopted to boost up production and productive. Therefore, health and welfare of the workforce have to be given due attention. In other words, better healthcare for the industrial workers have to be provided through occupational health services in every industry to keep them healthy, motivated and productive.

In the context of the above, the occupational health scenario will be changed to a great extent. The imminent changes are envisaged as follows:

- The increasing number of ageing workers and higher longevity will make it necessary to raise the age of superannuation with maintenance of physical capacity, mental alertness and audio-visual performance,
- The multiskilled professionals to handle the advanced technology have to be developed.
- The traditional approach of master servant relationship have to be replaced by new managerial techniques and better trade practice. This trend will continue and will undoubtedly extend to communication of risks to employees and the public through the opinion makers, social conscious group and NGOs.
- The employment opportunities of average workers will be limited whereas high skilled, high-tech professionals will have better job availability with good quality of working life. Therefore, preventive and promotive health care will be preferred by the workers rather than curative services alone or compensation benefits.
- The innumerable legislation enacted in our country for labour protection will be replaced by comprehensive umbrella acts/rules as prevalent in developed countries.
- The statutory authorities will play the advisory role on safety, health and environmental issues rather than the role of a police man prosecuting the occupiers for violation of statutory provisions. More stress has to be given on implementation of recommendations.

- The medical professional working in industrial hospitals have to be oriented towards changing events in the health care. The increased risk to health of workers arising due to new work methods, work processes and work environment have to be identified and mitigated.
- The age-old curative-biased health care will be replaced by preyento-curative approach because most of the occupational and work-related diseases are preventable but not curable.
- The occupational health professionals in future, have to develop an integrated approach to provide total health care to the workmen and not confining to hazards or occupational diseases alone. The newly emerging diseases like psycho-social job stress, musculo-skeletal disorders due to repetitive strain, radiation hazards and occupational concerns which are not prevalent in many industries today have to be taken care.

In addition to this, many of the industrial hygiene activities such as work environment monitoring, workplace hazard cantrol, risk assessment of exposed workers have to be pursued to study the impact of work on health. Industrial workers being a special group, their health has to be monitored regularly and a computerised health record maintained in the, Occupational Health Centre for follow up and referral.

The industrial wastes, both hazardous and non-hazardous in nature will pose a special problem for the industries. Lack of space for dumping and disposal of waste, non-biogradability of certain wastes, non-availability of facilities for recycling/reuse of the waste material, resistance from public to protect the water courses will be felt acutely in our country which has been neglected so far. The activities of the Central and State Pollution Control Boards will be extended to the polluting and dirty industries which may get a threat for closure or shifting elsewhere. To protect the environment and to conserve the economy, the industries will be compelled to adopt expensive measures, which will also produce an impact on their production cost and profit.

The international organisations, non-governmental organisations (NGOs) and professional associations will press the government to implement certain stringent measures to achieve their objectives. Of course, they will extend their helping hand to find out a solution to the emerging problems. Being a member of ILO & WHO, India has to adopt the recommendations on occupational heahh, safety and environment sooner or later.

More thrust will be laid on human resource developing in collaboration with international institutions and professional bodies. Specialised teaching on occupational health will be provided in medical colleges and national institutions at par with developed countries. The doctors and para-professionals will be encouraged to take up careers in this field and job opportunity is bound to expand.

The research in the field of occupational health is continuing in our country in many institutions and many reports have been published. More and more need based research projects will be undertaken in future being sponsored by the industrial houses or in collaboration with industrial undertaking and universities. Many research laboratories and field practising units will be established to translate the research findings into practical solutions. The future field of research will be for combat hazardous operations and finding out treatment for occupational diseases.

As the development process will continue and the industries will be intensified further in coming years, one can anticipate the increasing need for occupational health in our country which now is in rudimentary stage. Introduction of new legislation amendment of the existing ones, implementation of national health policy, preparation of a standard code of practice for health professionals and standardisation of procedures under the framework of acts, regulations and rules will come up in future. A nmlti-disciplinary team approach for effective solutions of health problems and other issues in the field of occupational health will be encouraged and strictly enforced by the statutory authorities. What is considered as voluntary action today, will be brought under the statute in future and occupiers will be required and adopt these measures in their respective work places even though it involves a good expenditure. There will be cost benefit in long run.

The name of occupational health has been changed to "Occupational and Environmental Medicine" in many developed country. This name will be adopted in India also, because more and more diseases are encountered today due to environmental pollution and unplanned industrialisation. The occupational and environmental diseases will be more pronounced in future and may appear in epidemic proportion in certain areas. Communicable and nutritional diseases being controlled to a greater extent in our country today, more non-communicable, occupational and genetic diseases will occur in the coming century due to impact of environment and psycho-social stressors. Therefore, the health professionals have to redefine their roles. While entering into the twentyfirst century, our endeavour should be to achieve what could not achieve during century in the filed of health and India should not lag behind. We can achieve this by optimistic approach and determination and let the situation not go out of our hands.

Check Your Progress 6

Name some of the prominent organisations involved in the Occupational Health in our country.

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4.10 LET US SUM UP

In this unit, you have leamt about the definition, scope and applicationof occupational health in industries, mines and other occupations. The health effects of industrialisation and impact of various workplace hazards on health have also been elucidated to impress that the occupations have definite impact on health of the'working population. The newer hazards arising out of ergonomic and psycho-social stress have also been described. The occupational and work-related diseases, their diagnostic criteria, notification, compensation, prevention and control measures have been mentioned in this unit for application in occupational medicine practice. Organisation of OHS in factories and mines which should be done under the leadership of an occupational physician has been emphasised and management principles applicable to occupational health has also been indicated. The present occupational health scenario in India, although gloomy at present, have to be raised to the international level in the coming century as per the expectations of the ILO and WHO. You have also leamt that for better trade practice, a healthy workforce have to be sustained by the industries for their future growth and development and hence occupational health should be given due importance.

4.11 KEY WORDS

Caison chamber	:	A pressurised air tight chamber in which workers have to work during tunnel and bridge making under water.
Compensable	:	Diseases for which compensation has to be paid to the workers diseases as per Workmen's Compensation Act and ESI Act.
Decompression sickness	:	Disease caused due to sudden decompression cause release of nitrogen from blood in form of large bubbles affecting lungs and other organs.
Ergonomics	:	It is inter-disciplinary approach to interface between the worker, workplace and equipment.
NIHL	:	Noise induced hearing loss caused due to exposure to high noise.
Noise dosimeter	:	A personal monitoring instrument to measure exposure to the noise during a work shift.

Notifiable diseases	:	Diseases to be notified to the statutory authorities as per Factories Act.
Octave band analyser	:	An instrument used to measure frequency (in hertz) of noise.
OHS	:	Occupational Health Services
Sound level meter	:	An instrument used to measure sound level in decibel (dB).

4.12 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

I) The salient features of occupational health are:
- the promotion and maintenance of health
- the prevention among workers the departures from health
- the protection of workers from adverse health effects
- the adaptation of work to man and each mean to his job.

2)
- protecting workers' health against hazards at work
- adapting work and work environment to the capabilities of the workers
- enhancing physical, mental and social well-being of workers
- minimising occupational hazards, accidents, work injuries and work-relatad diseases
- providing total health care to the workers and their family members.

3) The modern concept of occupational health is to provide preventive, curative, promotive and rehabilitative medical services to the workforce and their family members.

Check Your Progress **2**

1) The major health problems arising out of industrialisation are:
- lack of adequate infrastructure facilities
- growth of slums
- poor sanitary condition of industrial towns
- industrial waste dumping
- degradation of environment

2) The common physical hazards in the workplace are:
- heat, cold, pressure changes, noise, vibration, radiation (ionising and non-ionising) and ergonomic problems.

3) Heat balance equation of the body

$$M \pm Cv \pm Cd \pm R - E = 0$$

where,

M = Metabolic heat
Cv = Convection
Cd = Conduction
R = Radiation
E = Evaporation

4) Decompression sickness is caused among the workers due to sudden release of pressure while working in a highly pressurised chamber during bridge or runnel making under water, Sudden death may be caused due to release of dissolved nitrogen from blood which ruptures the alveoli of lungs forming large bubbles (bullies).

5) The occupational diseases are:
Noise – High frequency hearing loss usually bilateral (noise induced hearing loss)
Vibration – Vibration induced white finger and hand-arm vibration syndrome.
Radiation – Acute radiation syndrome. Leukaemia and radiation cancer.

Check Your Progress 3

1) Respirable dust particles which are fibrogenic, carcinogenic or systemic poison in nature are hazardous to health, e.g. silica, asbestos, manganese.

2) "Pneumoconis" of lungs is the common dust disease.

3) The methods of prevention and control of various hazards are:
   - engineering control,
   - statutory control,
   - medical control, and
   - environmental control.

Check Your Progress 4

1) Occupational disease is defined as diseases known to arise out of the exposure to substances and dangerous conditions in process, trades or occupations.

2) Tlie diagnostic criteria of occupational diseases are:
   - strong correlation between disease and occupation,
   - consistency,
   - specificity,
   - biological markers,
   - damage-risk criteria, and
   - international/national recognition.

3) a) Manganism due to manganese: Affects central nervous system and symptoms are similar to Parkinsonism.
   b) Lead poisoning due to lead dust - lead colic, wrist drop, blue line on the gums, high blood lead level.

4) i) Leukaemia or bladder cancer
   ii) Vinyl chloride
   iii) NIHL
   iv) Chromium
   v) Mineral oil

Check Your Progress 5

a) Participative Approach: The occupier and the trade unions should participate in all health programmes and arrive at solutions after discussion. Since the objective of health and safety is to benefit the workers, the management and trade unions should have participative approach while signing agreements.

b) Action Plan: To implement the safety and health programme, every industry should have a written down short term and long term plan, The responsibility for implementation within a specified time frame should be nientioned in the action plan. Thrust areas to be identified and periodic monitoring of the plan should be ensured.

c) Role of trade unions in promoting Occupational Health in Industry: The trade unions should promote occupational health by bipartite agreement. They should participate actively in improving work environment, preventing hazards, educating workmen and taking part in training and education programmes.

Check Your Progress 6

a) National Institute of Occupational Health (NIOH), Ahmedabad

b) Director General of Factory Advisory Services and Labour Institutes (DGFASLI), Mumbai

c) Employees State Insurance Scheme (ESIS)

4.13 FURTHER READINGS

Barbara AP, Benjamin GS &Kerwin, MA, *Fundamentals of Industrial Hygiene,* Third Edition, National Safety Council, **Chicago,** 1988.

Harrington JM and Gardiner, K, *Occupational Hygiene,* Second Edition, Blackwell Science Ltd. London, 1995.

ILO – Encyclopaedia of Occupational Health and Safety, Fourth Edition, Vol.II, Chapter 15, 22, 26 and 53, 1998.

Jayaratnam, J & David Koh, *Text Book of Occupational Medicine Practice*, World–Scientific Publishing Co. Pvt.Ltd., Singapore.

Jerry Stanks, *Occupational Health and Hygiene*, Pitman Publishing Co. London, 1995.

Mahapatra JK & Verma AK, *A Synopsis of Occupational Health and Hygiene*, National OHS Centre, Bhilai, 1999.

Phoon, W.O., *Occupational Health Practice,* First Edition, Mir Publications.

WHO – Early detection of Occupational Diseases, 1986.

UNIT 5 HEALTH INSURANCE

Structure

5.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the concept of health insurance;
- appraise the functioning of Central Govemment Health Scheme and Employees Slate Insurance Scheme; and
- understand the emerging trends in the field of Health Insurance.

5.1 INRTRODUCTION

In this unit you will learn about the basic concept of health insurance and its historical development. You will also learn in detail about the two important ongoing schemes namely Central Government Health Schemes (CGHS) and Employees State Insurance Schemes (ESIS) which are now in operation for over five decades. The Employees State Insurance and the Central Government Health Schemes are the two major schemes in this sector and have been in operation for over five decades.

The idea of opening up of the insurance sector to private sector has been under discussion for quite sometime. This issue has been discussed in later part of this unit.

You will also learn about the emerging trends in health insurance towards the end of the unit.

5.2 HISTORICAL OVERVIEW AND EVOLUTION

The concept of good health has gradually moved away from its traditional connotation of 'not being ill' and has assumed new dimension of a "state of complete physical, mental and social well being and not just absence of disease". This is the definition of health as embodied in the WHO charter.

The term Insurance according lo the Dictionary means to Indemnify against, another meaning given to this term is to Transfer the risk or to Monetise the risk i.e. in terms of monetary value.

In the life of an individual there are periods of 'Dependency' that is at the two extremes of life span. The period in infancy and old age are the times an individual is very dependent. In our society from times immemorial the period of childhood has always been taken proper care of and the elderly in the family were also considered an asset. Due to the agrarian make up of the society; the rich experience of the elderly to cope with natural and other vagaries were very useful to the younger generation in managing the fields and crops. With Industrialization, migration of workers from the villages to the urban centres, there has been a breakdown of the joint family system adversely affecting the care of the elderly.

In between the two extremes of life and during the working span of an individual's life there are period when one cannot work and earn the livelihood. These periods occur due to many causes, prominent among them being illness, injury and maternity. These lead to a condition of destitution.

In the first half of the 20th century the industrial workers were very poor and there were hardly any good health care facilities. Any interruption in work meant loss of wages (absence from work for whatever reason meant no wages). This posed a big problem for the worker and also the family who were then deprived of even the daily necessities of life including food at times.

The year 1923 was the dawn of Social Insurance in ow country when the Workmen's Compensation Act was passed. This provided financial protection to the workers against injury and death arising out of employment. This was followed by the 'Maternity Benefit Act'. In both cases the payments were to be made by the employer.

In subsequent years repeated efforts were made in the direction of implementing the ILO Convention for 'Health Insurance' for workers in Industry, Commerce, and Agriculture. From 1927 to 1943 many meetings were organised among various interest-groups (i.e. representatives of employers, workers and state government) and essential common ground/ consensus could not be achieved.

It was at this stage that the central government appointed Prof. Adarkar (a Social Scientist) to prepare a background paper. Professor Adarkar's report finally formed the basis of future discussions and developments. A 'Bill' presented in the Legislative Assembly in 1946 and was finally passed in 1948 by the Lok Sabha in independent Indh as the "Employees State Insurance Act",

5.2.1 Constitutional Provisions

Health has been at the centre of the concern of the individual and his family. Health is duly recognised as a human right to be made available universally to all members of the society. The constitution in our country provides for health care among other services.

The Government provides medical relief and health care facilities to all being a welfare state, the constitution of our country under Article 41 and 42 of Part IV provides security measures as follows:

Article 41: The state shall, within the limits of economic capacity and development, make effective provision for securing the right to work, to educate and to right of assistance in case of unemployment, oldage, sickness and disablement and in cases of undeserved want.

Article 42: The State should make provision for securing just and equitable conditions of work and for maternity relief

5.2.2 Social Security Concepts

Social security has been defined as the security that the society furnishes through some appropriate organisation against certain risks to which its members are exposed. These risks are essentially contingencies against which the individual of smaller means, meager resources, and common prudence cannot effectively provide. The risks are mainly sickness, injury, maternity, invalidity etc.

The pattern of social security is the product of historical development and socio-economic situation in a country. Social insurance is an important part of social security. Broadly social insurance differs from commercial insurance in as much as it is an insurance against social risks. It will be useful to note that in social insurance:

a) There is no individual equity.

b) Contributions are compulsory.

c) Cost is borne by the individual, the employer and the state.

In social security the benefits start from before birth. In terms of pre-birth care and maternity benefits and continue even after death in the shape of family benefit and death benefit. In true terms thus we can afford to call social security as the provision of security from "Womb to **Tomb".**

Under social security pattern 'Health Insurance' is one of the many benefits and the spectrum of total number of benefits provided is much larger in content, scope, and applicability.

Check Your Progress 1

Fill in the blanks:

a) The workman compensation act was passed in the year .....

b) The ESI Act was passed by the first Lok Sabha in the year .....

c) Who all bear the cost in social insurance .....

5.3 WEALTH INSURANCE SCHEMES

There are not many health insurance schemes in country.

Two main ongoing Health Insurance Schemes in our country are:

- Central Government Health Scheme (CGHS)
- Employees' State Insurance Scheme (ESIS)

In addition, some well defined category of industrial workers falling within the purview of certain labour welfare act are also covered for medical care **(viz.** iron and manganese, mica mines and chrome ore mines, limestone and dolomite mines workers, and beedi workers).

You will learn in detail about these two schemes.

5.3.1 Central Government Health Scheme (CGHS)

Earlier, the scheme was known as 'Contributory Health Scheme'. It was designed to do away with the expensive and cumbersome system of reimbursement. Currently the scheme is known as Central Govt. Health Scheme (CGHS).

Objectives **of the Scheme**

The Central Government Health Scheme (CGHS) commenced in Delhi in the year 1954 with a view to provide comprehensive medical care to the employees of Central Government and pensioner based locally. Broadly the objectives of the schemes ate providing:

- Comprehensive medical care facilities to the Central Government employees and their family members.
- To avoid cumbersome system of medical reimbursement.

Coverage

The scheme has been gradually extended over the last above 50 years to various towns beyond Delhi. Currently the scheme is in operation in the towns at Mumbai, Allahabad,

Meerut, Kanpur, Calcutta, Nagpur, Chennai (Madras), Bangalore, Hyderabad, Patna, Jaipur, Pune, Ahemdabad, Lucknow, Bhubaneshwar, Jabalpur, Ranchi, Guwahati and Trivandrum. The employees of Accountant General of India are being provided CGHS coverage at Bhuvaneshwar and Ranchi.

The towns of Gurgaon, Faridabad and Ghazjabad at the periphery of Delhi have been covered under the Delhi scheme.

Extent of Application

In addition to central government employees the scheme also caters/provide services to:

- Members and Ex-members of Parliament
- Judges of supreme court and high court (sitting and retired).
- Freedom fighters
- Central government pensioners, employees of semi-autonomous bodies/semi-government organisations.
- Accredited Journalists
- Ex-Governors and Ex-Vice President of India.

The scheme operates through service dispensaries mainly Allopathic. The benefit of care under other systems of medicine including Ayurvedic, Homeo, Unani, Sidha and Yoga are also available in some centres. As per published figures (as on March 1999) the broad statistical data about the scheme coverage is:

No. of Town		20
No, of cards		**9.74** lacs
No, of beneficiaries		**43.66** lacs
No, of Dispensaries		**320**
- Allopathic	**241**	
Other systems:	79	
- Ayurvedic	31	
- Homeopathic	**34**	
- Unani	'9	
- Siddha	**2**	
- Yoga	3	
No, of Poly Clinics		19
CGHS Labs		**72**
Dental Units		17

Facilities Provided under CGH Scheme

The following facilities are being provided to the beneficiaries of the scheme. These are organised through dispensaries, poly clinic and Government/recognised hospitals. These comprise:

i) Out-patient care facilities in all systems,
ii) Emergency services in allopathic system,
iii) Free supply of necessary drugs,
iv) Laboratory and Radiological investigations,
v) Domiciliary visits to seriously ill patients,
vi) Specialists consultation both at the dispensary and hospital level,
vii) Family welfare services,
viii) Treatment in specialized hospitals both Government and private recognised reputed hospitals, and
ix) 90% advance for undergoing specialised procedures after admission in hospitals when required.

Special Facilities for Pensioners

The pensioners are provided special facilities as indicated below:

- Option to join CGHS
- Option of obtaining a 'whole life' CGHS and card by paying ten years' subscription
- Card valid in any CGHS covered city
- Those living in non-CGHS areas can have a CGHS card in the nearest CGHS covered city
- Separate queue for senior citizens in CGHS dispensaries, and
- Facility to obtain medicines for chronic ailments up to three months at a stretch.

Referral and Reimbursement Procedure Simplified

The scheme allows the option to the beneficiary to avail specialised treatment at any hospital of their choice from out of the ones recognised by the CGHS. The facility can be availed after a specialist of CGHS/Government hospitals as recommended the procedure.

The reimbursement in such case is restricted to the package rate/ceiling prescribed by the government for the procedure. Any expenditure in excess is to be borne by the beneficiary.

In an emergent situation, to be recorded in writing by the CMO Incharge of the CGI-IS Dispensary the concerned CMO may directly (even before a specialist advise has been obtained) refer the beneficiary to a private recognised hospital for further management and treatment.

The beneficiaries have the option to taking treatment of their choice. When the beneficiary chooses such a hospital in another city (while facility for same are available in same town) the permission can be given, but the TA/DA shall be borne by the beneficiary.

Details of City-wise of Recognized Hospitals

The number of hospitals recognised in various cities are indicated as below:

Name of Town	No. of Hospitals Recognized
Ahmedabad	2
Allahabad	5
Bangalore	16
Calcutta	15
Chennai	20
Delhi	24
Heyderabad	23
Jaipur	10
Jabalpur	20
Kanpur	17
Lucknow	8
Mecrut	9
Mumbai	7
Nagpur	26
Patna	10
Pune	36
Ranchi	3

For indoor care in addition to the two main Central Government Hospitals in Delhi viz. Safdarjung and Ram Manohar Lohia Hospital, there is provision in Lady Hardinge (Sucheta Kirpalani Hospital) also. Some maternity hospitals for exclusive use of the beneficiaries are also being run. For treatment of cases specially so needing super speciality care in the field of Cardiac Surgery, Renal Dialysis Transplant etc., the scheme has arrangements with a number of private and corporate hospitals all over the country. The beneficiaries on proper referral from scheme specialists can take treatment at these institutions,

It may be seen that looking at it from the point of view of social security during the five decades or so that it has been in operation the benefits of the scheme have been extended to a very small number of card holders i.e. 9.7 lakhs only and to a limited number of towns across the country. It has been so partly due to the inherent nature of the scheme being meant basically for central government employees.

5.3.2 Employees State Insurance Scheme

Administration

The ESI scheme operates under the ESI Act, 1948. In accordance with the provisions of the ESI Act the Central Government has set up a body called the 'Employees State Insurance Corporation' for the overall supervision and guidance of the scheme. This 'Apex' body comprises representatives of employers, the enlployees, central government, medical profession, parliament etc. The Union Labour Minister is the Chairman while the Union Labour Secretary is the Vice Chairman of the Corporation. Under the general superintendence and control of the corporation a representative body (from out of the members of the corporation) called the 'Standing Committee' acts as the executive body.

The 'Medical Benefit Council' is chaired by the Union Director General of Health Services and comprises the states represented by the Director Medical Incharge of the scheme along with representatives of employers, enlployees, parliament, and medical profession. The Medical Benefit Council advises the Corporation on all medical matters concerning the scheme.

A Regional Board is set up for each state/union territory by the chairman of the corporation. The regional board may set up a local committee for such areas as be appropriate. A noteworthy feature of this is their 'Tripartite'nature. The representative of all interest groups are involved at all levels to ensure participation for smooth working.

The administrative office/national headquarters of the scheme is located at New Delhi. The Chief Executive at the Head Quarter is the Director General (DG). The DG is assisted by a Commissioner each on all matters related to Medical care, Insurance and Finance. Another Chief Officer is the actuary (for all actuarial work), while a Director Administration assists on all matters related to administration.

Coverage

The scheme was first implemented in the towns of Kanpur and Delhi in 1952. It has been progressively implemented in other states and towns and is in operation in 652 towns as of December 1999. Thus, it has, truly an all India presence. Initially the scheme was applicable to workers in lion-seasonal industries using power and employing 20 or more workers drawing wages not more than Rs. 400/- per month, later raised to Rs. 1000/- per month. On the recommendations of its committee on Perspective Planning and keeping in view the need to provide 'Health Insurance' protection to a larger number of workers in the organised sector the criteria for coverage was modified. Currently the scheme is applicable to:

- Non-seasonal factories using power and employing 10 or more workers.
- Non-power using factories employing 20 or more workers.

The provisions of the Act have been amended and further extended to establishments so as to cover workers in:

- Shops
- Hotels and Restaurants,
- Cinema Houses,
- Road transport undertaking,
- Newspaper establishments etc.
- Workers in establishment employing twenty or more,

Only workers as above and drawing wages not more than Rs. 6500/- per month are covered under the scheme.

Subjects like coverage, collection of contribution and payment of cash benefit are all done through the offices of the corporation (22 Regional/Sub-regional offices and 844 Local/Cash Offices) spread all over the country.

Implementation

The ESI is a Central Act operating all over the country. Since health is a state subject under the constitution, the provision of medical benefit is the responsibility of the respective state government. The two exceptions to this are Delhi and Noida (a town in western UP) where nledical care is provided directly by the corporation.

Contribution and Finances

The employer and employee are the main contributor to the scheme. The employer has to contribute @ 4.75% of the wages, and is empowered to deduct the contribution of the employee @ 1.75% of the wages, and deposit the total amount with the corporation. However, currently workers having a daily wage of Rs. 40/- or below are exempt from any contribution to the scheme, the employer however, continues to contribute his share to the ESI corporation.

Ceiling on Expenditure

The corporation fixes an annual ceiling of expenditure on medical care. It is reviewed periodically, for the year 2000-2001 the ceiling of expenditure of medical care is Rs. 600/- per annum, per family unit. This expenditure on medical care is shared by the corporation with the state goveniment. The corporation bears up to 87.5% of the expenditure and balance 12.5% is borne by the state government. Any expenditure incurred beyond the prescribed ceiling is at the sole cost of the state government.

Absolving Employers under other Acts

Once the provisions of the ESI act come into force in respect of the establishment, the employer is absolved of the liabilities of payments under the Workmen's Compensation Act and the Maternity Benefit Act. Provision of medical care and the payment of cash benefits under these two acts are taken care of by the corporation.

Benefits

There are two types of benefit under the scheme i.e. benefit in kind and benefits in cash.

a) ***Benefit in Kind***

Medical Benefit: This is the only benefit in kind and thus cannot be quantified. The scale of medical benefits includes:

i) Out-patient care, including emergency care
ii) Domiciliary care
iii) Specialists consultation, investigation and treatment
iv) In-patient care
v) X-ray, Laboratories and other investigations
vi) Preventive inoculation and immunization
vii) Free supply of drugs, dressings, artificial limbs and aids viz. caliper braces etc.
viii) Free supply of special aids for insured person only i.e. spectacles, dentures, intra-occular lens etc,
ix) Antenatal, confinement and post-natal care including domicilliary confinement.
x) Ambulance service or conveyance charges in lieu thereof.
xi) Family Welfare Planning Services and other National Programmes.
xii) Medical certification.

High Costs-Episodes: Keeping in view the development of technology and advancement in medical sciences the scheme provides (by arrangingladvance payment) specialised treatment

for cardiac care viz. pacemaker, valve replacement, by-pass surgery, renal dialysis and transplant, treatment for cancer and any other such like high cost treatment.

Out-patient Care: Out-patient care comprises direct system and indirect system which are being described here:

Direct System: For out-patient care the corporation organises a direct system through the aegis of dispensaries (full time, part time, mobile etc.) for the exclusive use of scheme beneficiaries. The full time dispensaries, meant for the exclusive use of scheme beneficiaries are manned by a minimum of two doctors and function in two shifts – morning and evening. At some places the dispensaries work for twelve hours by deploying two teams of doctors and para-medical staff, one team each for the morning and evening shifts. These dispensaries also have the facilities of dressing room, injection room, supply of special drugs and in some cases routine laboratory investigations. The facilities of lab investigations where provided are shared among a group of neighbouring dispensaries. In a group of dispensaries one is designated as an 'Emergency Dispensary' to function round the clock and cater to the requirement of beneficiaries when other dispensaries are not functioning. As of December 1999 there were 1452 dispensaries (including 1394 full time).

Indirect System: In certain areas the scheme has recognised the clinics of general medical practitioner, called Insurance Medical Practitioner (IMP) for providing out-patient care as an indirect mode. The IMPs ore entitled to register a restricted number of family units on their roll and notify a part of the out-patient working hours for the exclusive care of the scheme beneficiaries. In December 1999 there were a total of 2722 clinics of insurance medical practitioners recognised in various implemented centres. This system is in practice mainly in Maharashtra, Gujarat, Punjab and Goa.

Due to the very nature of the whole time set-up, much larger accommodation is needed which is not always easy to find, more so in metropolitan areas. Hence, the need of having panel doctors (who already have their own premises and skeleton staff) and are willing to work for the scheme on a part time basis i.e. in addition to their own routine out-door work. In experience both the direct and indirect system have their own advantages and disadvantages (the advantage of one system being disadvantage for the other and vice-versa).

Broadly the advantages of the indirect system are:

- It is less costly to run
- Capital outlay is nil
- The panel doctors are available at shorter distance, hence, very useful where the population is sparse.
- There is better inter-personnel relationship between doctor and the patient.

The **disadvantages** of the system are:

- Being a part time arrangement, the patient feel they are not getting appropriate attention. Panel doctors devote more attention and time to their direct paying patients.
- Laboratory services are not available and patients have to travel some distance for availing this facility.
- Medicines are not always available, more so the specialist drugs for which the beneficiary have to travel either to the Chemist or to the drug store.
- The doctors are less amenable to administrative and other controls.
- The desired level of equipment is not always available at the clinic of the panel doctor.
- It is difficult to enlarge/increase the facilities specially with regard to preventive service, immunization etc.
- There is some possibility of undesirable understanding between the doctor and patient in respect of certificate for leave and between these two and chemist with regard to drugs.

Specialist Care: The scale of care under the scheme provides for the facility of specialists, consultation (investigation and treatment included) for the scheme beneficiaries. A specialists centre is established in the hospital where facilities for indoor care are provided. This can be a scheme hospital or even in a hospital where beds for the beneficiaries are reserved.

Another pattern is to establish specialist centre in a dispensary to obviate the necessity of beneficiaries traveling long distance to the scheme hospital. The specialist centre are managed by full time scheme specialists (at ESI hospitals) or by part time specialists separately engaged for the centre.

In-patient Care: The scheme has a norm laid down for construction and provision of hospitals depending on the workers' population at tlie centre. Currently the scheme envisages to provide 4 beds per one thousand covered eniployees (can go upto 5 beds per thousand, if necessary). The emphasis has been on attempting to provide full time scheme hospitals so that beneficiaries have a sense of belonging and tlie provision of services is up to the norms laid down by the corporation.

For in-patlent care the corporation has already constructed and commissioned 129 hospitals, aiid 43 annexes providing a complement of 22642 beds. In addition 3519 beds have been reserved in government and non-government hospitals making a total of 26161 beds. It will thus will seen that for approximately 344 lakh beneficiaries the scheme has provided 26161 beds. It comes to about 0.74 beds per thousand population, which in any case compares well with the national average. Under an on-going programme five more hospitals arc in various stages of construction (us of December 1999).

Diet for In-patient: The scheme has laid down a scale of diet for patients admitted in the Irospitals. This is in terms of ingredients and not in terms of price (price may vary from season to season and place to place). The concept is to provide full caloric value ofbalanced diet to all beneficiaries admitted for in-patient care except those on therapeutic diet.

Treatment in a Neighbouring State and at Two Places in same State: The workers who are employed in one state and arc residing in a neighbouring town in another state are provided care at the town of residence (eventhough their contribution are deducted in another state).

Similarly when a worker is employed and living in one town and family is living in another town of the same state, the family is also entitled to medical care at the town of residence (the worker will get medical care at tlie town where he/she is employed and the family at the town of residence) in cnsc the same are available in that town.

Retired Workers: Medical Benefit is also provided to retired insured workcr and their spouses. Similarly those who cease to be in insurable employment on account of permanent disablement due to employment injury are also provided medical benefit. Each worker has lo make payment on annual basis. The current rate is Rs. 1201- per annum.

Indian System of Medicine: Beneficiaries under the scheme have the option to utilise tlie facility of treatment in systems other than allopathic. Dispensaries and clinics of IMPs in Ayurvedic systeni and integrated systeni are available in various states. In some states facilities for treatment in homeopathy, Unani, Siddha and Yoga are also available at some centres. Few beds for indoor care for Ayurvedic and Homeopathy are also available in some state.

Occupational Diseases: 'The corporation has set up four occupational disease centres for the four zones in the country. Each one is attached to an existing ESI hospital. These are Calcutta in East, Chennai in South, Mumbai in West and Delhi in North. Recently an occupational diseases centre has been commissioned at ESI hospital Nagda. This caters to tlie needs of insured workers in tlie state of Madhya Pradesh.

The'concept is to organise for the early detection and diagnosis of occupational disease in respect of ESI beneficiaries.

b) *Benefits in Cash*

These are statutory obligations under the act. The expenditure on cash benefit is borne directly and entirely by the'corporation. There is no ceiling of expenditure on cash benefits.

In addition to medical benefit the beneficiaries of the scheme are also entitled to various Cash benefits as briefly described hereunder:

i) *Sickness Benefit*

a) A worker gets cash compensation at the rate of approximately 50% of the wages for a period of upto 91 days per annum for 'certified absence' from work on account of sickness.

b) *Extended Sickness Benefit:* In case of a worker suffering from any of the 35 specified diseases (Tuberculosis, Fracture, Cancer etc.) from which the workers is not likely to recover in 91 days, the worker is entitled to cash compensation @ of 70% of wages upto period of two years. The list of diseases is updated periodically.

c) *Enhanced Sickness Benefit:* For undergoing Vasectomy/Tubectomy the worker gets 7/ 14 days leave with full wages. In case of postoperative complication, it can be extended by another 7 days.

ii) *Maternity Benefit*

Payment is made at the rate of full wages for a period of 12 weeks (Six week for miscarriage). An additional four weeks cash compensation can be made for complication/sickness arising out of pregnancy-confinement.

iii) *Employment Injury Disablement Benefit*

An insured worker whenever he/she meet with an employment injury is provided medical care for as long as is necessary for the recovery of the individual. Similarly leave of absence from work is also provided to an employment injury case for as long as is necessary without any limitation of number of days per annum.

Cash benefit/disablement benefit during this period is around 70% of the daily wage of the workers, this is much higher than the cash benefit given to the worker on account of absence from work due to sickness.

The treatment provided to a case of employment injury may result in a complete recovery with no disability, or go to permanent disability (partial or total). For residual permanent disability the worker is provided cash benefit. A medical board examines such cases to assess the 'percentage of loss of earning' on account of the disability. This recommendation entitles the insured worker to get permanent disability benefit (partial or complete) for the rest of life in the form of periodic cash payments.

iv) *Death Due to Employment Injury – Dependant Benefit*

In an unfortunate case the nature and effect of employment injury may lead to death of worker. In case of death due to employment injury the family of the worker is provided with Dependent Benefit. It is paid at the rate of 70% (approximately) of the wages. The widow gets 315th of the share and each child gets 215th of the share. Widow gets it for life (or up to tlie date of re-marriage) and the child gets up to the age of 18 years.

v) *Funeral Expenses*

To part meet the expenses on funeral of a deceased insured worker a sum of Rs. 1500/- or actual whichever is less is re-imbursed to the next of kin.

vi) *Rehabilitation Allowance*

For workers visiting Artificial Limb Centre for fitment and training are paid full wages for the days they are admitted.

vii) *Cash Benefit – 'Occupational Diseases'*

Workers suffering from specified occupational diseases are given cash compensation for "Loss or Earning Capacity" as determined by specially constituted medical board,

The following table depicts the salient features of the ESIS as on Jan. 2000:

Salient features of the ESI scheme as on Jan.2000	
States in which scheme is implemented	All states (except Nagaland, Manipur, Tripura, Sikkim, Arunachal Pradesh and Mizoram)
Union Territories and Centrally Administered Area	3 (Delhi, Chandigarh and Pondicherry)
Family units covered	88.76 lakhs
Beneficiariescovered	344.38 lakhs
No, of local offices and Cash Offices	844
No. of Centres where scheme is in operation	652
Total no, of dispensaries (Full time, part time, mobile & Employers run dispensaries)	1452
Full time dispensaries	1394
Clinics of insurance medical practitioner recognised	2722
No. of Doctors in dispensaries	6319
Exclusive ESI hospitals (five more hospitals under construction)	129
ESI Annexe/Annexes Attached to hospitals	43
Beds in ESI hospitals and Annexes'	22642
Beds reserved in govt, nnd other hospitals	3519
Total beds available	26161

In conclusion it mny be seen that from a modest beginning of just two towns in 1952 the ESI scheme has progressed to be implemented in 652 towns. Similarly, the coverage has been extended to over 88 lakh card holders comprising over 344 lakh beneficiaries (a little over 3% of the countries population). All this is impressive enough by itself. The ESI scheme is today the largest social security set up in this part of the world with a widespread network of facilities and very comprehensive range of benefits in kind and in cash comprising the health insurance set-up. However, due to the limitations in the applicability of the Act (and other factors) the ESI scheme did not develop to be true National Health Insurance Scheme.

Workers in Organised Sector – General Observations

It has been observed that out of a total of over 3100 lakh work force in the country only 9 % (i.e. 282 lakhs approximately) are in the organised sector. Out of these 282 lakhs the ESI scheme covers only 33% approximately i.e. 88 lakhs approximately. These 88 lakhs constitute even less than 3% approximately of the total workforce in the country. This is an indication of the magnitude of the *'unfinished task'*.

Out of the workers (in organised sector) who are not covered under the scheme a good number comprise:

- ***Central Government Employees:*** They in any case are availing of some benefits with regard to medical care health insurance.

- ***Workers who are Outside the Coverage of the Scheme:*** They are not getting the benefit of health insurance. They comprise mainly workers in factories/establishments where:-

  Number of worker is below 10 using power

  Number of workers is below 20 not using power

  Workers drawing wages above Rs. 6500/- per month

  Located in areas where the scheme has not been extended so far

  Employed in industries which are 'seasonal' in nature.

Check Your Progress 2

1) Fill in the blanks:

   a) Only workers earning a wage of up to Rs. ..... per month are covered under the scheme.

   b) The rate of contribution per month for the worker is ..... and for the employer is ..... of the wages.

   c) A worker with a daily wage of Rs. ..... or below is exempt from contributions.

2) Name the two systems for provision of out-patient care under the scheme.

   .....

   .....

3) What are the advantages under the indirect system?

   .....

   .....

   .....

4) What are the norms for provision of beds for indoor care under the scheme?

   .....

   .....

   .....

   .....

5) In a health insurance set-up under social security :

   a) An insured worker gets cash compensation for certified leave of absence From work and in addition full medical treatment. True/False

   b) 'Maternity benefit' payment to Insured lady cannot be extended beyond 12 weeks even for complication arising out of pregnancy/confinement. True/False

   c) The scheme pays a sum of up to Rs. 2500/- or actual whichever is less to part meet the funeral expenses of the deceased insured worker. True/False

5.4 EMERGING SCENARIO

5.4.1 Situational Analysis

The awareness about health has been increasing and has led to an increase in the demand for services. It is estimated that a very small segment of these consumers are as of today availing of the facilities of health insurance. Out of these a small segment only is availing the facilities through their employer. In effect most of those who avail of the facility pay out of their own pocket. It is believed that more and more people are willing to pay more and expect better facilities.

It is Pelt that the type of health insurance we have today is merely a means of financing health care. The provision of insurance coverage is primarily in terms of "monetary limits" and not 'on the extent of medical care. There is no provision for preventive care. The cost of care is not under any control. Thus, the total cost is borne mainly by the consumer who is unenviably placed between the insurer and the provider of care.

It is believed that the cost of medical care has been growing up slowly. There are a number of factors contributing to the higher cost of care today. Some of these are:

i) Recent advances in technology

ii) Higher utilisation of diagnostic aids

iii) Higher cost of drugs

iv) Higher incidence of chronic diseases

v) Increase the expectancy of life

vi) Change in the population profile with an increasing geriatric population.

vii) Higher morbidity – specially so, due to environmental changes, pollution, smoke etc.

With increase of the segment of "Middle Class" in the society there is an increase in the demand for better health care. The average household today thus spends fair amount of their earnings in obtaining health care. The inadequacy of the misting medical facilities has thus, become more pronounced.

The liberalisation and globalisation of the economy in our country has had its own effect. One view propounded is that in the post liberalisation and globalisation era the middle class have lower standards of living and also it has brought an element of job insecurity for the workers.

Some of the health insurance schemes currently available to the public are listed below:

a) Asha Deep Policy

b) Jeevan Asha Policy

c) Senior Citizen Plan

d) Cancer Related Policy

e) Jan Arogya and Bhavishya Arogya Policy

f) Personnel Accident Insurance (also available for groups)

g) Mediclaim individual

h) Mediclaim group

i) Overseas mediclaim

j) Specially designed policies for the benefit of
   - credit card holders
   - public sector undertakings

The above policies am provided mainly by:

a) Life Insurance Corporation of India (LIC)

b) General Insurance Corporation of India (GIC) through its four subsidiaries
   i) New India Assurance Co.,
   ii) United India Insurance Co.,
   iii) Oriental Insurance Co., and
   iv) National Insurance Co.

c) Unit Trust of India (UTI)

d) Policy provided by the hospitals viz. Cancer related

The Asha Deep Policy has been an endowment Life Insurance Policy. In addition it provides financial support on the beneficiary contracting any of the four major diseases.

i) Cancer.
ii) Renal Dialysis and Transplant
iii) Heart Disease including Coronary Artery By-pass Surgery
iv) Paralytic Stroke

Similarly, the Jeevan Asha Policy provided financial help periodically and lump-sum benefit in any emergency situation.

The mediclaim policy (both for within the country as also for videsh yatra) are also being used in increasing numbers for some time.

The drawback of commercial insurance and the policies available have been:

i) Exclusion clause – for existing conditions – not covered.
ii) Non-coverage of certain conditions during first year.
iii) The beneficiary has to spend the money initially from out of his pocket and claim reimbursement later on. This is a lengthy and at times tedious process.

Compared to commercial insurance in the case of health insurance through the social security route the distinguishing features are;

i) Participation is compulsory
ii) Financed by contribution mainly from the employer and the worker
iii) Contribution and cash benefits are proportionate to the earning of the worker
iv) Coverage is without a means test – coverage has no relevance to the income of the worker. The contribution from the workers is deducted at source as a percentage of the monthly wages.
v) Scale of Medical benefit is not related to contribution i.e. irrespective of the amount of contribution a worker and family is entitled to full scale of medical benefits.

It may be seen from above that apart from the fundamental differences in the provision of benefits of health insurance there are some Advantages (for the insured) under social security set up. These are:

a) There is no pre-entry medical examination
b) Pre-existing conditions are no bar to coverage
c) Rate of contribution does not increase even when there are pre-existing conditions
d) The rate of contribution remains the same and is irrespective of the number of members in the family. The contribution ddes not increase with the side of the family.

Parties Involved

In the field of medical insurance today there are three parties concerned. The consumer, the provider of care and the Insurance company – insurer. The role of the insurance company and the provider of care revolves round the needs of the consumer. The insurer and the provider of care generally do no interact with each other. In addition the pricing of services is not at all regulated.

During the operation of the policy in the last few years, the insured (beneficiaries), the general practitioner and the doctors in hospitals (the providers of care) and the insurer agency (providing insurance cover) have all been encountering difficulties with regard to their specific areas of operation and interest. Some of the difficulties are listed out below:

a) For the Beneficiary – Insured
   i) Options available are very limited
   ii) Admission in a hospital of choice is not/not always available
   iii) Hospital chosen invariably asked for deposit in advance (not at all easy–specially so i.e. at short notice).

iv) Long at times tedious wait and procedure for claiming reimbursement (some claims are rejected in part also).

v) Difficult to identify avoidable investigations advised ordered by the treating physician.

vi) Taking treatment at a place away from the town'when facilities for same are not available locally.

b) The Insurance Company – the insurer

i) Absence – paucity of facilities for regular – pre-insurance check up of the beneficiary

ii) Absence of organisation of providers both for outdoor care as well as for indoor-hospital care.

iii) Tendency for increasing number of claims.

iv) Purported – supposed malpractices.

c). Providers Difficulties

i) Absence of organised set-up of providers with respect to provision of care at the:

- Out-patient level
- Laboratory and other diagnostic procedures
- Indoor care .

ii) Delay in obtaining reimbursement from the insurer, at times only part of the claims are accepted.

iii) Difficulty (likely to come up at later stages) with regard to availability of beds. This is likely to be experienced more when the facilities for health insurance are provided in the rural areas.

5.4.2 Insurance Regulatory and Development Act (IRDA)

In the background of the discussions in the previous pages and the evaluation of the system the subject of opening up of "Insurance Sector" has come up repeatedly. This topic has been under scrutiny and discussion at all levels including the media and the parliament for the last couple of years. The government of India has now in the year 1999-2000 passed the Insurance Regulatory and Development Act (IRDA). With the provisions of this act coming into being the field of insurance (Life and General) will be open for Private Sector, Foreign Institutional Investment (FFI) and the Non-Resident Indians (NRIs) etc. With these developments medical insurance will never be the same again, change and change for better. What is expectedto develop is a more consumer friendly service.

5.4.3 Likely Set-up after Privatisation

Managed Care — Third Party Administrator

The changes that are coming about have helped in developing the concept of "Managed Care". This has been defined by the United Health Care Corporation (1992) as "A system of health care delivery that influences utilisation of services, cost of services, and measures performance".

It is expected to lead to development of

a) Network of providers, under contract with the insurer in the field of:

i) General Practitioner for out-patient care,

ii) Consultant for out-patient and indoor care,

iii) Diagnostic centre.

iv) Hospitals, and

v) Pharmacies.

b) Criteria of selection and development of the network

c) Criteria for review of the utilisation of the facilities

The IRDA Bill (in respect of health insurance sector) will broadly protect the interest of the consumer and simultaneously allow for the growth in the size of insurance market. It is said that there will be no restriction on the number of licences to be issued to thus there will be a healthy competition which is likely to result in:

i) A lowering of the premium rates for the consumers,

ii) Availability of a wider range of products for the consumers,

iii) Some element of cost control, and

iv) A wider penetration of the insurance in the society.

Coupled with the concept of the managed care is coming up the agency called as Third Party Administrator (TPA). This is expected to provide the much needed interface between the three components in the field, the consumer, the provider and the insurer. Thus, TPA will act as a interface between the consumer and the provider, the provider and the insurer and the insurer and the consunler. The TPA are likely to be a professional body of hospital/health administrators, specialists, or association thereof or such groups who may take up the roll of third party administrators in the emerging scenario.

Some professional bodies of management experts have also come up and started setting up office in metro towns. Even some corporate hospitals who have hospital of their own/or are networking in metropolitan towns are likely to take up the role of TPA.

The TPA is likely to provide administrative services which among other things may comprise:

i) Provision of Photo ID Cards for the consumers

ii) Twenty-four hour call centre as an interface between the provider and the insurer to facilitate availability of proper care to the consumer.

iii) Management of claims

iv) Report of clinical and administrative data

v) Development of selection criteria for network

vi) Utilisation and management review of work

vii) Increase in the volume of work

viii) A concept of accountability leading to improved quality

The TPA is also likely to help in the development of;

a) Provider network (provider of various categories; i.e. general practitioners, consultant, hospitals etc.)

b) In view of the volume of services offered the facility will be available economically at pre-negotiated prices and may also allow for credits and discounts.

c) A system of accreditation

The TPA is also likely to help the medical management by:

a) Interacting with the consumers and the families

b) Developing a system for medical audit – evaluation of care

c) Developing system for utilization management, specially so in the field of;

- pre authorisation
- cost management
- pharmacopoea – drug formulary

The entry of the TPA may be useful to the consumer by way of:

a) Help choose the appropriate policy by providing more information

b) Help choose the right provider of care

c) Improve quality of care

d) Likely reduction in cost of care

e) Speedy settlement of claims – there is a possibility of direct payment of the claim by the insurer to the provider, thus, obviating the necessity of consumer spending the money and getting reimbursement.

The TPA is likely to help the provider by:

a) Larger volume of practice

b) Assured volume of practice

c) Network with other leading providers

d) Development of packages for different ailments.

TPA is likely to help the insurance company i.e. insurer by:

a) Increase in the voluinc of policies

b) Direct contact with the providers of care

c) Satisfied consumer specially so with the TPA taking care of claim administration and speedy reimbursement thereof.

We can now conclude on a positive note that this development (opening up of the insurance sector) will mean:

- The new dispensation will be more efficient
- Services will be provided at a lower cost
- We may expect improved quality of care
- The system will develop in a manner that the payment to the Doctor, the Hospital, the Laboratory etc, will be made directly by the insurer (may be managed by TPA).
- Such a scheme will relieve the insured of having to incur expenditure and claim reimbursement. This will also reduce the element of malpractice reported to be in vogue (i.e. Collusion/Nexus between Hospital – Surveyor Officials of the Insurance Company etc.).

The anticipated changes in service as above with the entry of private sector, and competition in the field is bound to improve the services all to the advantage of the consumer.

Check Your Progress 3

In health insurance through social security

a) Participation is voluntary True/False

b) The scale of medical benefit depends on the amount of contribution True/False

c) Pre-existing condition are no bar to coverage True/False

d) There is necessity of pre-entry medical examination True/Farse

5.5 LET US SUM UP

Having gone through this unit you are now better placed to appreciate the evolution and development of 'Health Insurance' in our country.

In this unit you have learnt that in the beginning it was rather slow and the pace increased in good measure in the post-Independence era. It peaked after covering a little over three

percent of the country's population. The quantity and quality of services and the benefits have been improving constantly all these years. The inherent limitations of the 'Act' have been, only partly, responsible for the limited expansion of the scheme.

You have learnt in details about the functioning of two of the ongoing schemes in the country i.e. CGHS and ESIC. You have also learnt that there are going to be tremendous changes in the Health Insurance scenario in the years to come.

Towards end you have also learnt that in the era of Liberalisation, Privatisation, and Globalisation and the opening up of the Health Insurance Sector will help provide benefits to a much larger population in the country. We can safely expect that with the introduction of 'Accreditation System' and 'Medical Audit' the quality of services will improve in the years to come.

The readers will do well to kindly up-date themselves as the Anatomy and Physiology (structure and functions) of health insurance evolve in the emerging scenario.

5.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) 1923

b) 1948

c) The individual, the employer and the state.

Check Your Progress 2

1) a) Rs. 6500/- per.month

b) 1.75 per cent, 4.57 per cent

c) Rs. 40/- per day

2) Direct System, Indirect System

3) • Less costly to run
• Capital outlay is nil

4) The Panel Doctors are available at short distance and is suitable for thinly populated area Better inter-personal relationship between the treating doctor and the patient

5) a) True

b) False

c) False

Check Your Progress 3

a) False

b) False

c) True

d) False

5.7 FURTHER READINGS

Academy of Hospital Administration – Reading Material DH&HM Course Paper-111.

Health Insurance in Developing Countries – Social security approach, ILO Geneva.

Hospital Administration Journal, Issue 1 & 2, 3&4, 1999.

National Health System and their orientation towards health for all – WHO.

Personnel communication with Ms. Shakun Chaitanaya, Sedgwich Parekh Health Management India Pvt. Ltd.

Reports of CGHS, New Delhi.

Reports of ESI Headquarter, New Delhi.

Seminar – Corporate Hospitals in the New Millennium – April 2000, New Delhi –Talk by Ms. Shakun Chaitanaya, Sedgwich Parekh Health Management India Pvt. Ltd.

Social Security Principles, ILO Geneva.

UNIT 1 OVERVIEW OF HEALTH CARE DELIVERY SYSTEM,

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- describe briefly how the health care delivery system has evolved over a period of time;
- list the recommendations of important health committees;
- describe the health care infrastructure at various levels;
- specify the services provided at various levels; and
- relate the infrastructure to requirements of health services.

1.1 INTRODUCTION

In the previous block of this course you have learnt about the basics of community health, health for all and primary health care. In this unit you will learn about the overview of health *care* delivery system in the *country.* In the beginning of the unit, you will learn about the evolution of health *care* delivery system including the recommendations of various committees. Thereafter you will learn about the health *care* infrastructure at various levels. Towards the end of this unit you will learn about the role of voluntary organisation, private practitioners and indigenous system of medicine in the health delivery system of the country.

1.2 EVOLUTION OF HEALTH CARE DELIVERY SYSTEM

In this section you will learn about the health services in India which have evolved over a period of time. Salient features of various committees and shifts on thrusts under various Five Year Plans are the following:

1.2.1 Brief History of Evolution

Health, as you know, is defined as a positive state of well being in which the harmonious development of physical and mental capacities of the individual lead to the enjoyment of a rich and full life. It is not a negative state of mere absence of diseases. Health, further implies complete adjustment of the individual to his total environment, physical and social. Health involves primarily the application of medical science for the benefit of individual and society. But many other factors like social, economic and educational have an intimate bearing on the health of the community. Health is thus, a vital part of a concurrent and integrated programme of development of all aspects of community life.

In the subsequent gages you will learn that how health had been valued at individual community and organisation levels since Vedic times to-date and what shape health care system took in this country particularly since independence. It also indicates that to what extent it has assumed the dimensions to achieve the goals of Health for All through Primary Health Care approach. It is in no way alien to our thinking. Rather it presents revival of our approach in designing a health care system to solve the community health needs and to make health a cherished value of every one. The efforts under various committees within the framework of national development plans will also be reviewed to unfold the process of evolution of health care systems and its strategy in the country.

India as you must be knowing has a rich, centuries-old heritage of medical and health sciences. The experience and concern in health development and primary health care in India dates back to the Vedic period. As far back as 3000 B.C., in the Indus Valley Civilisation, one finds evidence of well-developed environmental sanitation programmes in the cities such as underground drains, public baths etc. Almost all households had bathrooms, latrines, water-closets and carefully built wells. Marshall (1931) remarked that public health facilities of Mohenjodaro *city* were superior to those of all other communities of the ancient orient states. The elaborate public health organisation of that time is an indication of the extent of health consciousness among the people of ancient Indus Valley Civilization. The emphasis on preventive aspects of health care indicates a fairly mature attitude towards health "Arogya" or "Health" was given high priority in daily life and this concept of health included physical, mental, social and spiritual well-being.

Irrespective of the phenomenal growth and development of modem Allopathic system of medicine, the fact remains that as late as the beginning of the 19th century, the only medical practices used for health care and treatment of sickness in India were largely "Traditional Indigenous System of Medicine".

Health Status and Health System Till Independence

This period covers a very large span of time starting with the origin and first mention of Ayurveda in the Rigveda and Atharvaveda, describing various diseases and treatments in the form of 114 Hymns (3000 B.C.). Presence of rich and unlimited wealth of varied medicinal herbs, plants and minerals proved exceptionally favourable to the growth and development of the Science. In course of time, it became a teaching subject in the Universities of Takshashila and Nalanda. In Ayurveda, one finds even in 1400 B.C. emphasis on health promotion and health education.

During that time the life style was conducive to health promotion and in the daily activities of life, various essentials of health care were emphasised i.e. health education, personal hygiene and habits, exercises, dietary practices, food, sanitation, code of conduct and self-discipline, civil and spiritual values, treatment of minor ailments and injuries etc. Vedic medicine, which developed after the migration of the Aryans to the Indus Valley took the momentous step from magico-religious therapeutics to rational therapeutics (Chattopadhyaya, 1977). The pharmacology which Ayurvedic medicine developed is colossal and is significant for giving direction even to current pharmacological research (Banerji, 1985). The Buddhist medical text "Millindepanha", of around the 1st Century A.D., also adhered to rationalism and secularism. According to Zimmer (1948), by the 10th Century A.D., often referred to as the age of Indian Renaissance, the scientific core of Indian medicine had reached its high point and social-medicine was being practiced in various parts of the sub-continent including the southern peninsula. Al-Biruni, the visiting scientist from Central Asia, who came to India in the early part of the 11th Century, spoke of the practice of herbal medicine (Chattopadhyaya, 1977). There were three major indigenous systems of medicine (ISM) in the early period i.e. Ayurveda—the Hindu system; Unani—the Greek System which was brought to India from West Asia around 10th Century A.D. by the Muslim rulers and became indigenous to the country along with them; Siddha system which prevailed in Tamil Nadu and some other parts of South India. Ayurveda, Unani and Siddha enjoyed universal acceptance by virtue to their being the only available system for care and cure of the health problem.

During the middle of the 18th Century, the British Government in India established medical services. Allopathy was introduced primarily to look after the health needs of British armies, their civil servants and labour employed in colonial enterprises and industries. General public was given the lowest priority. Indigenous systems of medicine were totally neglected and allowed to languish. The state of public health in British India was low as evident by wide prevalence of diseases like malaria, tuberculosis, cholera, small-pox, plague etc. and the conscqucnt high rates of mortality in the community as a whole. In the forties, the death rate for the general population in British India was 22.4 per 1000 inhabitants and for infants (children under one year of age) 162 per 1000 live births (Bhorc Committee, Vol.1, 1946). Services which were available in general hospitals located in big cities and commercial centres were largely curative for the care of the sick and injured. Later on, some preventive measures were provided for the control of epidemics and dispensaries were also opened in some remote villages. Provincial health departments were established in 1919. But neither health planning nor medical education was related to the health needs of the people (Roy, 1985).

Medical services were scattered inadequately, not only in number but in the kind of medical care they delivered. Rural population in particular were starved of services. In the United Provinces, one institution served a population of about 1,05,626 people inhabiting about 202 villages. The total number of beds available were 73,000 or 0.24 per thousand population. The same dismal picture existed with regard to health personnel. A ratio of one doctor to 6,000 population, one nurse to 43,000, one health visitor to 400,000, one midwife to 60,000, one qualified pharmacist to 4,000,000 and one dentist to 300,000 (Bhore Committee, Vol. 1, 1946 & Baneji, 1985).

An important feature of health policies, plans and programmes in India is that they started taking shape prior to Independence along with the growing national movement. The National Planning Committee (NPC) of the Indian National Congress was set up in 1938. This Committee set up a sub-committee on National Health chaired by Colonel Santok Singh Sokhey which made a penetrating assessment of then health situation and health services in tho country and recommended measures for their improvement in the interim report submitted in 1940. The integration of curative and preventive functions in a single state agency was urged and it was stressed that the maintenance of the health of the people was

the responsibility of state. The need for training large numbers of health workers in practical community and personal hygiene, first aid and simple medical treatment, with stress on the social implications of medical and public health work was emphasised. Practitioners of the Ayurveda and Unani systems were to be drawn into the state health system, after giving them further scientific training where necessary. Other aspects covered were nutrition, expansion of medical education and research, compilation of an Indian pharmacopoeia and production of drugs. Thus even as early as 1940, India's leaders had already envisaged a people oriented health service and had then advocated the concept of a community health worker to serve the rural community.

Growth of Health Care Services After Independence

During the period, vertical programmes of control of different communicable diseases, family planning and nutrition programme ran independent of each other. However, at peripheral level, they were working within the parameter of Peripheral Health Units system. It implied that for same geographical area, a large number of health workers belonging to different vertical programmes were covering a very large identical population at any point of time. Kartar Singh Committee found that the concept of the multipurpose workers at the periphery was both feasible and desirable. The Committee's recommendations were accepted and a new set of worker (multipurpose) drawn from the supervisory and field level of existing health functionaries at PHCs working under different vertical national programmes was created to work in the field in an integrated way for most of the existing vertical programmes at peripheral level. In other words, attempt was made to integrate the services at peripheral level maintaining the vertical structure at top. The launching of Multipurpose Worker's Scheme marked the establishment of an integrated health care delivery system. This led to establishing of the Primary Health Centres. Being conscious of curative services as support to Preventive Health Care services, it was essential to look into the condition of existing medical care services as well. Jain Committee gave several recommendations for the improvement of hospital medical care services and the Central Government Health Scheme. Later Shrivastava Committee suggested several measures for the improvement of medical education and support manpower to extend the outreach of the primary health care services. You will learn in more detail about the recommendations of these committees subsequently.

On achieving Independence, India embarked upon a planned effort for raising the standard of living of the masses. Health planning in Independent India was made an integral part of the overall planning for socio-economic development.

A major landmark in the development of health services in India was the establishment of the first Primary Health Centre (PHC) in October, 1952. The PHC, as part of the Community Development Programme signified the putting into practice of the concept of community participation and inter-sectorial development for health care.

A major step was taken in 1952 to bring about a reorientation of education and training of health workers to make them more relevant to conditions prevailing in the country. Upgraded departments of preventive and social medicine were established in medical colleges to relate the complex field of community health to the social, cultural and economic context (Banerji, 1973). Other major watersheds in the history of health services in India were the introduction of *Community* Health Volunteer's (Guides) Scheme and introduction of ROME Scheme (Reorientation of Medical Education) in 1977 as a consequence to Shrivastava Committee report. The idea was to entrust people's health in people's hand and involve medical colleges in community health problems and reorient medical education to achieve social objectives-of national health services.

As you know, the basis for organisation of health services in India through the basic health care approach in modem time, was laid by the recommendations and guidance provided by the "Health Survey Development Committee" (Bhore Committee) in 1946 which subsequently has moved to primary health care approach. Over the past more than four decades, the health services organisation and infrastructure have undergone extensive changes and expansion in stages following review by a number of expert committees (Mudaliar, 1961; Chadha, 1963; Mukherjee, 1966; Jain 1967; Kartar Singh, 1973; Srivastava, 1975, Alma Ata Declaration, 1978; National Health Policy, 1983; and various Five Year Plans). In subsequent sub-section you will learn in detail about the recommendations of these committees.

1.2.2 Salient *Features* of Various Committees

Bhore Committee (1943-46)

Taking into consideration the findings of interim report of National Planning Committee on Health (1940) and being dissatisfied with the then health care system in meeting of health problems of the community, particularly of rural population, in 1943, the then British Government appointed the 'Wealth Survey and Development Committee" with Sir Joseph Bhore as Chairman to make a survey of the existing health conditions and health organisations and to make recommendations for future development.

The recommendations and guidance provided by the Bhore Committee formed the basis for organisation of basic health services in India. The report was submitted to the Government in 1946.

The Bhore Committee emphasised the need for social orientation of medical practice, a high level of public participation to lay special emphasis on preventive work and consequent development of environmental health.

The Bhore Committee made two types of recommendations:

a) A comprehensive blue print for the distant future (20 to 40 years)—the smallest service unit was to be a Primary Health Unit, serving a population of 10,000 to 20,000; and

b) A short term scheme covering 2 to 5 years period–the emphasis would be on setting up 30 bedded hospitals, one for every two Primary Health Units.

The country-side was the focal point of these recommendations. Other recommendations of the committee were:

- Formation of Village Health Committee to secure active cooperation and support in the development of health programme.
- Provision of Doctor of future who should be a "Social Doctor" who combines both curative and preventive measures.
- Formation of a District Health Board for each district with district health officials and representatives of the public.
- To ensure suitable housing, sanitary surroundings, safe drinking water supply, elimination of unemployment and lay special emphasis on preventive work.
- Intersectoral approach to health services development.

Mudaliar Committee (1959-61)

The Government of India in the Ministry of Health set up a Committee on 12th

June, 1959 under the Chairmanship of Dr. A. Lakshmanswami Mudaliar for the assessment in the field of medical relief and public health since the submission of Bhore Committee Report and formulation of recommendations for the future plan of health development in the country.

Detailed recommendations on these aspects were submitted in 1961. Their salient features were:

- Upgrading and strengthening of PHUs
- Strengthening of District Hospitals
- Mobile Service teams for rural areas
- Levying of small fee for those availing hospital facilities, except on those who are really poor
- Long range health insurance policy for all citizens
- Formation of Central Health Cadre in which senior posts in the Central and State Ministries of Health will be included,
- Extension of the functions of the University Grants Commission to education in the fields of Medicine, Engineering, Agriculture and Veterinary Sciences
- Institution of National Programmes in regard to Malaria Eradication, Small Pox, Cholera, Leprosy, Tuberculosis and Filariasis
- Making the Central Council of Health more effective
- Director General of Health Services should enjoy the status of an Additional Secretary.

Chadha Committee (1963)

In April 1963, a special Committee was constituted by the Government of India under the Chairmanship of Director General of Health Services, Dr. M.S. Chadha to go into the details of the requirements related to the primary health centres, their planning, the necessary priority required according to the 'needs of the maintenance phase of Malaria Eradication Programme' and also for other health activities and the manner in which the technical and supervisory staff of the NMEP organisation should be utilised after malaria eradication has been achieved. The Committee considered that the maintenance was the responsibility of the general health services which should be adequately strengthened, particularly the rural health services. Vigilance through medical institutions (government or non-government) must be developed. Multipurpose domiciliary health services should be developed for all health programmes including malaria, small-pox, control of other communicable diseases, health education etc.

Mukherjee Committee (1966)

The Central Council of Health at its meeting on the 31st December, 1965, in Madras, appointed a Committee under the Chairmanship of Union Health Secretary to undertake the review of Family Planning Programme and its *strategy*. The Committee while recommending the strengthening of the administrative set up at different levels from the Primary Health Units up to the State Headquarters, also recommended to some extent, delinking of malaria maintenance activities from Family Planning Programme in order that the latter could receive undivided attention of its staff and could be carried through as a crash mass programme.

Jain Committee (1966-67)

Due to rapid industrialisation of the country and continuous growth of population, a number of medical and health problems were brought in. The Government of India, Ministry of Health and Family Planning set up the study group in August 1966

under the Chairmanship of Shri Ajit Prasad Jain to look into medical care services, It undertook:

- study of the working of different classes of hospitals in the country with a view to improve the standards of medical care and developing sound guidelines for the future expansion of the hospital services.
- review of the working of the Central Government Health Scheme (CGHS), to evaluate its progress and performance and to make suggestions for improvements and reduction in government liability.

Kartar Singh Committee (1972-73)

In pursuance of the recommendations made by the Executive Committee of the Central Family Planning Council, the Government of India constituted a Committee in October 1972 to study and make recommendations on:

- The structure for integrated services at the peripheral and supervisory levels.
- The feasibility of having 'multipurpose/bi-purpose workers' in the field.
- The training requirements for such workers.
- The utilisation of mobile service units set up under family planning programme for intergrated medical, public and family planning services operating from tehsil/taluk levels.

Its detailed recommendations were submitted in 1973 which highlight that:

- Multipurpose workers for the delivery of health, family planning and nutrition services to the rural cornmunitics arc both feasible and desirable.
- To begin with, one Male Health Worker (Multipurpose) should be available for a population of six to seven thousand.

  At least one Female Health Worker (ANM) should be available for a population of ten to twelve thousand.
- Each PHC should ultimately serve 50,000 population and should have 16 sub-centres spread over its area.
- Training for all workers engaged in the field of health, family planning and nutrition should be integrated.

Shrivastava Committee (1974-75)

The Government of India in 1974 formed a Committee on 'Medical Education and Support Manpower' under the Chairmanship of Dr. J.B. Shrivastava. The terms of references were as follows:

- To devise a suitable curriculum for training a cadre of Health Assistants conversant with basic medical aid, preventive and nutritional services, family welfare, maternity and child welfare activities so that they can serve as a link between the qualified medical practitioners and the multipurpose workers, thus forming an effective team to deliver health care, family welfare and nutritional services to the people.

  Keeping in view the recommendations made by earlier committees on Medical Education specially the Medical Education Committee (1968) and the Medical Education Conference (1970), to suggest suitable ways and means for implementation of these recommendations, and to suggest steps for improving the existing medical education process so as to provide due emphasis on the problems particularly relevant to national requirement.

- To make any other suggestion to realise the above objective and matters incidental thereto.

The Committee submitted its detailed report in 1975 and made specific recommendations for the initiation of the following major programmes for immediate action:

- Organisation of the basic health services (including nutrition, health education and family planning) within the community itself and training the personnel needed for the purpose.
- Organisation of an economic and efficient programme of health services to bridge the community with the first level referral centre, viz., the PHC (including the strengthening of the PWC itself).
- The creation of a National Referral Services Complex by the development of proper linkages between the PWC and higher level referral and services centres.
- To create the necessary administrative and financial machinery for the re-organisation of the entire programme of medical and health education from the point of view of the objectives and needs of the proposed programme of national health services.

Implications of Various Committees

Analysing the recommendations of various expert committees set up for the development of health care services, it is quite apparent that Bhore Committee set out a pattern of health development through primary health care units which continues till date; the basic framework of all the subsequent Health Development Plans. It is striking that the recommendations of the Bhore Committee spoke of "Primary Health Care Unit" with people's active cooperation long before the Alma Ata Declaration of 1977. Even in those early days, the Bhore Committee could visualise the importance of studying heredity and environment to promote the creation of a healthy and well-endowed community. The recommendations of Bhore Committee, therefore, provided inspiration for the development of comprehensive health services for India.

Several vertical programmes for control of communicable diseases were initiated following the suggestions of Mudaliar Committee. It recommended the introduction of Mobile Health Care Unit for Basic Health Care which was not found to be effective later on. Levying of small fee for those availing hospital facilities and long range health insurance policy for all citizens were some of the important recommendations of Mudaliar Committee.

As early as in 1963, the multipurpose concept could be seen in one of the recommendations (i.e. multipurpose domiciliary health service for all health programmes) of Chadha Committee dealing with Malaria Eradication Programme. However in 1965, Mukherjee Committee, in order to boost family planning activities delinked malaria maintenance activities from family planning programme.

1.23 Changing Trends in Evolution of Health Care Delivery System

At the time of Independence, the country's health care infrastructure was mainly urban and clinic based. Outreach of services in the rural areas was very limited; there were very few preventive and rehabilitative services available. From the First Five Year Plan, Central and State Governments made efforts to build up primary, secondary and tertiary care institutions and tried to link through appropriate referral system. The private and voluntary sectors also tried to cater to the health care needs of the population. Efforts to train adequate number of medical, dental and paramedical personnel were also taken up. National Programmes for combating major public health problems were evolved and implemented during the last 50

years. Efforts to further improve the health status of the population by optimizing coverage and quality of care by identifying and rectifying the critical gaps in infrastructure, manpower, equipment, essential diagnostic reagents, drugs and enhancing the efficiency of the health systems are underway.

The National Health Policy was formulated and adopted in 1983 by providing comprehensive framework for planning, implementation and monitoring of health services. Successive Plans have evolved various health programmes to achieve the goals set in the National Health Policy. Alma Ata Declaration of WHO adopted by India, envisaged availability of Health for All by Year 2000 AD.

Improvement in coverage and quality of health care and implementation of disease control programmes resulted in steep decline in the Crude Death Rate (CDR) from 25.1 in 1951 to 8.9 in 1997. Life expectancy rose from 32 years in 1947 to 61.1 years in 1991-96 with female life expectancy (61.7 years) higher than the male (60.6 years). However, the morbidity due to common communicable and nutrition-related diseases showed a progressive increase because of increasing longevity and. alterations in life style. During the 9th Plan, efforts are being made to tackle this dual disease burden effectively so that there is sustained improvement in the health status of the population. During the last 50 years a large network of health facilities in rural areas have been established. The number of 132730 Sub-centres, 21854 Primary Health Centres and 2424 Community Health Centres have been established to cater to health service requirements of the rural areas. It provides integrated promotive, preventive, curative and rehabilitative services to the population close to their heart and home. However, there are marked disparities at the state and district level. There is considerable backlog in terms of construction of the building for sub-centres and PHCs. Apart from funds made available to States under Minimum Needs Programme, additional central assistance is now being made available under Basic Minimum Services.

The outcome and impact of any health programme depends on the competencies and skills of the personnel who implement it. The Bhore Committee was the first to recommend a population based norm for medical (1/1500) and nursing personnel (1/500). Medical Education has been given a priority during all the Plans in the country. This was essential in the initial years of the Planning, as there existed a wide gap in the availability of skilled and trained manpower. During the 9th Plan, health manpower planning is being linked to the needs and demands of health services.

At the time of Independence, communicable diseases were the major cause of morbidity and mortality in the country. Efforts were, therefore, initially directed towards their prevention and control. Small pox, a major killer in pre-independence era has been eradicated. In 1953, malaria affected over 75 million and killed 0.8 million people. The National Malaria Control Programme, which was launched in 1953, successfully brought down the incidence of malaria to 0.1 million cases with no death by 1965. Subsequently, there has been a resurgence of malaria. Modified Plans have succeeded in keeping morbidity and mortality at relatively low levels. Effective therapy for infections and vaccines for prevention of infection were the major factors responsible for the steep fall in crude death rate from 25.1 in 1951 to 8.9 in 1997.

Even though health is a State subject, the Central Government has over the last 50 years, provided additional funds through centrally sponsored schemes for control of some of the major communicable diseases. Apart from programme for control of malaria, the national programme for control of tuberculosis, blindness, leprosy and HIV/AIDS etc. have been undertaken.

Sexually transmitted diseases (STDs) have been a global problem since time immemorial. A national STDs control programme has been in operation since 1967. With the advent of HIV infection the situation underwent dramatic change because

there is no effective drug for treatment or vaccine for protection against HIV infection. Available data indicate that HIV infection exists in all states both in urban and rural areas. ICMR had estimated that the number of HIV infected persons in the country is between 2-3 million. At present the number of AIDS patients in the country is small. However, over the next decade persons who got infected in the eighties will develop AIDS, resulting in a steep and progressive increase in the number of AIDS patients in India. Realising the gravity of the HIV epidemic in the country, a National AIDS Control Programme was initiated in 1992 as a 100% Central Supported Scheme. You will learn in detail about these national health programmes in Block 3 of this course.

Shifts in Thrusts Under Various Five Year Plans

The planning process in the country was initiated in April, 1951 when the First Five Year Plan was launched. Progressive changes in thrust areas have been introduced into the programmes over the seven Five Year Plan periods. The First Five Year Plan (1951-56) initiated a process of all-round balanced development to ensure a steady improvement in the living standard over a period of time. New programmes for the control of communicable diseases such as malaria, filaria, tuberculosis, leprosy etc. were instituted. Health and medical care infrastructure facilities and water supply and sanitation were expanded with a view to improve the accessibility and availability of services. Education and training facilities for medical and para-medical personnel and other health functionaries were also instituted and expanded.

The subsequent Five Year Plans (2nd, 3rd and 4th) aimed at extending health and family planning services to bring those increasingly within the reach of all the people for improving their health status. In the first year of the Fifth Five Year Plan, 'Minimum Needs Programme' was introduced. The objective of the programme is to establish a network of basic services and facilities of social consumption in all the areas within a specified time frame. This package of 'Minimum Needs Programme' contains important elements from the fields of health, nutrition, environmental improvement and water supply, apart from elementary and adult education, roads and electrification in rural areas and housing for landless labourers.

During the Fifth Plan (1974-79), removal of poverty and achievement of self-reliance on the part of the community were given emphasis. For preventing and correcting nutritional deficiencies, supplementary feeding programmes for the children and expectant mothers were initiated on a country-wide basis. The family planning programme was integrated with the MCH and nutrition programmes.

India is a signatory of the Alma Ata Declaration of 1978 and it is committed to attaining the goal of "Health For All" (HFA) by the Year 2000 through the primary health care approach. Consequently, while formulating the Sixth Five Year Plan (1980-85), a critical review was made of the approaches in the past Five Year Plans. Based on these, a long term perspective was outlined by the Government for achieving the HFA goals. Efforts were initiated for the formulation of the National Health Policy, keeping in view the HFA principles and strategies. These strategies were also incorporated in the Sixth Five Year Plan. The National Health Policy was essentially a policy of democratisation of the health services, based on the concept of people's health in people's hands. During the Sixth Five Year Plan emphasis was given on health problems, contraceptive practices and diseases among tribal groups of India.

The objectives and thrusts of the Seventh Plan (1985-90) were formulated as a part of the long term strategy which seeked by the year 2000 to virtually eliminate poverty and illiteracy, achieve year-full-employment, secure satisfaction of the basic needs of food, clothing and shelter and provide health for all. The working group on Population Stabilisation and Maternal and Child Health Care felt that strategy during the Seventh Five Year Plan for achieving the targets should comprise of:

- improvement of efficiency and effectiveness of the programme infrastructure,

- enforcement of the law relating to minimum age at marriage,
- special programmes for low performing states,
- more involvement of voluntary organisations,
- greater emphasis on spacing methods,
- efforts to achieve much higher protection rate for cities with population over 10 lakhs.

Health w e for mothers and children were to be strengthened through the Primary Health Care approach which includes integrated comprehensive MCH Care, suitable strengthening of referral services and logistic support. Each major state should have at least one centre of excellence for re-canalisation. The main focus of Eighth Five Year Plan was on integration and consolidation rather than expansion of the infrastructure. The objectives of the plan also included:

Strengthening of physical facilities,

- Provision of essential equipment, and
- Filling up of vacant posts.

Check Your Progress 1

1) List two types of recommendations made by Bhore Committee (1946).

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2) Which committee recommended multipurpose worker for delivery of primary health care?

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3) Which committee is known as 'Committee on Medical Education and Support Manpower'?

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4) Which committee recommended Mobile Services teams for rural areas and levying of small fee for availing hospital facilities?

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5) In which five year plan the minimum need programme was introduced?

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6) List the thrust areas of Seventh Five Year Plan.

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1.3 WEALTH CARE: INFRASTRUCTURE

In this section you will learn about health care infrastructure in the country at various levels.

1.3.1 National Level

Health and human development are integral to overall socio-economic development. The Ministry of Health and Family Welfare "plays a vital role in the effort to enable the citizens to lead a healthy life by promoting policies and programmes covering preventive, promotive and curative health care. Under the constitution, the items' like public health, sanitation, hospitals and dispensaries fall in the *state* list. Population control and family planning, medical education, adulteration of food stuffs and other goods, drugs, compilation of vital statistics including registration of births and deaths and lunacy and mental deficiency find a place in the concurrent list, while international health comes under union list.

The official organs of the general health system at the central consists of

1) Union Ministry of Health and Family Welfare
2) Directorate General of Health Services and Central Council of Health and Family Welfare.

Ministry of Health and Family Welfare is the apex executive organisation dealing with the issue of health and family welfare in the country as per guidelines enshrined in the Constitution of India and depicted in the National Health Policy and in accordance with the policy decisions of the cabinet.

Ministry of Health and Family Welfare is headed by:

- Cabinet Minister

  Minister of State

  Deputy Health Minister

Currently, it has following two departments:

- Department of Health

  Department of Family Welfare

Department of Health

Department of Health is headed by Secretary to Govt. of India as its executive head and is assisted by Additional Secretary, Joint Secretary and Deputy Secretary and a large administrative staff.

The Union Ministry formulates national policies on health and gives advice on health and allied matters, coordinates health programmes and policies, supplies technical information and equipment and provides financial and other assistance towards health measures which promote in general, the health and well being of the people.

It is also responsible for implementation of numerous programmes of national importance like Family Welfare; Child Survival and Safe Motherhood; Prevention, Control and Eradication of major diseases; propagation of Indian systems of medicines etc. The Ministry implements several centrally sponsored schemes through the state governments. These schemes aim at fulfilling the national commitment to attain the goal of Health for All by the Year 2000 AD.

Health is a state subject in India and Union Ministry of Health and Family Welfare acts only as the coordinating agency between the State Health Departments, Planning Commissions and Central Council of Health etc.

Department of Family Welfare

Department of family welfare was created as a separate department in 1966 in Ministry of Health and Family Welfare. The Maternity and Child Health section comes under the Department of Family Welfare.

The Mother and Child Health and Family Planning Services were integrated in the Fourth Five Year Plan for better effectiveness. The organisation pattern for MCH and Family Planning Services cannot be considered apart.

The Secretary to the Government of India in the Ministry of Health and Family Welfare is in overall charge of the Department of Family Welfare who is assisted by an Additional Secretary (Commissioner, Family Planning/MCH), Joint Secretary (MCH), Director (Technology Mission on Immunization), Deputy Commissioner (MCH) and a team of Assistant Commissioners (EPI, MCH, ORT and Child Survival).

Policy formulation, intelligence and evaluation, planning and budget formulation, autonomous bodies and subordinate officers, supply of contraceptives, International Aid for Family Welfare, Urban Family Welfare Programme and contraceptive research programmes are looked after through various divisions by Joint Secretary.

Maternal and Child Health Services including child survival programmes like universal immunization, control of acute respiratory infections, oral rehydration therapy programmes, infrastructure and social safety network, training programmes, voluntary organisations sector and technical operations are looked after by Director, Technology Mission.

Various technical divisions functioning in the department are programme appraisal and special schemes, technical operation, maternal and child health, evaluation and intelligence, information, education and communication (IEC), supply division, transport, universal immunization programme, area projects and rural health division.

The technical divisions look after the technical aspects of family planning. Evaluation and intelligence division helps in perspectives planning and monitoring and evaluation of the performance of the various programmes. It also coordinates demographic research. The rural health division looks after health infrastructure at the peripheral level, training, extension components, facilities and services. The IEC division is responsible for providing communication, educational publicity and extension support to the programme through mass education and extension education with emphasis on interpersonal communication. It is also looking after population education activities.

Directorate General of Health Services

Director General of Health Services (DGHS) is the executive head of the technical wing of the Union Ministry of Health and Family Welfare. He renders technical

advice to the Government of India in all medical and public health matters and in the implementation of various health schemes.

DGHS is assisted by an Additional Director General of Health Services, a number of Deputy Director Generals, Assistant Director Generals and Deputy Assistant Director Generals. Deputy Director General (Planning) and Deputy Director General (Rural Health) look after MCH activities. Deputy Director General (Planning) is assisted by Assistant Director General (EPI) who supervises vaccine production and quality control.

Majority of maternal and child health services are under control of Director, Technology Mission (Immunization) in the Ministry of Health and Family Welfare.

Directors of various health institutions such as National Institute of Communicable Diseases (INCD) and All India Institute of Hygiene and Public Health (AIIPH) etc. are in the cadre of Deputy Director General.

Central Council of Health and Family Welfare

Central Council of Health and Family Welfare was set up by a presidential order on August 9, 1952, for promoting coordinated and concerted action between the centre and the states in the implementation of all the programmes and measures pertaining to the health of the nation.

The union health minister is the chairman and the state health ministers are the members of this council.

1.3.2 State Level

Under the provision of our Constitution, the main responsibility of providing the health services to the people through hospitals, dispensaries, health centres, clinics, public health and sanitation projects etc. lies with the state govemments.

The state is the ultimate authority responsible for all the health services operating within its jurisdiction.

At present there are 29 states and 9 union territories in India and as many types of health administrations. In all the states, the management sector comprises the S t . Ministry of Health and Directorate of Health.

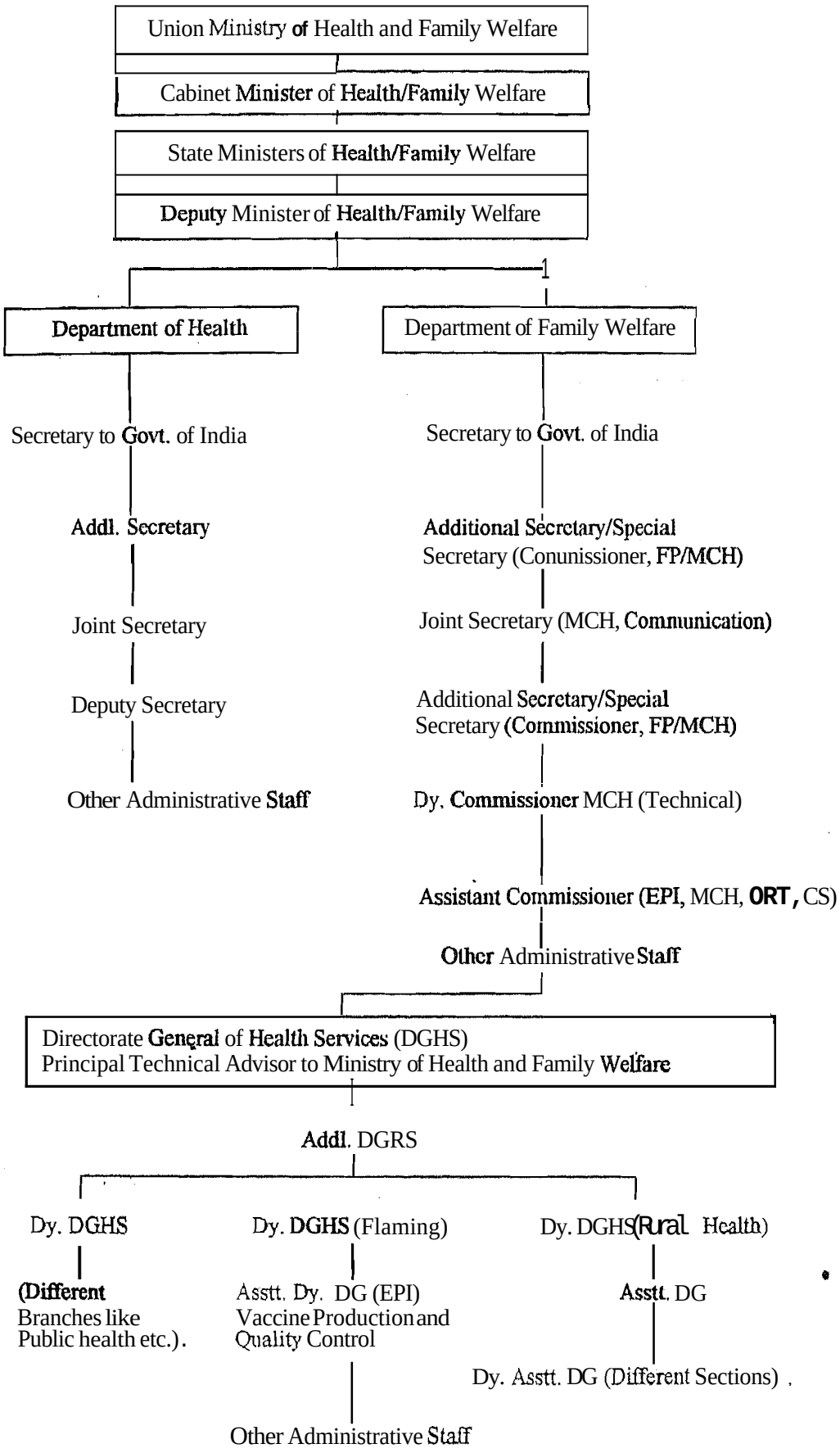
During the past few years, the state governments have assumed major responsibility for delivering of primary health care services including maternal and child health services. All the states have appointed qualified women medical officers to render mother and child health services. Some states have also appointed regional officers known as Additional Director (Range) to supervise maternal and child health work at the divisional level. Similarly, Government of India has appointed Regional Directors who work at state level.

State Ministry of Health

The State Ministry of Health is headed by a Minister of Health and Family Welfare and a Deputy Minister of Health and Family Welfare.

The Health Secretariat is the official organ of the State Ministry of Health and is headed by a Principal Medical Health and Family Welfare Secretary who is assisted by a Secretary, 3 or 4 Special Secretaries, Joint Secretaries, Deputy Secretaries and Under Secretaries.

The Director General of Health Services (known in some states as Director General—Medical/Health and Family Welfare or Director Genera—Family



Organisationdl Chart at the Centre

Welfare) is the chief technical advisor to the state government on all matters relating to medical and public health including **MCH** or **solely and family welfare. He is also responsible for the organisation and direction of all health activities including family welfare activities.**

The organisational structure of the State Directorate of Health Services is not uniform throughout the country. For example, in some states the programme officers below the Director General of Health Services (or Director of Health and Family Welfare) are called Additional Directors, while in other states, they are called Joint/Deputy Directors. But regardless of the job title, the programme officers below the Director General of Health Services may be for two types:

- Regional
- Functional

The Regional Directors are at divisional level and are classified on the basis of geographical distribution. They inspect all the branches of public health within their jurisdiction, irrespective of their speciality.

The Functional Directors are in a particular branch of public health such as mother and child health, family planning, nutrition, health education etc. Director, Family Welfare is assisted by Additional Director, Family Welfare; Joint Director, Family Welfare; State Demographer and Assistant Directors.

Similarly, Director, Mother and Child Health is assisted by Additional Director (UIP/EPI), Joint Director (also known as State MCH Office) and Assistant Directors (MCH, UIP and Child Survival).

In some states the area on medical education is integrated with the State Directorate of Health Services but in other states (e.g. Uttar Pradesh) medical education area maintains a separate identity.

To coordinate the family welfare activities between the state government and the central government, one family welfare cell has been sanctioned for each state. Regional Director, Govt. of India is responsible for coordinating between State and Centre.

1.33 District Level

The district level structure of health services is a linkage system between the state as well as regional structure on one side and the peripheral level structure such as primary health centres and sub-centres on the other side. It receives information from the state level and transmit the same to the periphery by suitable modifications to meet the local needs.

The district officer with the overall control is designated as the Chief Medical and Health Officer (CM&HO) or as the District Medical and Health Officer (DM&HO). These officers are popularly known as CMOs or DMOs. They are responsible for implementing health and family welfare programmes according to the policies laid down and finalised at higher levels i.e. state and centre.

DMOs/CMOs are assisted by 3-4 Deputy CMOs. The exact number of such officers, their specialisation and status in the cader of State Civil Medical Services differ from state to *state.*

One of the Deputy CMO who was previously known as Dy. CMO (UIP) has been designated as District MCH Officer who is a nodal officer of MCH activities in the district and works under the supervision of CMO.

The major contribution of district health administration towards MCH services is to make available medical care and family welfare services, free of cost to all sections of the community in the district, through the primary health centres and down. You will learn in detail about the District Health Organisation in Unit 4 of this block.

1.3.4 Block Level

Rural areas of the district have been organised into blocks, known as Community Development Blocks. The block is a unit of mral planning and development and comprises of approximately 100 villages and about 80,000 to 1,20,000 population, charge of a Block Development Officer.

To provide effective services and referral support to primary health care programme, one Community Health Centre (CHC) is being established in each block. The CHCs are framed by upgrading some of the block level PHCs or by creating new centres, whenever absolutely needed. The officer in-charge of CHC is known as superintendent CHC or medical officer in-charge block PHC.

Each CHC has been envisaged to get primary and secondary care needs of one lakh population. It is intended to be a first level referral institution. Normally onc CHC should have 4 Medical Officers who are either qualified or specially trained to work as Surgeon, Obstetrician, Physician and Paediatrician. One of the existing medical officer similarly should be either qualified or specially trained in Public Health. One CHC should have 30 beds.

Social Safety Net Scheme

Under this scheme, additional funds arc provided to community health centres in the districts, where birth rate is more than 39 per thousand population. 90 such districts have been identified all over the country.

Each CHC is given funds for providing facilities like provision of an operation theatre, a 30 bedded observational ward, a labour room, onc electricity generator, one water pump and one ambulance, if not already available. This scheme helps in strengthening of emergency obstetric care at community health centres.

1.3.5 Primary Health Centre Level

The delivery of primary health care is the principal objective of the rural health care system and forms the foundation of the National Health System. The services are provided through the network of integrated health and family welfare delivery system. The infrastructure is based on the complex of Primary Health Centres and their sub-centres.

A Rural Family Welfare Centre with a medical officer and supporting staff (Health Assistant—Male and Female, Clerks, Laboratory technicians and others) forms an integral part of the Primary Health Centre. One PHC covers a population of 30,000 and as such there are 3-4 PHCs in a block. These PHCs are now known as New PHCs or Mini PHCs in some of the states. The Primary Health Centre is expected to provide fairly comprehensive "essential health care" including MCH and family planning care. The details of primary health care infrastructure have already been discussed in the unit on health for all and primary health care (Unit 2, Block 1 of this course)

1.3.6 Sub-centre Level

Sub-centres are the peripheral outposts of health care delivery system. These are to provide main thrust of the programme. Each sub-centre covers the population of 5000 and is manned by a team of one health worker male and onc health worker female. They provide preventive and promotive health care in addition to MCH and family planning services. Health Worker (Female), previously designated as Auxiliary Nurse Midwife (ANM) is crucial in providing mother and child health care services in rural area. She conducts immunization sessions, distributes Iron and Folic acid tablets, vitamin A and provides antenatal, natal and postnatal services to pregnant mothers along with family planning services to eligible couples. She also

provides knowledge and information to mothers about nutrition, lactation and correct weaning practices. The work of Multipurpose Worker (Family) is supervised by Health Assistant (Female), also known as Lady Health Visitor (LHV). The Multipurpose Worker (Male) as you know perform activities other than MCH w e and is supervised by Health Assistance (Male).

1.3.7 Village Level

At the village level primary health care activities are carried out by supporting health worker like Village Health Guides, Traditional Birth Attendants, Anganwadi Workers (AWW) and others.

1) Village Health Guides

Village health guide scheme was initially started as Community Health Workers scheme on October 2, 1977 in all states except Tamil Nadu, J&K, Kerala and Arunachal Pradesh. The scheme was renamed as Village Health Guide scheme in 1981 when it was made 100 per cent centrally sponsored scheme under family welfare programme.

You will recall that a village health guide is a person with an aptitude for special service and is not a government functionary. These village health guides serve as link between the community and the governmental infrastructure. They provide the first contact between the individual and the health system. They mainly provide health education and create awareness in MCH and family welfare services. They also treat minor ailments and provide aid to the patients.

2) **Trained Dais**

Most deliveries in rural areas are still handled by untrained dais who are often the only people immediately available to women during the prenatal period. An extensive programme has been undertaken to train all categories of local dais (Traditional Birth Attendants) in the country to improve their knowledge in the elementary concepts of maternal and child health and sterilisation besides obstetric skills. The training is for 30 working days. The emphasis during training is asepsis so that home deliveries are conducted under safe hygienic conditions with observation of five cleans, thereby reducing the maternal and infant mortality.

Check Your Progress 2

1) List the functions of Ministry of Health and Family Welfare.

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2) Who are the members of Central Council of Health and Family Welfare?

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3) Which is the most peripheral health institutional facility provided by the government?

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4) Describe the health care delivery system at village level.

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1.4 NON-GOVERNMENTAL SECTOR

In this section you will learn about the involvement of voluntary organisations, private practitioners and indigenous system of medicine (ISM) in the national health care delivery system.

Voluntary or non-governmental health organisations occupy an important place in health care delivery of the country. The National Health Policy has envisaged key role of voluntary organisations in the two most vital components of health and family welfare programmes i.e. population stabilisation and primary health care. NGOs have been playing a significant role in the provision of health care services including medical care. They also play an important role in educating and motivating the people to adopt the small family norm. Voluntary agencies are also involved in ICDS programmes and other community health programmes. These agencies are able to tailor the programmes to take account of the local situations.

1.4.1 Role of Private Sector

You have learnt that the public health infrastructure in the country is small and inadequate to meet the health care demands of the people. As a consequence the private health care sector has taken a dominant position, especially with regard to treatment of routine illnesses. Private general practice is the most commonly used health care service by patients in both rural and urban areas. While this has been known all these years, data in the eighties and nineties from small micro studies as well as national level studies by the National Sample Survey Organisation and the NCAER, provided the necessary evidence to show the overwhelming dominance of the private health sector in India. These studies show that 60-80 per cent of health care is sought in the private sector for which households contribute out-of-pocket 4-6 per cent of their incomes. This also includes the hospital sector where the private sector has about 50 per cent of the market share.

You will agree that, for all practical purposes the private sector provides mainly curative services whereas the emphasis of public sector is on preventive services.

To re-emphasise two sets of dichotomies have been identified in health sector: the curative (private)-preventive (public sector) dichotomy and the rural (preventive)-urban (curative) dichotomy.

It is important to remove these dichotomies for universal coverage and equity consideration. For this purpose, it is essential to dovetail the services provided by the private practitioners/hospitals into primary health services so that comprehensive health services without any social and geographical discrimination can be provided to the people at large.

To achieve this, general practitioners/family physicians besides providing services for personal health care need to be involved in the following:

- First level referral hospital care and basic speciality services, including dental and ophthalmic services.
- Immunization services against vaccine preventable diseases.
- Supply of rational and essential drugs as per accepted standards.

- Ambulance services
- Contraceptive services
- Health education.

1.4.2 Role of Voluntary Organisations

Government attitude towards involvement of NGOs has changed in recent years towards equal partnership as against the earlier relationship which tended to be one of patron and supplement. Still there is a need for development of better understanding between NGOs and government, for joint planning and delivery of health services.

Involvement of NGOs in Health and Family Welfare Programme will give it the much desired impetus as the voluntary workers can work in close collaboration with the people and bring about desired change in social personal attitudes, perceptions and behaviour more than the staff of the government hierarchy.

The voluntary agencies can effectively supplement the government efforts in implementing various national and other programmes like population stabilisation, strengthening and rural women organisations (Mahila Mandals), School Health Progamme, Control of STDs through education and treatment and family planning programme.

1.4.3 Role of Indigenous System of Medicine

Indigenous Medical Practitioners (IMPs) including registered/non-registered medical practitioners (RMPs/NRMPs) are recognised as human resources who heal simple and complex health problems through different approaches using either single or combined system of medicine. By now, it has been well recognised that there is a huge battalion of these IMPs practising mainly in the rural areas and urban slums. They have a good rapport with the community and are widely acceptable to the people and provide health care in a more friendly manner. They have a say in the community and people by and large respect them and tend to follow their advise and instructions.

Thus IMPs can be of great help to the government in promoting the preventive aspects of health, especially in the field of MCH and family planning. There have been researches to demonstrate their role in National Health Programmes and their acceptance by community.

Check Your Progress 3

1) List the areas in which general practitionerslfamily physicians need to be involved.

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2) What will be the impetus of involvement of NGOs/Voluntary Organisations in health and family health care programmes?

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1.5 LET US SUM UP

In this unit you have learnt about an overview of health care delivery system in the country. To start with, you learnt about the brief history of evolution of health services in the country both in prc and post-independence era. You learnt about salient features of various committees from time to time which formed the basis of present day health care delivery system of the country. You also learnt about the changing trends of health care delivery system across various Five Year Plans. Subsequently you learnt about the organisation of health infrastructure at various levels i.e. Central, State, District, Block and Village. Towards the end you learnt about the role which voluntary sector, private sector and ISM can play in the delivery of health care services.

1.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) The Bhore Committee made two types of rccornmendations:

   a) A comprehensive blue print for the distant future (20 to 40 years)—the smallest service unit was to be a Primary Health Unit, serving a population of 10,000 to 20,000;

   b) A short term scheme covering 2 to 5 years period—the emphasis would be on setting up 30 bedded hospitals, one for every two Primary Health Units.

2) Kartar Singh Committee

3) Shrivastava Committee

4) Mudaliar Committee

5) Fifth Five Year Plan

6)
   - improvement of efficiency and effectiveness of the programme infrastructure
   - enforcement of the law relating to minimum age at marriage
   - special programmes for low performing states
   - more involvement of voluntary organisations
   - greater emphasis on spacing methods
   - efforts to achieve much higher protection rate for cities with population over 10 lakhs.

Check Your Progress 2

1)
   - Formulation of national policies on health
   - Advice on health and allied matters
   - Coordinates health programmes and policies
   - Supplies technical information and equipment
   - Provides financial and other assistance towards health measures
   - Implementation of programmes of national importance like Family Welfare; Child Survival and Safe Motherhood; Prevention, Control and Eradication of major diseases.

- Propagation of Indian systems of medicines
- Implementation of centrally sponsored schemes through the state governments.

2) Union Health Minister and the State Ministers

3) Primary Health Centres and their sub-centres

4) At village level there is one village health guide for every 1000 population

Check Your Progress 3

1)
- First level referral hospital care and basic speciality services, including dental and ophthalmic services
- Immunization services against vaccine preventable diseases
- Supply of rational and essential drugs as per accepted standards
- Ambulance services
- Contraceptive services
- Health education

2) **Involvement** of NGOs in Health and Family Welfare Programme will give it the much desired impetus as the voluntary workers can work in close collaboration with the people and bring about desired change in social personal attitudes, perceptions and behaviour more than the staff of the government hierarchy.

UNIT 2 HOLISTIC APPROACH TO HEALTH

Structure

2.1 OBJECTIVES

After going through this unit, you should be able to:

- understand the need, concept and basis of holistic medicine;
- fulfil the needs of the people by adopting holistic medicine;
- prepare inputs required to develop infrastructure for holistic medicine;
- appreciate that holistic medicine makes a physician more effective; and
- develop comprehensive and efficient strategy to achieve 'Health for All',

2.2 INTRODUCTION

Health as you know has been a common basic theme, essential to human survival, for all the cultures throughout the world. The holistic model of health would be an optimum synthesis of all these concepts and could be described as a

multidimensional synergistic synthesis for the well-being of the individual as a whole, to correspond to the views held by the ancients that health implies a sound mind, in a sound body, in a sound family, in a sound community, in a sound environment. The universally accepted emphasis should be on the promotion and protection of health, with early recognition of disease and effective cure with minimal disability, as well as efficient scope for rehabilitation with useful , productive participation in the community.

In this unit, you will learn about the concept and various aspects of the practice of Holistic Medicine for the physical, mental, emotional, social and spiritual well-being of the individual, family, community and the mankind as a whole.

You will also learn about the evolution of medicine including the principles and philosophy of various systems of medicine. Having understood the basic principles and philosophy of various systems of medicine you will also learn about the need and scope of integration of that system at various levels of health care delivery system including the training needs.

2.3 EVOLUTION OF MEDICINE

From time immemorial, the man has been interested in his health and has tried to find various means to prevent or eradicate disease or illness. It has been said that the first doctor was the first man, and the first nurse was the first woman. Medicine was conceived in sympathy and born out of necessity. The prehistoric man, motivated by feelings of kindness, was always at the behest of his kindred, trying to provide relief in the times of sickness or suffering.

The history of medicine originates to great degree from intuition, observation and cumulative experiences. It is a study of accomplishment and errors, as well evolution of man and of human knowledge down the ages and across the various cultures of the world. Medicine is built on the best of the past. The goal of modern medicine became enlarged beyond the mere treatment of sickness to the more important objective of prevention and as an essential component of socio-economic development.

However, the explosion of knowledge during the later half of 20th century has made the practice of medicine very complex and expensive. The benefits of modern progress in medicine have not been able to reach the social periphery of most nations of the world. The glaring contrast in the state of the health between the developed and developing countries, between rural and urban populations, and between the rich and poor has become the source of worldwide criticism as lack of "social injustice". There is an ever-increasing hiatus between the resources available and the needs and demands of the public.

The WHO objective of "Health for All by 2000 AD" by all the nations of the world and attainment by all the people of the highest possible levels of health across the globe has proved to be a failure with more than half the world's people still not having any access to health care at the turn of millennium. The death rates and life expectancy have remained unchanged for the last two to three decades in the developed countries. The statistical gain of the health indices of developing nations are being attributed to improved public health and economic progress. According to Rudolf Virchow, the western father of biomedicine and public health, "Social equity is perhaps the single most important factor if uniform improvements in the health of a population are to be achieved. The improvements of medicine will eventually prolong human life but the improvements of social conditions can achieve this result more rapidly and more successfully."

Through this period, the overall morbidity has perhaps gone up as never before. Even in areas where people are living longer, it has been at the expense of 'quality of life'. Dr. Hiroshi Nakajama, the former Director General of WHO stated, "Our goal should not be solely to extend lives in the physical sense, but to ensure that the added years are worth living with diminishing handicaps and disabilities, and with a greater degree of health security". 'Life to years' is considered equally, if not more, important than 'years to life'.

The increase in ageing population in the world has brought a new focus to the particular health needs of the older persons. Urgent action is needed in preparation for this situation as it is largely not included in the scope of current health care services.

While the WHO Alma Ata declaration called for 'indigenisation' and 'deprofessionalisation' of medicine whereby a medical doctor, besides playing the core curative role should also supplement this by being an educator, case finder, preventer, counsellor and agent of social change through a team of health workers comprising community health workers, anganwadi workers, multipurpose workers, social workers and practitioners of indigenous systems, the approach remained heavily dependent on the modem or the 'allopathic' system of medicine with all its inherent limitations.

The modem system of medicine is confined to the care of health only in its 'physical sense'. At the most, drugs and surgery nay provide some relief, but cannot cure nor reverse the disease process. The patients continue to suffer increasing morbidity in spite of the best medical care. Even when people are living longer, it is at the expense of quality of life. Society-is also becoming increasingly aware of 'iatrogenesis'. Besides, even the richest nations of the world find it difficult to cope with their financial constraints and are unable to extend quality health care to their entire populations.

It has been the official policy of the Government of India to encourage all the systems of medicine, regardless of their origin. The initial recognition of Modern Medicine, Ayurveda, Unani, Homeopathy and Naturopathy was extended to Yoga which has important therapeutic aspects, the Tibetan System of medicine called Alchi, and Acupuncture. Various boards and committees were set up for each one of the systems, way back in 1970s, and it was decided that National Institutes would be established. However, despite all *these* efforts, alternative systems of medicine have not attained Government support nor the acceptance and popularity of the public that was expected.

The National Health Policy adopted by Government of India in 1983 covers almost all the systems and sub-systems required for Health for All by 2000 AD, yet what is realised today is a model truly inconsistent with the desirable goals and objectives. The developed infrastructures and human resource are largely unresponsive to the needs and expectations of the people. The conspicuous lack of political will throughout is reflected in the low priority for 'health' with progressively reducing per capita budgetary outlay in the successive Five Year Plans.

In the subsequent sub-section you will learn in brief about the principles and philosophy of various systems of medicines which need to be integrated with modem medicine to make it holistic.

2.3.1 Ayurveda

Ayurveda, as you know is India's ancient science of life and has a legacy of more than 3000 years. As a system of medicine, it has become thoroughly blended in the philosophy and become a way of life. Jt has been in continuous practice throughout

this period undergoing improvisation, research and development through the human quest for perfection in health. It is termed as a holistic system by itself, for its simultaneous effect on physical, mental and emotional aspects of health. It uses herbal minerals to preserve homeostasis and prevent illness.

Ayurvedic treatment focuses on the cure of the disease, not merely its symptoms. Thus, it provides not only curative but also preventive and promotional applications. It simultaneously restores physiological as well as consequent imbalances, thus *curing* very chronic diseases.

The medicines used in Ayurveda are mostly extracts of herbs and vegetables. Herbal oils play a major role in massage treatments.

The Ayurveda system of medicine has its foundation in the theory of ***'Tri-dosha'*** and ***'Pancha-Bhuta'***. It propounds that everything in the universe is made up of a specific combination (ratio) of these ***bhutas*** and ***doshas.The*** derangement of this particular ratio leads to diseases and hence the physician's role is to restore this ratio.

In Ayurveda equal importance is given to enhancing the health of the healthy, preventing the concept of disease in all and curing the diseases of the ill.

There are eight specialities in Ayurveda:

I) ***Kuyachikitsa*** (General Medicine)

2) ***Koumarabritya*** (Paediatrics)

3) ***Manasika Chikitsa*** (Psychiatry)

4) ***Salakya Chikitsa*** (Surgery)

5) ***Salya Chikitsa (ENT*** and Ophthalmology)

6) ***Visha Chikitsa*** (Toxicology)

7) *Rasayana* (Geriatrics) and

8) ***Vajeekarama*** (Sexual dysfunction and sub-fertility)

Ayurvedic treatment is divided into:

- Sodhana (Process of cleansing the disagreeable elements or toxins) and
- Samana (Symptomatic treatment)

Sodhana is given higher importance for the following reasons:

- It prevents the development of morbidity.
- It impedes the further development of the disease.
- It cures the manifest disease.
- It prevents the reoccurrence of the disease.

Sodhana Chikitsa has five activities—the Karamas known as 'Panchkarama':

- Vamana
- Virechana
- Nasyam
- Kashayavasti and Snehavasti
- Ratha Moksha

Yoga as you must be knowing is a life of self-discipline based on the tenets of 'simple living and high thinking'. It is a very ancient Sanskrit word and has two different meanings, a general one and a technical one. In a general sense, the word 'Yoga' is derived from the root 'yujir-yoge', which means union, union of the self with the Supreme. The technical meaning of the term 'Yoga' is derived from another root 'yuj', which means a state of stability, peace and stillness. The 'Yoga Sutra of Patanjali' (second century B.C.), describes the 'Ashtanga' or eight-fold yoga, which includes outer and inner aspects of disciplining and training the mind and body. 'Ashtanga Yoga' consists of following:

- Abstinence or 'Yama'
- Observances or 'Niyama'
- Postures or 'Asanas'
- Breath control or 'Pranayama'
- Detachment from objects of enjoyment or 'Pratyahara'
- Concentration or 'Dharana'
- Contemplation or 'Dhyana'
- Absorption or 'Samadhi'

The two main purposes of practicing yoga today are:

a) to gain fitness of body and mind to reduce the adverse impacts of the environment we live in; and

b) to prevent and cure the various disorders that afflict the human body.

The body is seen as a temple or vehicle for the soul, and has specific requirements, which must be fulfilled for it to function smoothly. This body-vehicle needs following:

- Proper Exercise: Acts as a lubricating routine to the joints, muscles, ligaments, tendons, and other parts of the body by increasing circulation and flexibility.
- Proper Breathing: Aids the body in connecting to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific Yoga breathing techniques (Pranayama), this energy is released for physical and mental rejuvenation.
- Proper Relaxation: Cools down the system. When the body and mind are continually overworked, their efficiency diminishes. Relaxation is Nature's way of recharging the body.
- Proper Diet: Provides the correct fuel for the body. Optimum utilization of food, air, water, and sunlight is essential.
- Positive Thinking and Meditation: Puts you in control. The intellect is purified. The lower nature is brought under conscious control through steadiness and concentration of the mind.
- Cleansing techniques or 'Shuddhi Kriyas': Clean the various internal organs of the body by using various techniques such as Neti, Dhouli, Basti, Tratak, Nauli and Kapalbhati.

Thus the main aim of yoga is to bestow on an individual a perfect state of mental and physical health. This can be described as a state in which all the organs must perform their functions effectively and in a coordinated manner, to enable one to fulfil, the higher purpose for which one is born.

Yoga has many advantages over other methods of maintaining health. It does not need any costly equipment or material. The only requirement is a thick carpet for spreading on the floor, personal dedication and time. It is beneficial for all individuals irrespective of age, occupation, education and economic status. It can be described as the best form of health insurance.

2.3.3 Naturopathy

According to the philosophy of nature cure or naturopathy, the origin of all diseases is an accumulation of toxins in the body. And the disease is that state in which the body tries to expel those toxins, which it could not expel in its normal condition and through its normal processes.

As per naturopathy, the body has its own power to heal itself and remain in a healthy state. But, when a person adopts a life-style in disharmony with nature and keeps on breaking the rules of nature, the natural balance of his body gets impaired and toxins begin to accumulate, as more toxins are produced than expelled by the body.

Therefore, the first and the foremost step in the cure of a disease is to improve one's life-style and start living in harmony with nature. Basic ingredients of such a life-style are:

Proper Diet

Some of the rules advocated regarding diet are as under:

- Vegetarian diet, which is light and easy to digest.
- Reduce intake of salt, avoid salt-rich substances, and preferably use rock salt.
- Reduce intake of refined sugar, preferably use country sugar, rich in minerals,
- Avoid refined and synthetic foods, use natural foods, which are easy to digest and have greater nutrition.
- Do not overeat, and have your meals at least three hours before sleeping.
- Drink plenty of water, especially after waking up in the morning.
- Do not overcook the food and use minimum spices.
- Avoid fried food and increase intake of salad and fresh fruits.
- Rest after meals and do not engage yourself in strenuous physical work immediately after meals.

Proper Exercise

Exercise should be light and invigorating. The regular practise of yogasanas and long walks preferably in natural surroundings are considered ideal to maintain a good circulation of blood to all parts of the body.

Proper Rest

When the body and the mind are constantly overworked, their natural efficiency diminishes. Therefore, our body and mind need rest to recoup their energy and to help them regenerate. During rest the body's capacity, to perform the necessary repair and eliminate toxins, increases and it gets back to normal.

Even fasting is a way of resting our digestive system, which helps the digestive organs to recoup their energy and continue performing efficiently.

Naturopathy stresses the fact that internal and external cleanliness are prerequisites for a healthy, disease-free body.

External cleanliness, which is basically related to body hygiene, is of paramount importance. By practicing external cleanliness one can also achieve internal cleanliness, as it eventually permeates to our inner self.

Bathing daily, washing hands properly before meals, keeping our teeth and nails clean are some of the simple rules, which need to be followed, apart from some advanced techniques, which could be adopted later.

Therapeutic Measures

There are also various therapeutic measures employed in Nature cure. The basic principle behind them is to affect an improvement in the blood circulation either to a particular part or to the whole body, so as to wash away the accumulated toxins.

These techniques mainly involve various kinds of baths, packs and massages. Steam bath, sun bath, cold hip bath and mud pack are some of the examples of these techniques.

2.3.4 'Siddha Vaidya System

Siddha Vaidya System is an ancient herbal medical system, which is said to have originated with the civilizations of Mohenjodaro and Harappa. Through its evolution it travelled to Southern India along with the Dravidians about 2500 years ago.

The Siddha vaids meticulously studied thousands of herbs for medicinal purposes, which were accurately defined, documented and well researched.

These herbal remedies have a tangible solution for the various types of disorders afflicting the human race. It forms an ideal bridge between modem medicine and other complementary systems of medicine and is effective in the management of:

- Chronic diseases
- Degenerative conditions
- Autoimmune diseases such as rheumatoid arthritis
- Disorders of the central nervous system such as hemiplegia
- Viral infections such as hepatitis and herpes
- Prevention of heart diseases, etc.

In short, this system of medicine promises health and productive longevity.

2.3.5 Unani Medicine

The Unani system of medicine recognizes the influence of surroundings and ecological conditions on the health of human beings. The essential factors that influence health and vitality are—air, food and drinks, bodily movements and repose, psychic movement and repose, sleep and wakefulness, excretion and retention. It aims at restoring the equilibrium of various elements and faculties of the human body and stresses on the maintenance of a proper ecological balance and keeping water, food. and air free from pollution.

The theoretical framework of Unani medicine is based on the teachings of Hippocrates. The principal, basis of diagnosis in Unani medicine is the theory of Humours.

There are mainly four Humours in the body—Dam (blood), Balgham (phelgm), Safra (yellow bile), and Sauda (black bile). According to the preponderance of these Humours, blood, phlegm, yellow bile and black bile, the temperaments of persons are expressed by the words sanguine, phlegmatic, choleric and melancholic. respectively.

Every person is supposed to have a unique, humoral constitution, which represents his healthy state. To maintain this healthy state there is a power of self-preservation called Quwwat-e-Mudabbira (medicatrix naturae) in the body. When this power weakens, an imbalance in the humoral composition occurs and disease results. The therapy in Unani medicine is aimed at restoring this humoral balance.

Another distinctive feature of the Unani system of medicine is its emphasis on diagnosing a disease through nabz (pulse), a rhythmic expansion of arteries, which is felt by the fingers. Other methods of diagnosis include examination of baul (urine), baraz (stool), etc.

Therapeutics

The various types of treatments employed in Unani medicine are:

1) *Ilaj bit-tadbeer* (regimental therapy): This therapy includes venesection, cupping, diaphoresis, diuresis, turkish baths, massages, cauterization, purging, emesis, exercise, leaching etc.

2) *Ilaj bil-ghiza* (dietotherapy): Dietotherapy aims at treating certain ailments by administration of specific diets or by regulating the quantity and quality of food.

3) *Ilaj bid-dawa* (pharmacotherapy): It deals with the use of naturally occurring drugs, mostly herbal, though drugs of animal and mineral origin are also used. Single drugs or their combinations in a raw form are preferred over compound formulations. The materia medica of Unani medicine is vast and most of the drugs are easily available. They are free from side effects. Drugs that are toxic in the crude form are processed and purified many times before use.

4) *Jarahnt (surgery): When all* other therapeutic measures fail, surgery is resorted to.

2.3.6 Homeopathy

Homeopathy was introduced by the celebrated German physician Samuel Hahnemann through his work, The *Organon of the Art of Healing*, which was first published in 1810 AD. It emerged as an important therapeutic modality during the latter half of the nineteenth century in Europe and Americas. Due to its increasing popularity in our country, the Government of India extended official recognition to Homeopathy in the year 1977 and enacted the formation of Homeopathy Council of India. The World Health Organisation has recognized it as a viable form of therapeutics.

The primary emphasis of Homeopathy is that it is a non-invasive therapy, it is low cost, non-toxic, and safe. It may be used to treat both acute and chronic disorders. However, its main utility is in the successful treatment of many chronic illnesses that are usually difficult to manage with other methods or treatment.

Homeopathy aims to restore the lost equilibrium of the sick person at the physical, mental and emotional levels by stimulating and regulating the intrinsic defence and curative mechanisms, or the so called vital forces.

The Homeopathy principle according to Hahnemann is "In order to discover the true curative powers of a remedy to treat diseases one must ascertain the specific artificial disorder it develops in the healthy human body, and then utilize it to treat similar morbid conditions. In order to radically cure chronic diseases, one must search for the single remedy that may evoke a similar disease picture, the closer the similarity the better."

Hitherto, diseases of the human organism were treated neither rationally nor on logical principles, but according to various esoteric, hypothetical, curative paradigms, among which is the palliative rule: *contraria contrariis curentur.* The truth is, in fact, diametrically opposite; to cure mildly, rapidly and permanently. In every disorder, a remedy is selected which produces a similar clinical picture when administered: *similia similibus curentur.* This is the fundamental principle of homeopathy, known as the Law of Cure.

Hahnemann's fundamental propositions, peculiar to homeopathy, may be expressed thus:

1) That the action of the drug is demonstrable by observing the signs, symptoms, and pathological changes that occur when they are administered to healthy human subjects.
2) That the action of drugs in the *healthy* constitutes their therapeutic potential with respect to the sick.
3) That a similarity between the disease process in a particular individual, and the known effects of a particular drug in the healthy will lead to its successful application in the treatment of that diseased individual.

Thus, the Law *of Similars* forms the foundation of all medicinal Iiomeopathic practice. Similia *Similibus Curentur*, "let likes be treated with likes".

Increasing concern about the dangers and complications caused by the crude physical methods employed in the therapeutics s f his day, and with his intuition coupled with careful observations, Hahnemann developed a subtle and effective approach based on ancient principles of healing. He sffectively used natural substances of plant, animal, and mineral origins that have the properties of stimulating the body's curative responses (of the vital principles) to disease. Beginning with his classical proving experiments with the quinine, cinchona or china bark used in the treatment of malaria, he was able to develop a wide range of natural healing substances during his life time of dedicated research. These remedies now form the basis of the modern homoeopathic *materia medica*, which has since been considerably cxpandcd by many dedicated workers.

23.7 Traditional Chinese Medicine

The edifice of traditional Chinese medicine was built on a solid foundation of careful clinical observations. The ancient Chinese believed that disease was caused by the imbalance in the body of two principles, which they called 'Yin' and 'Yang'. By 'Yin' they meant the negative or female principle, while 'Yang' was the positive or male principle and both of which are universally present in all nature in the healthy state. There was believed to be a harmonious balance between these opposite but mutually interacting principles—a state of affairs called homeostasis. In the healthy stat. when the Yin and Yang are in balance, normal vital energy or 'Qi', which flows through the channels of the body is produced. But when disease supervenes, it was believed that one or other principle becomes dominant at the

expense of other. Correction of this imbalance is achieved by the techniques of acupuncture, moxibustion, acupressure and auriculotherapy.

Another important aspect of Chinese medicine is the concept of the internal organ, which is radically different from that of contemporary western medicine. Understanding the difference is very important because the physiology of the organs are fundamental to the understanding and treatment of diseases. For example, assuming that treatments which are regarded by the Chinese as beneficial to the liver will automatically be useful against western defined hepatic disorders is not always correct.

There is in Chinese medicine, a lack of emphasis on the anatomical structure. The organs are divided into Yin (Zang) and Yang (fu) organs.

The five Yin organs, which form the core of the entire system are—lungs, heart, liver, spleen and kidney. A sixth organ—the pericardium exists but it is more in conjunction to the heart.

The six Yang organs are—gall bladder, urinary bladder, stomach, small intestine, large intestine and sanjiao.

The Yin organs sustain homeostasis and Yang organs transform food and dispose wastes. Each Yang organ is related to a particular Yin organ.

The forum of diagnosis and conceptualisation of the body differs in Chinese medicine. Each of the vital organs is responsible for a variety of disorders that appear along the path of its associated channels.

The channels or meridians are conduits for the smooth flow of the vital energy called 'qi' (pronounced 'chi'). Likewise there are 12 pairs of channels associated with the organs. Like the internal organs there are six Yin channels and six Yang channels. Each Yin channel is paired with the Yang channel. In addition to these, there are eight extra channels. This network of channels connects the internal organs and the exterior of man, the microcosm, with the universe, the macrocosm, to establish a universal harmony.

The six paired channels are:

1) Lungs and Large Intestines
2) Spleen and Stomach
3) Heart and Small Intestines
4) Kidneys and Urinary Bladder
5) Pericardium and Sanjiao
6) Liver and Gall Bladder

Apart from the above channels, the 'Ren' and 'Du' channels (two of the eight extra channels) play an important role in maintaining the balance.

2.3.8 Acupuncture

The word acupuncture is derived from the Latin words Acus (needle) and Punctura (to penetrate). It is the most ancient and characteristic therapeutic technique of Chinese medicine. It entails the introduction of hair-fine needles into various specific points on the body to restore lost balance. The effects observed on needling are both subjective and objective. One of the subjective effects may be slight pain at the site of needling. Another important subjective effect is the appearance of a

peculiar sensation, which is called 'deqi' in Chinese. It is a combination of numbness, heaviness, slight soreness, and distension. Radiation of these sensations may also occur along the channel.

There are six known objective effects of acupuncture:

1) **Analgesic** (pain-relieving): It is used to relieve the pain of arthritis, toothache, headache, Bow backache and other similar painful disorders.

2) **Sedation:** The needling of certain specific acupuncture points has a sleep-inducing effect. This effect is used in the treatment of insomnia, anxiety state, addictions, epilepsy, and mental disorders.

3) Homeostatic (regulatory): This is the most important feature of acupuncture It is an adjustment of the internal environment of the body towards the state of normal balance. It is achieved by balancing the activity of the sympathetic and parasympathetic divisions of the autonomic nervous system and also the endocrine system, by needling specific points.

4) **Immune Enhancing:** The body resistance to disease is strengthened. There is an increase in the white blood cells, antibodies, gamma globulins and other substances. Thus, acupuncture is useful in combating infections.

5) **Psychological Effects:** Acupuncture has a calming and tranquillizing effect.

6) **Motor recovery:** It hastens the motor recovery in patients who have become paralysed from some cause or another.

The acupuncture points are systematically arranged on the basis of the pertaining internal organs over which they have an influence. The series of points having an effect on a particular organ are connected to form a channel. Apart from body acupuncture described above, traditional acupuncture comprises the components of—Ear acupuncture, Moxibustion and Reflexology.

Moxibustion

Moxibustion is the therapeutic method of treating diseases by burning 'moxa-wool' or generating similar forms of heat on or near specific acupuncture points.

Direct Moxibustion

In direct moxibustion a small moxa-cone is placed directly on the skin surface at an acupuncture (moxibustion) point and then ignited. There are two forms of this method.

a) *Scarring Moxibustion:* The moxa is allowed to bum out completely on the skin. This results in the formation of a blister and is not used very much today for obvious reasons, although it is said to be very effective in certain chronic seasonal allergies.

b) Non-scarring Moxibustion: A cone is ignited at the top, placed Ow the point and removed as soon as a sensation of scorching with slight pain is felt. The procedure m y be repeated several times until there is redness and congestion at the site. Usually 3 to 5 cones are applied during a single session, and this is repeated daily or every other day. If performed carefully, this method is quite safe and there is no blistering or scarring.

Indirect Moxibustion

In indirect moxibustion a slice of ginger, a slice of garlic or a thin layer of salt is placed over the point before introducing the moxa. Alternatively, an ignited moxa

stick may be used to warm the point from a distance of about 3 to 5 cm. The lighted end of the stick may also be brought briefly into contact with the diseased area and immediately withdrawn. This movement is repeated at intervals of a few seconds.

Auriculotherapy

Auriculotherapy may be defined as that branch of acupuncture which makes use of the external ear to diagnose as well as to treat illness. The ear is the place where all the channels meet. It has a rich nerve supply derived from several spinal segments. In addition, branches of the vagus, glossopharyngeal, trigeminal and facial nerves supply the ear. It also has a very rich blood supply, with both sympathetic and parasympathetic fibres running close to the blood vessels. As the nerves mentioned above spread out widely connecting all areas of the body, including the internal organs, it is not surprising that any lesion, anywhere in the body, will exhibit changes in the collateral branch, which supplies the ear.

By and large, it is a more effective form of acupuncture therapy than body acupuncture in internal organ disorders. Auriculotherapy may be combined with either body acupuncture or head-needle therapy where indicated.

The external ear has an external or Yang surface and an internal or Yin surface also called the back of the auricle.

There are some 200 acupuncture points on the ear. In the practice of Chinese auriculotherapy, steel filiform needles are used. The needles may be inserted perpendicularly or obliquely. But it should not penetrate the cartilage, as any injury or infection may have serious consequences. As mentioned earlier, the results of auriculotherapy are very good in the treatment of internal organ disorders.

Reflexology

Also called foot and hand acupuncture, this is an ancient self-health technique that has been widely used through the Orient for thousand of years. It is an easy to perform method to restore health and well-being, or to bring yourself symptomatic relief. This technique may be used by any one in normal health up to several times daily.

It works by affecting the flow of the life force throughout the system. A complete healing network of energy carrying channels is said to terminate in the hands and the feet.

Various body organs and structures are located on the hands and feet at various points. The best way for actually finding your own points is to press deeply an area on your hand or foot until you contact a tender and sensitive point. The most tender points are the most effective for bringing relief and promoting healing. When they are no longer tender, discontinue the use.

2.3.9 Reiki

Reiki is the Japanese word for universal life form energy, whereby 'Rei' stands for universal cosmic energy (macrocosm) and 'Ki' denotes the vital life force energy (microcosm), very similar to the 'Prana' of Indian Ayurveda, the 'Chi' of Chinese Acupuncture, the 'Light' to Christianity, and 'Bioplasmic Energy' to Russian Researchers.

Reiki, the Universal Life Force Energy lives in all creations. It is inherent in all living beings, and is the factor that nourishes them to keep alive and healthy.

Reiki is divine grace meant for anyone who is open to receive it. The more the life force energy is free to move in the body, die energy centres known as the '*chakras* are opened to enable them to vibrate and channel higher amounts of universal life force energy. It also facilitates the '*kundalini*', the spiritual transformative energy, to be awakened. Once the kundalini is awakened, the release of emotional and mental blocks is even more accelerated.

Reiki is, thus, not only the ability to self heal and heal others, but it also enables spiritual transformation. It is an art of gaining access to one's own inner healing powers as well as the subtle energy that pervades all inner and outer manifestations of life.

Reiki increases the vitality of the individual, and works to heal on the physical, subtle and causal levels to link with all other forms s f healing on physical, mental, emotional and spiritual planes.

Through the process of initiation, or attunement, of the pupil by the teacher, one can transfer the electromagnetic life force energy to accelerate the process of healing.

Each one of us can learn how to attain consciousness of this power and put it to use for the good of ourselves and our patients. It is a natural method of healing. This can be used done or in complement with any other system of medicine.

Check Your Progress 1

1) Enumerate the reasons for giving higher importance to *Sodhana* than *Samana*.

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2) Enlist the six specific requirements which body vehicle needs.

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3) What is the philosophy of nature or naturopathy?

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4) List the disease in which Siddha Vaidya System is effective;

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5) List four types of treatments employed in Unani Medicine.

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6) Enlist six paired channels which are required for smooth flow of vital energy called 'qi'.

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7) List the six objective effects of acupuncture.

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2.4 ROLE OF ALTERNATE SYSTEMS OF MEDICINE

The practice ofmedicine is as primitive as man himself. Rudiments of primitive medicine still persist around the world in many parts of Asia, Africa, Australia, the Americas and even Europe. The progeny of the primitive man, 'the traditional healers' are found everywhere and are still popular amongst large cross-sections of society. They live close to the people and their treatments are based on various combinations of magic, mystic, empiricism and religion. Besides, every culture has developed its own traditional systems of health and even given their modern scientific growth to them to a large extent. Thus, we have a large reservoir of qualified practitioners of the various recognised systems of medicine registered with their respective councils, viz., Ayurveda, Siddha, Unani, Homeopathy, Naturopathy, Yoga, etc. in our country. One of the great advantages is that generally their cost is much lower, and in a country like ours with vast millions still struggling below the poverty line, they could fill a very important need.

The People's Republic of China has attained a health status comparable with the best developed nations of the world, within its meagre resources by judicious integration of Traditional Chinese Medicine (TCM) with Modern Medicine.

This should provide us a model frame-work to integrate our traditional/alternate systems with a 'spiritual zeal' into the primary health care of our country which would work as a successful 'mantra' for attaining the desired status of Health For All in our country.

The common factor between Indian Ayurveda/Yoga and Chinese TCM/ Acupuncture is that the both restore and 'harmonise the spirit' or the life force termed 'prana' and 'chi', respectively, to achieve the desired state of positive health.

Whereas the role of Yoga as a way of life (*Yama, Niyama, Asana, Pranayama, Pratihara, Dhyana, Dharana, Samadhi*) is essential at the promotive and preventive levels of health, Acupuncture is effectively used for further curative, limitation of disability as well as rehabilitative roles for health. The two systems in harmony shall ideally fulfil the Hippocrates' doctrine, *'primum non-nocere'*: Let there be no harm first as well as work in synergy for his intuitive observations, 'the *natural* healing *force within each of us is the greatest force in getting well'*, as the prime factor in the restoration of health. In fact, only this combination within the existing medical and health infrastructure can fulfil the entire ingredient to Health For All, into a dream reality in a short period of time.

The greatest advantage is that the Indian Ayurveda, Yoga and TCM are extension of each other in their science and philosophy, and being purely natural are easier on logistics while being devoid of any 'iatrogenesis'. Being simple in technology, as proved by the Chinese barefoot doctors, they are most practical and can be delivered at the doorstep of any community, anywhere, at any time. Thus, the judicious application of this synergy at the Primary Health Care level would lead to early management of a wide range of common health problems at a much lower cost, relieving the secondary and tertiary health services of a great burden, even to enable them to perform their services far more satisfactorily.

Thus, would be the ideal *'rasayana'* for the desired status of complete physical, mental, social and spiritual health, and positive well-being of the individual, the family, community, and the nation as a whole.

25 HOLISTIC MEDICINE

The objective of any health care infrastructure would bc to offer to the community the most simple, acceptable, accessible, cost-effective, efficient and versatile system of health. It should be easily available and accessible to any community at any time, at a cost that it can easily afford. It should be effective at all levels of health, viz. primary, secondary as well as tertiary.

The concept of Holistic Medicine comprises a synergic optimum synthesis of Modem Medicine (westcm scientific knowledge) with the so-called Alternate Systems of Medicine (oriental ancient wisdom).

It aims to restore the health and hannony of the human being (Body-Mind-Spirit) as a whole entity encompassing physical, mental, social as well as spiritual well-being.

Holistic Medicine would also aim at promoting health in all its dimensions and at various levels, as far as possible by natural (non-pharmaceutical and surgical) means, in consonance with the Indian psyche and as per health care practices imbibed in religious, social and ritualistic aspects of life.

This can be easily achieved by augmenting and sensitizing our primary' health care infrastructure which is essentially based on modern medicine with the various

traditional systems of health, viz. Ayurveda, Siddha, Unani, Yoga, Naturopathy, Homoeopathy, Acupuncture, etc.

The success of Acupuncture as a natural, harmless and highly efficient modality has been proved by its successful role through the 'barefoot doctors' in the primary health care services of the People's Republic of China (PRC).

The various modalities of Acupuncture like acupressure, reflexology, moxibustion, etc. have gained tremendous popularity in recent decades due to their easy application by paramedical personnel. In fact, Acupuncture as a system has undergone scientific research and modern development worldwide and has been endorsed as an effective cure by World Health Organisation (WHO) in a number of common diseases and surgical analgesia. It has withstood scientific evaluation for its useful role in primary, secondary and tertiary levels of health.

Acupuncture can easily integrate with all the systems of health and various specialities of medicine. It bridges the gap between modem medicine and traditional systems of health to develop the perfect integration for the most desirable health care infrastructure for any community or nation.

2.6 NEED FOR APPLICATION IN INDIAN SCENARIO

The modem system of medicine essentially forms the basis of health care infrastructure in India, with a majority of health budget being allocated to it. But the holistic approach to medicine forms an integral part of the Indian psyche. An illness is viewed as the consequence of a disharmony with the cosmic order. It is not limited in space and time. An individual is considered as a non-divisible unity, an integrated whole which cannot be reduced in terms of its parts, nor can the individual be separated from the social, cultural and spiritual environments nor the cosmic link. The universe is a perfectly organised whole where nothing happens without reason or fortuitously and everything is moving towards a definite goal.

Thus, it is not a purposeless combination and separation of certain chemicals occurring by chance which causes the disease. Malfunctions are understood and treated in the context of an individual's social, cultural and spiritual environments. The purpose of treatment of body, mind and soul are considered integral. Various health care practices are imbibed in religious, social, cultural and ritualistic aspects of the living tradition of India. For health and longevity, a state of equilibrium and harmony must be maintained with our immediate environment as well as with the functioning of the cosmos.

The human being lives as a 'host' in a symbiotic relationship with other organisms or 'agents' and the 'environment'. It is believed that generally one becomes prey to external attacks and causation of disease when inner harmony and balance is lost due to neglecting health leading to weakening of host defences. An illness is also not considered limited in space and rime and it never occurs by chance. It is due to an accumulated effect of disharmony and imbalance within an individual over a period of time; and this time period may be beyond the limited span of one life.

Ayurveda therapy is divided into three parts:

a) Rational;

b) Psychological; and

c) Spiritual.

Rational therapy consists of a rational administration of diet and drugs. It also includes instructions on nutrition, external hygiene, internal purification, various drugs to re-establish inner equilibrium and to get rid of external attacks, if any.

Psychological therapy is done by the use of the power of the mind to enhance the process of healing. A patient is directed to help oneself in this process. The important factor in this therapy is to make the patient 'know' and feel the ailment, to develop a relationship with it and then use the will power to prevent the causing factors and participate in the healing process.

Spiritual therapy consists of the recitation of ***mantras***, religious percepts invoking blessings, rendering oneself to god, offerings, auspicious acts, atonement, fasting, wearing gems and stones, pilgrimage and other similar acts. Through prayers, pilgrimage, the worship of various gods (which represent different forms of energy and five fundamental elements), the human consciousness recognises the cosmic power beyond the material in order to establish a connection with the limitless, timeless and endless energy.

These three types of therapies are applied simultaneously. In Ayurveda, the physiological and psychological are interlinked and interdependent and are thus treated simultaneously, unlike modern medicine where body and mind are considered separate and so are the ailments divided according to their origin.

Spiritual therapy does not exist in modern medicine; it is regarded as mere superstition. It is quite understandable as in modern medicine, the ailments are comprehended at biological and molecular level, and are treated by physical and chemical intervention. Therefore, reality beyond the material reality of the human physical form is not taken into consideration.

To achieve holistic health, the main task of health care should be to revive and develop the familial, social, religious, ritualistic and ethical aspects of life. We should create awareness for the people to use their home methods of health care and the fact that their health is their own responsibility and not always that of the doctor. We should revive this knowledge through school curriculum and the mass media. The undergraduate curriculum in Medical, Ayurvedic, Unani, Homoeopathic, Yoga and Naturopathy institutions should lay stress on the 'holistic' concepts of health.

Students from each system of medicine should be initiated into the basis of the other systems, with facility for postgraduate studies in the other systems so as to integrate their knowledge and promote the practice of health care offering the best from each system of health, promoting increasing use of drug-free and natural modalities of health, thereby minimising iatrogenesis, cutting down on the cost and need for sophisticated technology, making health care simple, effective, economical and acceptable and accessible to all the people.

In China, non-drug natural therapy plays a significant role in primary health care. Much of the treatment used in primary care is based on traditional medicinal plants and, when needed, modern drugs are also made available. Non-drug therapy, however, place a very important role and includes Acupuncture and its various modalities like Moxibustion, Acupressure, Reflexotherapy, Massage, Heat, Cupping, Magnetotherapy, Hydrotherapy, Remedial Exercises and Controlled Breathing. The use of ancient techniques of traditional Chinese medicine are used on a very large scale in modern China in everyday health care. They are not restricted to hospitals or health centres but form part of the general way of life of the people, as in the case of Qigong and Taiji, which have beneficial effects on health. Though not of medical origin, they are very much a part of regular medical practice.

It is a pity that our health care delivery system has not made use of this tremendously successful example at national level in our neighbourhood.

To achieve "Health for All" in our country, non-drug components of Ayurveda, Yoga and Naturopathy along with various modalities of Acupuncture must be introduced at the primary health care. Acupuncture has attracted very wide interest and is being practiced worldwide. Acupuncture can be infinitely complicated and requires great skill and experience to be used at its best, but has also been adapted arid simplified to the point where it can be used to good effect by health personnel with relatively elemental training in a limited way.

Simultaneous availability of medicinal herbs, and that of modem drugs for appropriate use will optimise the primary health services. It will enable an enhanced level of primary health and ensure timely cure of most of illnesses, thereby restricting morbidity and mortality significantly, while relieving the tremendous burden on the secondary and tertiary health care services, thus enhancing their performance too.

Check Your Progress 2

1) What is the advantage of Indian Ayurveda, Yoga and Traditional Chinese Medicine?

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2) What is the aim of Holistic Medicine?

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3) How the availability of medicinal herbs and modern drugs will optimize the primary health services?

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2.7 TRAINING AND SUPPORT

You are aware that India has a very wide base of trained medical personnel in the various systems of health registered with their respective councils i.e. Modem Medicine, Ayurveda, Unani, Homoeopathy, Yoga and Naturopathy. Following recognition by Government of West Bengal, the system of Acupuncture must be recognised by the Government of India.

In order to achieve "Health for All", a vigorous nationwide time-bound programme should be launched to create public awareness at all levels on the need and benefits of the health of body-mind-soul, with stress on primary health, promotion of public health measures and development of natural drug-free methods of treatment.

2.7.1 Education System

At school level and pre-university level, health education including civic, ethical, moral and spiritual aspects should be given due importance in the form of a compulsory subject.

2.7.2 Medical and Paramedical Education

All paramedical personnel and undergraduate students of the various systems of medicine should be introduced to the 'Science' of all the other systems, so as to enable them to develop a comprehensive outlook, especially by the natural modalities of health and healing.

2.7.3 Post-graduate Specialisation

The graduates of various systems of medicine should be encouraged to undertake post-graduate training in other systems of medicine as well, especially in non-drug or natural methods of treatment, e.g., Yoga, Naturopathy and Acupuncture should be encouraged as they can integrate with any other system of medicine to enhance the efficacy, acceptability and professional satisfaction of the practitioner.

The respective councils should offer post-graduate certificate/diploma/degree courses to such students. A doctor with basic qualification in any system of medicine with post-graduate qualifications in other systems of medicine with comprehension of health as a state of positive physical, mental, social and spiritual well-being should be termed a specialist in Holistic Medicine. Employers should give adequate incentives to such doctors and promote the concept of managing various diseases by drug-free, natural and conservative techniques. Medicinal and surgical modalities must be made available for use with total discretion. Similar incentives should also be applicable to other categories of medical and health care personnel.

2.7.4 Primary Health Care

A PHC managed by staff trained in Holistic Medicine would be far more versatile and efficacious in delivering its objectives. It would be able to achieve the objectives of promotion of health, prevention of disease, timely cure, limitation of disability and even offer adequate rehabilitation within tho limited resources of equipment and drugs. This would enable more cost-effective and reduced per capita expenditure on patient care, while bringing in a far greater sense of professional satisfaction and achievement amongst the staff.

2.7.5 Secondary and Tertiary Health Care

Secondary and tertiary health care in our country is almost entirely managed by the modern medical system. It would far more efficacious if the management of various acute and chronic diseases was done by physicians and surgeons with holistic temperament and training.

It would become possible to even permanently cure a majority of patients suffering from conventionally incurable diseases that need life-long medication with progressive deterioration and unavoidable complications.

It shall, thus, lead to reduce morbidity, restore a large percentage of such population to normal health and productivity, while relieving the nation of their medical burden.

2.7.6 Logistics of Training

The well developed training infrastructure of various systems should be used to train doctors already qualified in other systems of medicine, broadening their understanding and skills, while simultaneously understanding their scope and developing respect for the other systems. The knowledge and skills thus gained would "synergise" their professional acumen for improved patient care and eventually better health of the nation. This would also lead to higher professional satisfaction and self-esteem.

2.7.7 Economics of Holistic Medicine

The expenditure incurred on training of health care personnel would be a permanent national asset. By the increased use of natural modalities in health management, the reduced cost of health care would simultaneously lead to significantly reduced morbidity and mortality, it would lead to better national health, productivity and thereby national pride.

Cheek Your Progress 3

1) List the levels where training is recognised for holistic medicines.

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2) What is the advantage of training in various categories of personnels in holistic medicines?

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2.8 LET US SUM UP

In this unit you have learnt that the leading cause of failure of "Health for All by 2000 AD" has been due to almost total reliance of the health care services on the modem system of medicine. While it was appreciated right in the beginning of the Alma-Ata Declaration that it would be essential to indigenise the health care services with due support from traditional systems of medicine to achieve the laudable objective, primary health care services remained largely confined to the modem system of medicine.

You also learnt that the recommendation of WHO to include 'spiritual' well-being as the fourth dimension to the definition of health as a state of positive physical, mental and social well-being, and not nearly absence of disease has to be incorporated in spirit into our scientific understanding of practice of medicine to achieve desired health objectives and control morbidity and mortality in the world.

Further you learnt about the lesson from the successful Chinese example which has its trusts in traditional Chinese medicine. Similarly, the abundant reliance of Indian population in its traditional, cultural, religious and spiritual practices need to be incorporated into our health care delivery system. The synergy between scientific knowledge of modern medicine with traditional wisdom of ancient systems of

health, with more reliability on the drug-free natural modalities of Ayurveda, Yoga and Acupuncture in health and healing offer an optimum solution to achieve human longevity and health.

Towards the end you learnt that the concept of Holistic Medicine aimed at achieving health of the individual 'Body-Mind-Soul', as far as possible by natural means, deserves increasing priority of health care strategies in future to achieve effective, efficacious, acceptable, affordable and accessible objectives. To achieve this objective it shall be essential to train and develop personnel dedicated to Holistic Medicine for health care services in the country.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check **Your Progress 1**

1) Sodhana is given higher importance for the following reasons:
   - It prevents the development of morbidity.
   - It impedes the further development of the disease.
   - It cures the manifest disease.
   - It prevents the reoccurrence of the disease.

2)
   - **Proper Exercise:** Acts as a lubricating routine to the joints, muscles, ligaments, tendons, and other parts of the body by increasing circulation and flexibility.
   - **Proper Breathing:** Aids the body in connecting to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific Yoga breathing techniques (Pranayama), this energy is released for physical and mental rejuvenation.
   - **Proper Relaxation:** Cools down the system. When the body and mind are continually overworked, their efficiency diminishes. Relaxation is Nature's way of recharging the body.
   - **Proper Diet:** Provides the correct fuel for the body. Optimum utilization of food, air, water, and sunlight is essential.
   - Positive Thinking and **Meditation:** Puts you in control. The intellect is purified. The lower nature is brought under conscious control through steadiness and concentration of the mind.
   - Cleansing techniques or 'Shuddhi Kriyas': Clean the various internal organs of the body by using various techniques such as Neti, Dhouli, Basti, Tratak, Nauli and Kapalbhati.

3) According to the philosophy of nature cure or naturopathy, the origin of all diseases is an accumulation of toxins in the body. And the disease is that state in which the body tries to expel those toxins, which it could not expel in its normal condition and through its normal processes.

4)
   - Chronic diseases
   - Degenerative conditions
   - Autoimmune diseases such as rheumatoid arthritis
   - Disorders of the central nervous system such as hemiplegia
   - Viral infections such as hepatitis and herpes

- Prevention of heart diseases, etc.

5) a) *Ilaj hit-tadbeer* (regimental therapy): This therapy includes venesection, cupping, diaphoresis, diuresis, turkish baths, massages, cauterization, purging, emesis, exercise, leaching ctc.

b) *Ilaj bil-ghiza* (dietotherapy): Dietotherapy aims at treating certain ailments by administration of specific diets or by regulating the quantity and quality of food.

c) *Ilaj bid-dawn* (pharmacotherapy): It deals with the use of naturally occurring drugs, mostly herbal, though drugs of animal and mineral origin are also used. Single drugs or their combinations in a raw form are preferred over compound formulations. The materia medica of Unani medicine is vast and most of the drugs are easily available. They are free from side effects. Drugs that are toxic in the crude form are processed and purified many times before use.

d) *Jarahat (surgery)*: When *all* other therapeutic measures fail, surgery is resorted to.

6) The six paired channels arc:

a) Lungs and Large Intestines

b) Spleen and Stomach

c) Heart and Small Intestines

d) Kidneys and Urinary Bladder

e) Pericardium and Sanjiao

f) Liver and Gall Bladder

7) a) Analgesic (pain-relieving): It is used to relieve the pain of arthritis, toothache, headache, low backache and other similar painful disorders.

b) Sedation: The needling of certain specific acupuncture points has a sleep-inducing effect. This effect is used in the treatment of insomnia, anxiety state, addictions, epilepsy, and mental disorders.

c) Homeostatic (regulatory): This is the most important feature of acupuncture. It is an adjustment of the internal environment of the body towards the state of normal balance. It is achieved by balancing the activity of the sympathetic and parasympathetic divisions of the autonomic nervous system and also the endocrine system, by needling specific points.

d) **Immune Enhancing:** The body resistance to disease is strengthened. There is an increase in the white blood cells, antibodies, gamma globulins and other substances. Thus, acupuncture is useful in combating infections.

e) Psychological Effects: Acupuncture has a calming and tranquillizing effect.

f) Motor recovery: It hastens the motor recovery in patients who have become paralysed from some cause or another.

Check Your Progress 2

1)
- Extension of each other in their science and philosophy.
- Purely natural and easier on logistics.
- Devoid of any iatrogenesis.

2) It aims to restore the health and harmony of the human being (Body-Mind-Spirit) as a whole entity encompassing physical, mental, social as well as spiritual well-being.

   Holistic Medicine would also aim at promoting health in all its dimensions and at various levels, as far as possible by natural (non-pharmaceutical and surgical) means, in consonance with the Indian psyche and as per health care practices imbibed in religious, social and ritualistic aspects of life.

3) It will enable an enhanced level of primary health and ensure timely cure of most of illnesses, thereby restricting morbid and mortality significantly, while relieving the tremendous burden on the secondary and tertiary health care services, thus enhancing their performance too.

Check You Progress 3

1) a) Education system
   b) Medical and paramedical education
   c) Post-graduate specialisation
   d) Primary health care
   e) Secondary and tertiary health care

2) The knowledge and skills gained would "synergise" their professional acumen for improved patient care and eventually better health of the nation. This would also lead to higher professional satisfaction and self-esteem.

2.10 FURTHER READINGS

Frawley, David (1997), *Ayurvedic* Healing: A Comprehensive Guide, Motilal Banarsidass Publishers Pvt. Ltd., Delhi, India.

Jayasuriya, Anton (1995), The *Scientific* Basis *of Acupuncture*, Medicina Alternativa International, Colombo, Sri Lanka.

Lessell, Colin B. (1983), Homoeopathy for Physicians, Thorsons Publishers Limited, Northamptonshir, UK, GB.

Park, K. (1995), Park's Text Book of Preventive and Social Medicine, M/s Banarasi Dass Bhanot Publishers, Jabalpur, India.

Ros, Frank (1995), *The* Lost Secrets *of Ayurvedic Acupuncture*, Motilal Banarsidass Publishers Pvt. Ltd., Delhi, India.

Sharamon, Shalila, *Reiki* Universal Life Energy, Liferhythm, CA 95460, USA.

Swami, Rama (1980), A Practical Guide to Holistic Health, The Himayalan International Institute of Yoga Science and Philosophy, Pennsylvania 18431, USA.

UNIT 3 HEALTH AND POPULATION POLICY AND STRATEGIES

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the need for health policy;
- list of elements of National Health Policy;
- list the National Goals for Health for All by 2000 AD;
- outline the features of population policy statements; and
- identify future strategies for population control.

3.1 INTRODUCTION

This unit describes the needs for National Health Policy (NHP). It gives in detail the various elements of NHP. In the end various health goals to be achieved for attaining Health for All by 2000 AD are given along with level prevailing at the time of policy formulation.

This unit also deals with National Population Policy. It describes the population problem, existing population policies and the one recommended for future by an expert committee.

3.2 NATIONAL HEALTH POLICY

You will agree to that the policies provide framework for accomplishment of the objectives to be achieved. You must also be aware of that each country evolves its policies in light of the problems to be tackled. In the absence of a well-designed policy, tackling the problems become difficult and may result in the wastage of men, material and money. The policy prescribes the aims, objectives and the targets that would be used to achieve the objectives operationally. It specifies the expected

that would be used to achieve the objectives operationally. It specifies the expected results, the measures for achieving them and mechanisms or methods to be adopted. Succinctly, it refers to that aspect of administration, which is considered to define the objectives and determining the choice of action.

Health has been a major problem in India during the British regime, who did not pay any serious attention to improve the health standards of the people. Realising the gravity of the situation, the framers of the Constitution have made a specific mention that the state shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health are among its primary duties. But unfortunately, till 1983 National Health Policy was not formulated and health programmes and schemes were implemented as a part of the National Five Year Plans.

The fragmented approach in the sphere of health by the Government of India exposed many shortcomings and the problems like increasing rate of population growth, high mortality rate of women and children, low nutritional standards, widespread communicable diseases, poor sanitation and non-availability of potable water to the majority of population. This prompted the government to formulate a comprehensive national health policy that could serve the actual health needs and priorities of the country. It was in this context the National Health Policy was evolved by the Government of India in the year 1983.

3.2.1 Elements of National Health Policy

In this sub-section you will learn about the important elements of National Health Policy. However the detailed policy document is given at Annexure-1. The preamble of National Health Policy document describes the progress achieved and existing health picture at the time of formulation of policy. It makes mention of considerable achievements made in reducing mortality and increasing life expectancy. However, the demographic and health scenario still has many foci for serious concern and fertility decline is not commensurate with mortality and annual growth rate is alarmingly high. Further mention has been made about high maternal mortality, high infant mortality (12911000 live births) and high child mortality (113 of total deaths below 5 years of age) besides the presence of chronic infectious diseases like Tuberculosis and Leprosy. The document further describes the dismal picture of water and sanitation facilities. It states that only 31% of rural population has access to safe water and just 0.5% of population has basic sanitation. Diarrhoea, Pneumonia and Measles keep on threatening tender lives. It has been realised that we need to identify and prioritise problems and amicably solve them in a time bound programme. Following are the elements of National Health Policy:

1) Problems Requiring Urgent Attention

The policy document has identified the following problems, which require urgent attention for improvement of overall health of people:

a) Nutrition: Policy document in reference to nutrition recommended the following:

   i) Formulation of a National Nutrition Policy with regional strategies.

   ii) Improving nutritional status of people particularly in rural areas and urban slums through well-developed public distribution system.

   iii) Increasing purchasing power of people by ensuring employment generation schemes.

   iv) Promoting low cost locally available nutritious foods.

   v) Improving nutritional practices through nutrition education.

vi) Promoting and supporting breast-feeding.

vii) Developing special schemes for supplementary nutrition of vulnerable sections like pregnant women, children and weaker sections in rural areas and urban slums.

viii) Attending to chronic nutritional problems like anaemia, iodine deficiency disorders and malnutrition through supplementation, fortification and enrichment.

b) **Preventing food adulteration and maintenance of drug quality:** The health policy stresses to enforce stringent action against:

i) Food adulteration and contamination at the level of production, processing, storage, transport and distribution.

ii) Manufacture, sale and distribution of spurious of substandard drugs, through enforcement and review of existing laws.

c) **Water** supply **and sanitation:** The policy recommends integration of safe water supply and sanitation with intensive health education for improvement in personal hygiene efforts towards economic use of water and sanitary disposal of wastes and excreta.

d) **Environmental protection:** For preventing ecological disturbances leading to fresh health hazards, following have been recommended in the policy document:

i) All economic development plans should be made in consultation with health professionals.

ii) Review of existing industrial and urban development plans to avoid congestion and unchecked release of harmful effluents and gases.

iii) Strict legislative regulations before clearing projects in future.

e) **Immunization:** The NHP suggested to launch a nation-wide programme aimed at cent per cent coverage of target groups i.e. children and pregnant women with vaccine against preventable communicable diseases.

f) **Mother and child health services: As** stated earlier, relationship of a high birth rate with high IMR has been recognised. The NHP accords highest priority to mother and child **health (MCH)** services focusing on under-served sections of the society. These services should be available as an integrated package at primary health centres on essential basis nearest to the doorsteps of beneficiaries. At present Traditional Birth Attendants may be provided orientation and refresher courses. However, for long-term benefits action should be taken to ensure that progressively all deliveries are conducted by competently trained persons.

g) **School Health Programme:** Policy lays emphasis on the health of school going children and recommends that organised school health services integrally linked with general health services to be established within a time frame.

h) **Occupational Health Services: With regard to** occupational health services, NHP document mentions that occupational hazards not only in industries but also in unorganised sectors like agriculture exist which needs to be minimised and attended timely of avert fatalities, restrict disabilities and reduce loss of man days. For this to extend the coverage of Employee State Insurance Act (ESI) of 1948 has been suggested. The centre and states

both must introduce organised occupational health services to promote health and welfare besides increasing productivity.

2) Population Stabilising

Small family norm has been recognised as a key factor in improving the health status. In view of this formulation a separate national population policy has been recommended.

3) **Provision** of **Primary Health Care**

It has been observed despite the rural character of country and shortage of resources, there is disproportionate distribution of resources on urban-based curative services. To ensure universal access, provision of primary health services has been recommended. These should be linked to a strong referral network. This will ensure optimal utilisation of expertise at higher levels.

To ensure integrated delivery of package of services establishment of nation-wide chain of sanitary-cum-epidemiological station has been recommended. These should be located between primary and secondary levels. These stations would participate in the integrated action plans to eradicate and control diseases, besides tackling local environmental health problems.

4) Medical and Wealth Education

Taking cognisance of the fact that effective service delivery would largely depend on education training and skills besides orientation of all cadres of health workers towards community health and also that the western models can't work, it is necessary to provide need based training. It, therefore, needs major changes in cumculum and training programmes to develop health workers with enough skills to deliver services within present constraints. Therefore, formulation of a National Medical and Health Education Policy has been recommended.

For reorientation of existing medical and health personnel the policy suggests a positive approach based on innovation and dynamism to ensure 'Health Team' approach in work.

5) Role of Practitioners of Indigenous **and** other Systems **of Medicine**

NHP acknowledges the relevant scientific contribution of ISM and mention that a large number of practitioners of ISM do exist without due official cognisance and census. The trust and confidence besides their local acceptance can be utilised to influence health related beliefs and practices of people. The NHP, in order to tap this potential, propounds the following:

i) Organised efforts to develop and support: these systems according to their stature and genius.

ii) Integration of the functioning of practitioners of ISM with existing system, maintaining their identity, to deliver 'preventive and promotive health services.

iii) Meaningful phased integration of ISM with modem system.

6) Health Education

NHP recognises the need for minimal level of awareness about health and health related issues among general population and calls for nation-wide health education programmes, backed by appropriate communication strategies to develop healthful behaviours.

7) Management Information System

You know that information complimented by experiences helps in planning. For this a good efficient manageable and easily retrievable Health Information System (HIS) not only timely warns but also helps in monitoring and evaluation. For this information should flow both ways, form top-to-bottom and bottom-to-top, on a regular basis. The policy document recommends the need for development of an effective Management Information System.

8) Medical Industry

Policy document states that the sound technical competence and manufacturing capability build over years, in the field of drugs, vaccines and biomedical equipment, needs to be exploited to its maximum particularly in relation to national programmes like malaria, tuberculosis, leprosy, blindness and immunisation. The production of essential drugs under generic names and economical packaging would reduce the unit cost. Also promoting the indigenous capacity to manufacture essential diagnostic equipment is to be built.

9) Health Insurance and Legislation

In order to mobilise social and community resources policy document emphasis the need of a well-conceived health insurance scheme that can ensure people sharing the cost. The health policy stresses the need to review existing health legislation particularly in relation to their enforceability.

10) Medical Research

In the policy document, high priority has been accorded to applied, operational research, including action search for continuously improving the cost effectiveness of delivery of health services. Identified with high priority areas in basic research are contraceptives, more effective therapeutics and preventive measures for communicable and other common diseases.

3.2.2 National Health *Policy-Indicators* and *Goals*

You have already learnt that India is committed to attain the goals of HFA by 2000 AD through Primary Health Care approach. In order to achieve this goal, the policy document has identified certain indicators and laid certain time bound targets with respect to these indicators.

Goals for Health and Family Welfare Programmes

Sl. No.	Indicator	Current Level	Goals		
			1985	1990	2000
1	2	3	4	5	6
1.	Infant mortality	Rural 136 (1978)	122		
		Urban 70 (1978)	60		
		Total 125 (1978)	106	87	Below 60
	Perinatal mortality	67 (1976)			30-35
2.	Crude death rate	Around 14	12	10.4	9.0
3.	Pre-school child (1-5 yrs.) mortality	24 (1976-77)	20-24	15-20	10
4.	Maternal mortality rate	4-5 (1976)	3-4	2-3	Below 2
5.	Life expectancy at birth (yrs.)	Male 52.6	55.1	57.6	64
	below 2500 gms. (percentage)	30	25	18	10
6.	Crude birth rate	Around 35	31	27.0	21 0

1	2	3	4	5	6
7.	Effective couple protection (percentage)	23.6 (March 82)	37.0	42.0	60.0
8.	Net Reproduction Rate (NPR)	1.48 (1981)	1.34	1.17	100
9.	Growth rate (annual)	2.24 (1971-81)	37.0	42.0	60.0
10.	Family size	4.4 (1975)	3.8		2 3
11.	Pregnant mothers receiving antenatal care (%)	40-50	50-60	60-75	100
12.	Deliveries by trained birth attendants (%)	30-35	50	80	100
13.	Immunisation status (% coverage)				
	TT (for pregnant women)				
	TT (for school children)				
	10 years		40	100	100
	16 years	20	60	100	100
	DPT (children below 3 years)	25	70	85	85
	Polio (infants)	5	50	70	85
	BCG (infants)	65	70	80	85
	DT (new school entrants)	20	80	85	85
	Typhoid (new school entrants 5-6 yrs.)	2	70	85	85
15.	Leprosy—permitage of disease arrested cases out of those detected	20	40	60	80
16.	T.B.—percentage of disease arrested cases out of those detected	50	60	75	90
17.	Blindness—incidence of (%)	1.4	1	0.7	0.3

Check Your Progress 1

1) **List problems requiring urgent attention as stated in National Health Policy.**

.....

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2) **Enlist the three areas in which formulation of separate policies has been recommended in the NHP.**

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3) National Health Policy goals for the following are:

Indicators	Goals by 2000 AD
a) Infant mortality rate	.....
b) Crude death rate	.....
c) Maternal mortality rate	.....
d) Crude birth rate	.....
e) Net reproduction rate	.....
f) Couple protection rate	.....
g) Deliveries by trained birth attendant	.....
h) Prevalence of blindness	.....

3.3 POPULATION POLICY

A disproportionate decline in mortality as compared to fertility is often put forth as the logic towards high growth rate. Even in mortality it is the crude death rate which has declined substantially (from 47.2/1000 in 1911-21 to 10.3 in 1991) while decline in child mortality has been relatively slow (IMR 222 in 1901-11 to 78 in 1991). Historically the sex ratio has always been adverse to females for many reasons such as illiteracy, early marriage, teen-age pregnancies, violence against women etc. The declining sex ratio—972 in 1901,930 in 1971,933 in 1981 and 929 in 1991, particularly during last two decades is matter of concern. The uneven progress of states is also a shot in the arm. The four states (UP, MP, Rajasthan and Bihar) contributed 42% of the net increase in population during 1981-91. Despite a clear recognition of problem and in spite of enjoying "first" population control programme, the population growth remains a formidable challenge. Drafts and documents on population policy have generated discussions only, waiting to get translated into a formal population policy to be approved by the parliament. With this background *you* will learn about the population policy—genesis, issues, approaches and future perspectives.

You must be aware that the national family planning programme was launched in 1951 starting with a clinical approach emphasis being on conventional contraceptives. The family planning research and programme committee observed in May 1953 that tubectomy was the most favoured method. The expectation was that growth rate would continue at 1.25% annually during First and Second Five Year Plans. In different Five Year Plans the goals of reduction of birth rates were set. Under Fifth Plan (1974-79) family planning was integrated with MCH services and birth rate was targeted to be reduced to 30 (1978-79) and 25 (1983-84). Subsequently in *NHP* (1983), the demographic goals were delineated.

3.3.1 Population Policy Statements—1976 and 1979

The philosophy underlying a population policy was conscious education for all to accept the small family norms on a voluntary basis goals of population policy were to stabilise the population and disrupt the quality of life.

April 16, 1976 and the issue of a national policy on population crossed a milestone when the first draft statement was placed in the parliament by Dr. Karan Singh.

Some of the salient features of which were:

a) Implementation of minimum needs programme.

b) Education and economic development are crucial but waiting for them is not a practical solution as time factor is too pressing and population growth so formidable.

c) The family planning programme has not made desired progress,

d) Raising the age of marriage will have demonstrable demographic impact.

e) Adoption of small family norm is vital.

f) Voluntary organisation *can* contribute effectively.

g) Research in reproductive health and contraceptive technology can strengthen 'cafeteria' approach.

h) Multi-media motivational strategy can work. On these premises the draft suggested certain approaches which were approved in the parliament and are given here:

i) Freezing the representation of states in the parliament until year 2001 on the basis of 1971 census population.

ii) 1971 population to be the basis of central assistance, devolution for taxes and grants-in-aid to states till 2001.

iii) 8% of central assistance to be linked to the state's performance in family planning.

iv) Monetary compensation to couples adopting terminal methods shall be linked to number of living children.

v) Compulsory sterilisation after 3 children in case the State feels it has enough legislative powers and enforcement structure.

vi) Raising the age of marriage--18 years for girls and 21 years for boys.

vii) Research on reproductive biology and contraception.

viii) Introduction of group incentives in a bold and innovative manner to make family planning a people's movement.

ix) Promotion of multi-media, rural-oriented communication strategy.

x) Including population education in the education system.

xi) Increasing level of female education particularly above middle level through formal and non-formal education.

xii) Involvement and support of voluntary organisations.

The statement of policy with regard to population was announced by the Janata Govt. in June 1979 and changed the nature of programme from family planning to welfare. The new policy statement was almost similar on major issues to that of the earlier one which was issued in 1976. Some of the major issues included:

a) Raising the minimum age of marriage.

b) Linkage of central assistance to states with performance in family welfare work.

c) Raising the level of female literacy.

d) Target of bringing down birth rate to 25 by the end of Seventh Plan.

e) Involvement of all ministries in the programme.

f) Continuing of monitory compensation for sterilisation operation. It was categorically stated that there would be no room for coercion or pressure of any sort. The government was not in favour of any disincentives.

The working group, appointed by Planning Commission, on population policy in 1978 proposed a long-term objective of attaining Net Reproduction Rate (NRR) of

unity by 1996 on an average and by 2001 for all states (a clear shift in priority from decreasing CBR to NRR). National Development Council approved it and incorporated the expected correlates of goal in terms of CDR, CBR, IMR and CPR.

With national health policy, approved in 1983 following demographic goals were enunciated to be achieved by the year 2000 AD.

NRR	1
Birth rate	2111,000 population
IMR	Below 6011,000 live births
CPR	60%

Life expectancy of 64 years (for both the sexes): According to progress made so far and existing rates, indications are that we may not be able to achieve the goal (NRR-1) till 2006-11, as stated in the 7th document. The Seventh Plan, therefore, set the targets to be achieved by 1990 as CPR 40%, CBR 23.1, CDR – 10.4 and 90.

3.3.2 Revised Strategy for Family Welfare

Based on the operational research studies the Government revised the strategy of family welfare in 1986. The ministry decided to adopt the following approaches and strategies beyond and within the family planning measures.

a) Beyond Family Planning Measures
   i) Increasing the mean age of marriage
   ii) Raising the status of women
   iii) Raising the literacy rates among females
   iv) Enhancing child survival and development
   v) Alleviating the poverty of the people
   vi) Ensuring old age security

b) Within Family Planning Measures
   i) Energising the existing infrastructure
   ii) Augmentation of the infrastructure
   iii) Upgrading the technical services and follow-up care
   iv) Integrated family planning in the health cart: system
   v) Generating demand for family planning services
   vi) Involving voluntary organisations to make it a people's programme
   vii) Providing family planning services as near to people as possible
   viii) Making available the contraceptives freely and widely in both urban and rural areas

3.3.3 Population Policy—Future Perspectives and Prospects

Following the approaches of present policy statements limited success has been achieved. Recognition of the fact that small family norm adoption and reaching NRR of unity is vital for population stabilisation. Government of India initiated the appointment of a committee on population by National Development Council (NDC) in 1991, which recommended that a national population policy be formulated and approved by the parliament at the earliest.

The NDC on July 13, 1993 ascribed this task to an expert group under the chairmanship of Dr. M.S. Swaminathan. The group submitted the policy draft on May 23,1994 to Ministry of Health and Family Welfare. The draft deliberated over the issue under two heads—policy framework and implementation measures. The observations and recommendation of the group are summarised below:

a) Declining sex ratio is a warning signal—gender equity and women empowerment integrated with health and family welfare can help reverse this ratio.

b) There is an in-built momentum for growth in present age structure and current levels of fertility. The empowerment and enabling environment can help reach the goal of TFR of2.B by 2010.

c) Speedy and effective implementation of Minimum Needs Programme (MNP).

d) Formation of a population and social development committee (PSDS) at district and state level which would ensure:

- Preparation of a socio-demographic charter
- Convergence of ongoing programmes
- Availability of acceptable contraceptive methods
- Priority based, area-specific approaches.

e) At the national level proposed changes are:

- merger of MCH and FW with health
- no targets and no incentives
- elimination of all kinds of discrimination against women
- involvement of voluntary organisations in policy, planning and implementation and extending authority and autonomy to be innovative within norms and resources
- monitoring and evaluation by Population and Social Development Commission (PSDC) at national level
- reproductive research with ethical considerations

IEC to have supportive role facilitating informed decisions

- decentralised locally relevant use of multi-media communication strategies.

f) The suggested national socio-demographic goals for the year 2010 will be as follows:

i) Reduction in number of marriages below 18 years in girls to zero.

ii) Reducing MMR to less than 1001100000 live births.

iii) Universal child immunization and prediction in incidence of diarrhoeal and ARI diseases.

iv) Reduction in IMR to 3011000 live births also in child mortality and incidence of low birth weight.

v) Universal access to information on contraceptives.

vi) Containment of AIDS and other STDs.

vii) Full coverage of registration of births, deaths and marriages.

viii) Laying guidelines for foreign aided population programmes.

ix) Strengthening research.

x) Preparing report on population and social development.

Recently National Population Policy has been approved by the parliament and National Commission on Population has been constituted under the chairmanship of Prime Minister. The commission will oversee and review the implementation of policy. National Population Policy-2000 document is given in Annexure-2 for your reference.

Check Your Progress 2

1) **Fill in blanks:**

   a) Family planning programme was launched in the year .....

   b) The family planning was integrated with MCH services in .....Five Year plan.

   c) The sex ratio in 1991 was .....

2) Enlist important causes of adverse sex ratio.

   .....

   .....

   .....

3) List the important features for population policy of 1979.

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4) What is the long-term objective of Population Policy?

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5) Enlist the beyond family planning measures under revised strategy of family welfare.

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3.4 LET US SUM UP

In this unit you have learnt that the fragmented approach in health, despite planning process initiated in 1951, helped to achieve a considerable reduction in mortality. The global goal of HFA-2000 through primary health care along with the strong political commitment led to formulation of NHP in 1983 considering the issues like reorientation of medical education and restructuring of health services. Due priority was given to MCH, nutrition, immunisation, water and sanitation and health education. Accordingly output indicators were identified and goals set to be achieved in a phased manner.

You also learnt that growing population and declining sex ratio alarmed the policy makers. Ours was the first country to address population problem through a national programme way back in 1951 and consequently realised that the adoption of small family norms was vital to development, but had limited success. The need to have a population policy came up. Draft documents on population policy in 1976 placed before parliament focussed on regulating fertility through increasing age of marriage, female literacy, reduction in IMR, contraceptive method mix availability. The 1979 policy stressed on informed decisions on voluntary basis. The uneven progress among states led to freezing of states representation in parliament and central assistance to states on the basis of 1971 census population till the year 2001. Role of voluntary organisations, NGOs, professional bodies and organised sector was realised to make it a people's movement.

Towards the end of the unit you have learnt the future perspectives and prospects of population policy including formulation of National Population Policy-2000 and constitution of National Commission on Population under the chairmanship of Prime Minister.

3.5 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1)
- Nutrition
- Prevention of food adulteration and maintenance of drug quality
- Water supply and sanitation
- Environmental health protection
- Immunisation coverage
- Mother and child health
- School health
- Occupational health

2)
- Nutrition
- Population control
- Medical and Health Education

3) a) 60
b) 9.0
c) <2
d) 21
e) 1.0

f) 60%
g) 100%
h) 0.3%

Check Your Progress 2

1) a) 1951.
b) **Fifth**
c) 929.

2) • illiteracy
early marriage
• teenage pregnancies
• reduction in IMR
• evidence against women

3) • Raising the minimum age of marriage
• Linkage of Central assistance to states with performance in family welfare work
• Raising the level of female literacy
• Target of bringing down birth rate 25 by the end of VIth plan.
• Continuance of monitory compensation for sterilisation operation.
• Voluntary nature

4) Attaining NRR of unity (1)

5) Beyond family planning measures are:
i) Increasing the mean age of marriage
ii) Raising the status of women
iii) Raising the literacy rates among females
iv) Enhancing child survival and development
v) Alleviating the poverty of the people
vi) Ensuring old age security.

National Health Policy, 1983

Introductory

1. The Constitution of India envisages the establishment of a new social order based on equality, freedom, justice and the dignity of the individual. It aims at the elimination of poverty ignorance and ill-health and directs the State to regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties, securing the health and strength of workers, men and women, specially ensuring that children are given opportunities and facilities to develop in a healthy manner.

1.2 Since the inception of the planning process in the country, the successive Five Year Plans have been providing the framework within which the States may develop their health services infrastructure, facilities for medical education, research, etc. Similar guidance has sought to be provided through the discussions and conclusions arrived at in the joint conferences of the Central Councils of Health and Family Welfare and the National Development Council. Besides, Central legislation has been enacted to regulate standards of medical education, prevention of food adulteration, maintenance of standards in the manufacture and sale of certified drugs, etc.

1.3 While the broad approaches contained in the successive Plan documents, and discussions in the forums referred to in 1.2 may have generally served the needs of the situation in the past, it is felt that an integrated, comprehensive approach towards the future development of medical education, research and health services requires to be established to serve the actual health needs and priorities of the country. It is in this context that the need has been felt to evolve a National Health Policy.

Our Heritage

2. India has a rich, centuries-old heritage of medical and health sciences. The philosophy of Ayurveda and the surgical skills enunciated by Charaka and Shusharuta bear testimony to our ancient tradition in the scientific health care of our people. The approach of our ancient medical system was of a holistic nature, which took into account all aspects af human health and disease. Over the centuries, with the intrusion of foreign influences and mingling of cultures, various systems of medicine evolved and have continued to be practised widely. However, the allopathic system of medicine, has, in a relatively short period of time, made a major impact on the entire approach to health care and pattern of development of the health services infrastructure in the country.

Progress Achieved

3. During the last three decades and more, since the attainment of Independence, considerable progress has been achieved in the promotion of the health status of our people. Smallpox has been eliminated; plague is no longer a problem; mortality from cholera and related diseases has decreased and malaria brought under control to a considerable extent. The mortality rate per thousand of population has been reduced from 27.4 to 14.8 and the life expectancy at birth has increased from 32.7 to over 52. A fairly extensive network of dispensaries, hospitals and institutions providing specialised curative care has developed and a large stock of medical and health personnel, of various levels, has become available. Significant indigenous

UNIT 4 DISTRICT HEALTH ORGANISATION

Structure

4.8 OBJECTIVES

After going through this unit, you should be able to:

- describe the structure and functions of district health organisation;
- explain the concept, machinery and process of decentralised district planning for health and development; and
- discuss about the district health information system and its utility.

4.1 INTRODUCTION

District as you know is the vital link in the health care delivery system of the country as it is the focal point for management of health and family welfare programmes. The purpose of this unit is; thus, to give you an insight of the District Health Organisation.

In this unit you will learn about the set-up and functioning of District Health Office, decentralised planning process at the district level and about the district health information system.

4.2 DISTRICT HEALTH OFFICE

By now, you would have become conversant that for the delivery of health care services in the country, health infrastructure has been developed at different levels, which extends from the national/central level to the village level. A detailed description of the health care delivery system has been given in Unit 1 of this block. However, a broad picture of the total organisational structure for health and family welfare programmes is depicted in the chart given on page 88.

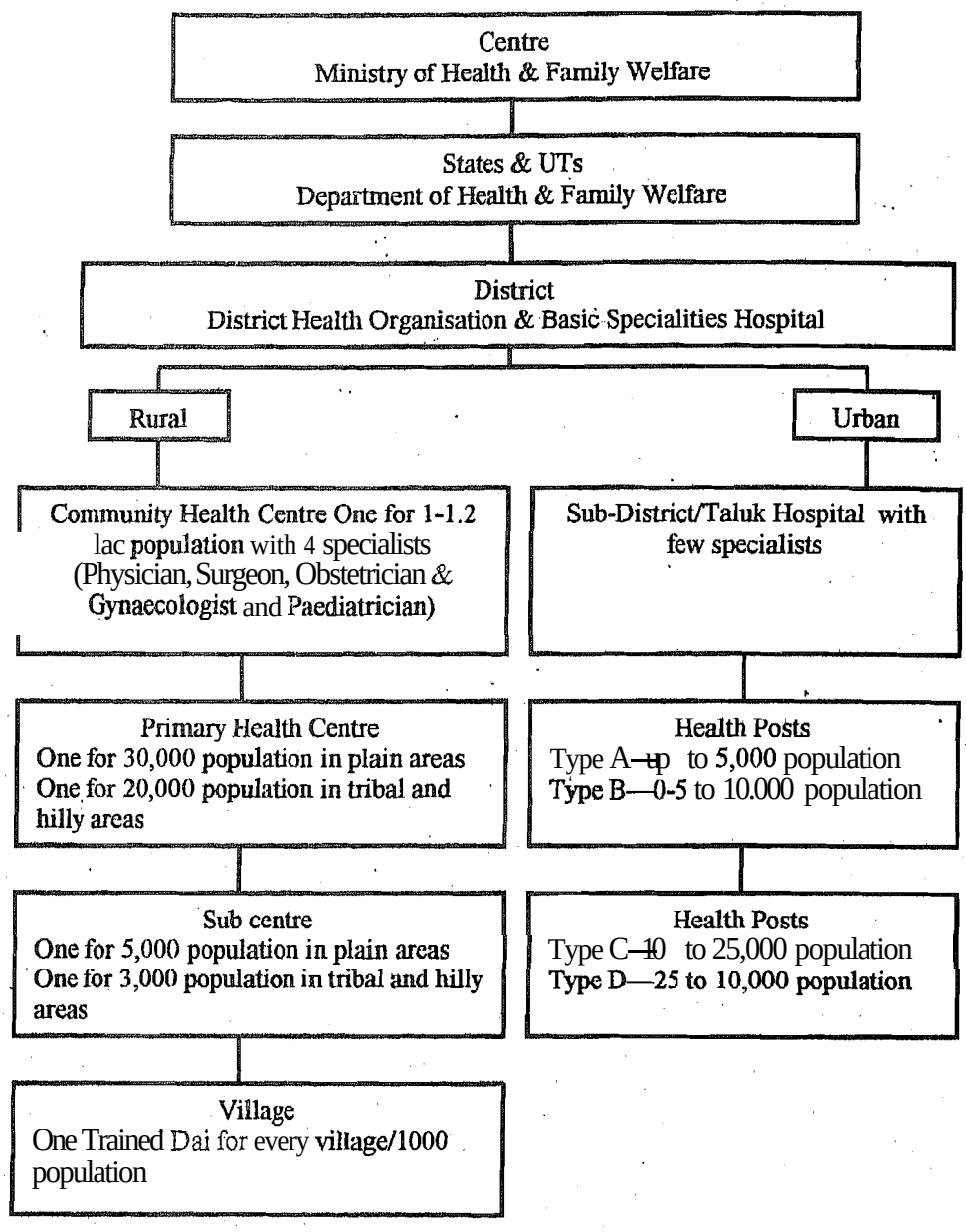

Chart 4.1: Organisational Structure for Health Care Delivery in India

4.2.1 Organisational Structure of Health Care System at District Level

The District level structure of the health care system is a middle level management organisation and it is a linkage between the state on one side and the peripheral level structures on the other side. With the implementation of multipurpose health workers scheme, a reorganisation of health care services structure has taken place. Consequently, all the health and family welfare programmes in the district have been brought under a unified charge. This district officer with the overall control is popularly known as the CMO (Chief Medical Officer). However, different nomenclatures are used in different states. Such a district officer may actually be designated as Chief Medical and Health Officer (CMHO) or District Medical and Health Officer (DMHO) or even Civil Surgeon. The district chief is assisted by Deputies/Programme Officers, whose numbers/specialisations and status in the cadre of state health services differ from state to state. Due to this, the span of control and hierarchy also varies from state to state. Since, health is a state subject; there is no uniform model of a district health organisation in India. However, each state has adopted this broad pattern with minor modifications, suiting its own requirement and also depending upon the availability of resources of men, money and material. Chart given on next page represents a general organizational structure at district level.

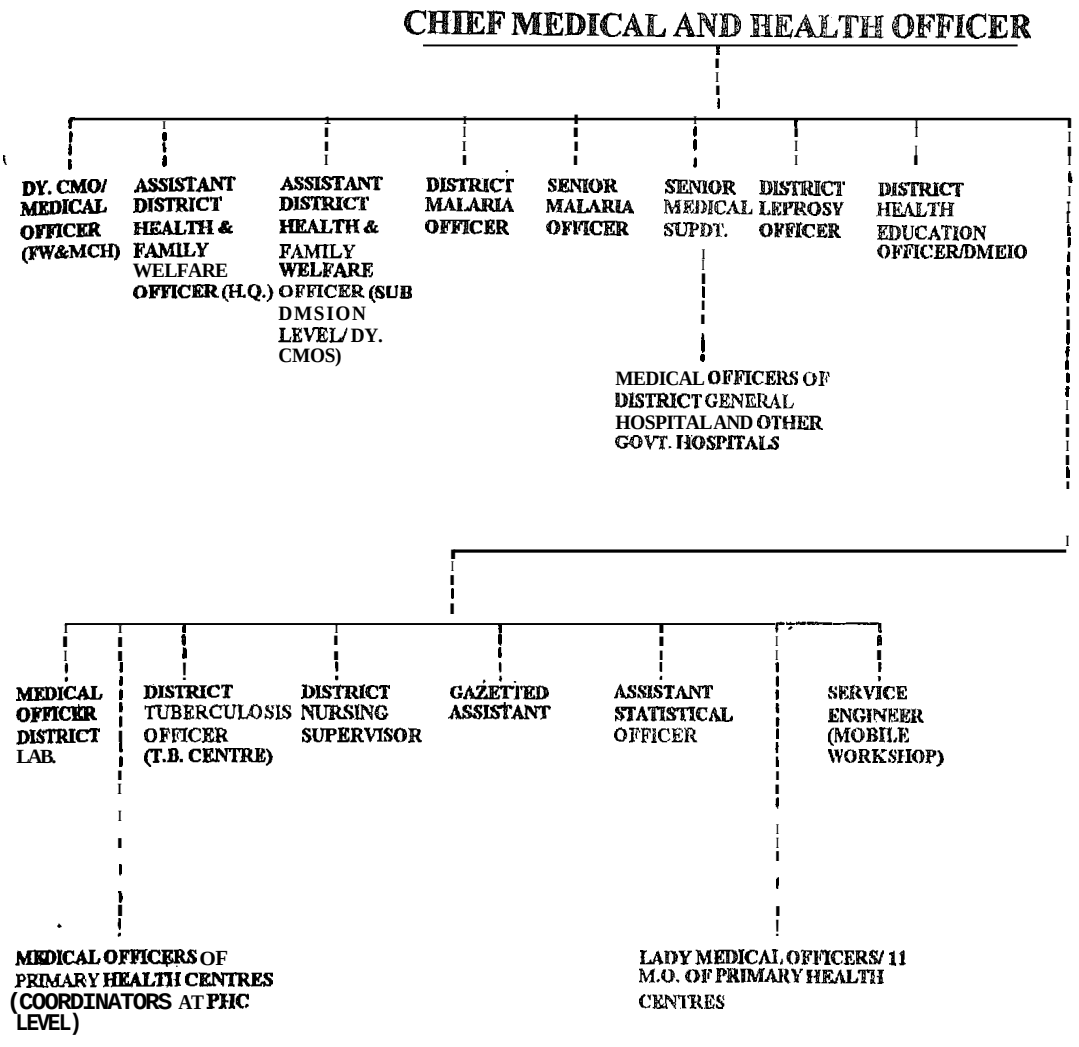

Chart 4.2: District Health Organisation

4.2.2 Functions of District Health *Office*

The Chief Medical Officer (CMO) being the supreme authority of district health care services structure who is expected to translate the broad health policies and programmes into action in the district. In doing so, the CMQ Is expected to provide direction and guidance to the peripheral health care structure in the district, Further, as a supreme authority of the district health services, the CMO is also expected to manage the structure of district as well as peripheral health care services. In addition, the CMO might also have other roles in the district development administration and its activities. Thus, the functions of CMO are several and these are inter-linked. In fulfilling his responsibilities, the CMO often delegates certain functions to other district health officials. With the adoption of multipurpose workers scheme, these deputies at the district health office have been relieved of their singular programme responsibilities and have been assigned responsibilities of supervising the activities of all the programmes in the specific areas of the district allocated to them.

The major functions of district health administration/office are to:

- arrange for the provision of health and family welfare services in the district adopting the comprehensive primary health care approach.

  integrate the preventive, promotive and curative activities prescribed under separate health programmes in a manner envisaged under the multipurpose workers scheme.

- incorporate the paradigm shift of the Reproductive and Child Health (RCH) programme by operationalising the Community Needs Assessment (CNA) approach in the district.
- make arrangements for the provision of services required statutorily e.g. medico-legal work, post-mortem, medical examination and certification, drug licensing, enforcement of Prevention of Food Adulteration (PFA) Act, registration of vital events etc.
- deal with the preventive, promotive, curative and rehabilitative activities related to natural calamities, disasters and epidemics.
- organise pre-service entry training for the para-professionals and paramedicals, and inservice training for health personnel working at different levels in the district.
- maintain liaison with Panchayati Raj Institutions, municipal bodies and other developmental and administrative departments of the district.

Check Your Progress 1

1) The chief of the District Health Organisation may be designated differently in different states viz. as .....

2) Tick the correct answer:

The deputies to the chief of the district are often given:

a) singular programme responsibilities

b) responsibilities of supervising activities of all the programmes in specific areas of the district.

4.3 DISTRICT LEVEL PLANNING AND MANAGEMENT

4.3.1 CMO's Role

In order to perform the functions assigned to the District Health Organisation in an efficient and effective manner, the chief of the district has to resort to decentralised district level planning and management. As a manager of the District Health Care Delivery System, the CMO has to perform three broad roles. These are:

1) **Interpersonal Contact Role**

a) ***Figurehead:*** By the status of their office, CMOs are required to carry out a variety of social, legal and ceremonial roles e.g. make opening remarks at meetings, signs various government forms and make themselves available to VIPs.

b) ***Leader:*** The role *that* describes CMO's interpersonal relations with his subordinates. CMOs need to motivate staff of work and give them responsibility according to *staff* competence.

c) ***Liaison:*** CMOs are responsible for relations/dealings with people outside the district health organisation. CMOs develop a network of contacts with other development sectors, district collector, local political representatives and leaders in the community.

2) **Information Processing Role**

a) ***Monitor:*** CMOs continually seek and receive information about their organisation and its services.

b) ***Disseminator:*** CMOs share information with subordinates according to what they need.

3) **Decision Maker Role**

a) ***Innovator:*** CMOs adopt innovative alternate approaches to the delivery of services and bring about changes in their organisation. CMOs anticipate problems and take initiative to solve them.

b) ***Disturbance Handler:*** CMOs take charge when the normal routine is disturbed e.g. during disaster, during intensive health campaigns, when employees strike, or when there is a breakdown of the supply line.

c) ***Resource Allocator:*** CMOs determine who will get what in their organisation and plan the distribution of health organisation resources.

d) ***Negotiator:*** CMOs may enter into negotiations with any one that affect the delivery of health services in the district.

In general, activities related to interpersonal contact, information processing and decision making are inseparable in CMO's day-today work.

Another way to look at CMO's role as district manager is:

- Planner
- Coordinator

  Facilitator
- Information processor
- Decision maker

  Supervisor
- Monitor

  Promoter of inter-personal interactions among individuals, between groups, and within the community

  Evaluator

  Communicator
- Innovator

  Motivator
- Resource provider

  Community contact maker

  Team leader

In playing his role, a CMO needs to have such qualities of leadership such as social . acceptance, empathy, capacity to inspire and motivate others particularly colleagues, subordinates, influential community groups and opinion leaders and to mobilise their commitment, ability to communicate, courage to take calculated risks and make bold decisions, take initiative and demonstrate faith in people's capabilities. He has to maintain an optimal concern for both the task as well as for the people with whom and for whom he works.

4.3.2 Decentralised District Planning: Concept and Machinery

There has been a growing recognition of the fact that there is a need to supplement the national and state health plans with a more detailed examination of the problems, resource and potentials of local areas, so that investment plans and

programmes tailored to the particular needs of each district; could be formulated and implemented. Apart from that, there has been an increasing emphasis on the involvement of people and their elected representatives in the formulation of district plan; so that such plans reflect the aspirations of the people and also fulfil the basic health needs.

In the field of health care, the district is the most peripheral unit that has comprehensive powers and responsibilities. Thus, district as a basic administrative unit, serves as a normal meeting point for bottom up community planning and top down central and state planning. In contrast to national or state level plans, the district plans present a multisectoral package of area specificity.

District planning generates a popular enthusiasm for innovation and experimentation to ameliorate the local problems. Further, it brings about involvement of people's representatives not only in the formulation of schemes but also in implementation and its follow-up, thereby ensuring a participative commitment.

District Planning Board has emerged as an effective organisation to formulate schemes and getting them implemented. It provides a forum for all sectors and organisations engaged in development work including panchayats to pool their, efforts and assist in evolving a well-coordinated and participatory approach to planning.

The District Planning Board is broad based and highly representative in character. The District Collector is its vice-chairman and the president of Zilla Panchayat as its co-vice-chairman. A Minister of the State Government is the chairman. There are 15 other categories of members consisting of lady members of Zilla Parishad, Presidents of Taluka/Block Panchayat, MPs, MLAs, Mayors of municipal bodies; officials like District Development Officer, Chief Medical Officer, etc. Associate members include representatives of voluntary organisations, Khadi Gram-udyog, Schedule Tribe Development Corporation, Deputy Collectors of the district etc.

The District Planning Board generally meets every three months and has powers to formulate and sanction schemes. The Board also has at its disposal the 'united funds' allocated by the state for 'Decentralised District Planning'. About one-third of total outlay under plan is allocated to district level schemes to be implemented through heads of departments of different sectors. There is also a special outlay for development of identified backward areas.

With the enactment of Panchayati Raj Act, the process of decentralisation has got strengthened further. There is provision for transfer of powers, functions and devolution of funds to the representatives of people. The Panchayati Raj institutions are a three-tier organisation viz. Zilla Panchayat at the district level, Taluk Panchayat at the taluk/block level and gram panchayat at the village level. The physical jurisdiction of Zilla Panchayat covers the entire district, barring the urban areas and town municipalities. In terms of activities, barring law and order, almost all other developmental activities come within its scope. It is the local government at the district level and 22 departments involved in developmental activities ideally fall within the governance of Panchayats. The Zilla Panchayat functions through various committees and the health committee is one of the important committees to work for health development. Thus, Panchayati Raj Institutions are expected to play a pivotal role in the decentralised district planning for health and development.

4.3.3 Designing the District Health Plan

A *plan* is a blue print for taking action. Planning needs to be done to prepare such a print for action. This by itself is a process. Thus, *health planning* can *be* defined as an orderly process of defining community health problems, identifying unmet needs; surveying the resources to meet them, establishing priority goals that are realistic

and feasible, and projecting administrative action to accomplish the purpose of the proposed plan.

The purpose of health planning is to:

- match the limited resources with many problems to be tackled.
- eliminate wasteful or duplication of expenditure, and
- develop the best course of action to accomplish a defined objective.

It has also been recognised that the vertical district plans for different sectors are less meaningful. Health of the people reflects on the success of all developmental efforts being undertaken in the district. Similarly, development has a bearing on health too e.g. greater availability of nutritious food through organised developmental efforts have a bearing on health of the people. In turn, healthy people can contribute more effectively towards developmental efforts.
Districts are now recognising the need to strengthen their planning system. However, the actions required would differ depending upon the context of various programmes. One may being with simplified programme for major activities and gradually refine them into detailed co-ordinated plan. Generally, the areas that support planning system have inherent weaknesses in them. These relate to:

a) ***Data*** System ***and its*** Use: District ***has*** a weak data system and at the same time it is used only in a limited way.

b) Planning ***Capabilities:*** The managers at different levels need to have skills in planning. As Panchayati Raj Institutions are expected to play a pivotal role in designing the district plan for health and development, not only the skills of health managers need to be increased, but also the planning skills of Panchayat members need to be strengthened.

The above considerations of weakness imply that health and health related sectors would have to develop an appropriate formalised planning system. Broadly there are three types of programmes from the planning point of view. The modes of planning vary to some extent in all of the three.

In Supply-oriented programmes, the planners are concerned with provision of goods and services. The demand is assumed to exist. The success of the programme depends upon the extent to which accessible, efficient and qualitative services *can* be provided in view of the existing demand. Maternal and Child Health (MCH) services may follow supply-oriented planning, as there is a fairly wide acceptance of these services.

In Strategically managed programmes, the planners are concerned with both creating demand, supply and services. The demand creation activities such as information, education and communication (IEC) and willingness to learn about the response to local needs are extremely important. Consequently the process of planning rather than the plan becomes more important. Programmes related to family planning may have to be strategically *managed.*

In ***Community centred programmes,*** the ***health*** services are seen as an integral part of overall developmental activities and are borne out of community needs, Here the programme operations have to be very flexible and the community participates actively in operational planning. The tuberculosis programme could be community centred.

Thus, the district may have to incorporate a mix of the above three planning modes at the same ***time.*** The planning process is a continuous cycle and it has typically five stages, namely, planning, execution, monitoring and control, evaluation and replanning. The basic steps needed for designing a district plan relate ***to*** answering a few key questions as reflected in Chart 4.3.

Basic Steps	Key Questions
1) Situational analysis 2) Projection/prediction of health status 3) Identification and definition of problems	When are we now?
4) Selection of priorities 5) Establishment of goals and objectives	Where do we want to reach?
6) Listing key alternative strategies 7) Try/Examine strategies in relation to resources 8) Selection of feasible strategy/choosing options 9) Listing of activities 10) Making an implementation plan	How will we reach?
11) Monitoring and control of operations 12) Evaluation 13) Replanning	Are we going in the right direction? Have we reached?

Chart 4.3: Steps for District Health Planning

Each of the steps have been briefly described below:

1) Situational Analysis

As a first step it is very necessary for a planner to know the health status of the community, factors promoting good health and the risk factors associated with ill health. Thus, for making a proper situational analysis, bath, the community as well the health aspects need to be looked into.

a) ***Community*** Aspects

i) ***Demographic Profile:*** Total population of the district, its distribution, age-sex composition, etc.

ii) ***Socioeconomic Conditions:*** Per capita income, housing conditions, major occupation etc.

iii) ***Socio-cultural Aspects:*** Attitudes ***and*** beliefs of community.

iv) ***Education*** Related: Literacy rate, institutions for imparting education etc.

b) ***Health Aspects***

i) ***Health Status:*** Morbidity (incidence and prevalence of various diseases), mortality pattern, etc.

ii) ***Health Facilities:*** Governmental, Voluntary ***as*** well as Private.

iii) ***Resources:*** Human Resources, financial resources, material resources, community resources.

iv) ***Training Centres:*** Location, numbers being trained, their capabilities for imparting training etc.

2) Projection/Prediction of Health Status

After making a community diagnosis through a situational analysis, it also needs to be deliberated as to what would be the likely situation in future for which planning needs to be done e.g. expected increase of population, migration of people, increase in HIV positivity etc.

3) Identification and Definition of Problems

The first two steps would yield in identification and definition of health problems in the district for which planning needs to be done.

4) Selection of Priorities

It may not be possible to redress all the problems at one go. In such a situation, health problems need to be tackled on a priority basis depending upon the:

i) Number of affected and severity of the problem.

ii) Diseases which are prevalent in the weaker sections of the community.

iii) Health problems with which the vulnerable groups of the community are associated e.g. mothers and children.

iv) Problems which have serious social and economic consequences, e.g. leprosy, tuberculosis, blindness.

5) **Establishment of Gods and Objectives**

It is very necessary to determine the ultimate state that is desired. The objectives set forth should be realistic to achieve and in measurable terms e.g. reduction in infant mortality rate from 75 to 70 in a period of two years.

6) 7) 8) Strategies

There could be various ways to resolve the problem. However, one has to adopt a strategy that is feasible and matches the available resources e.g. for control of diarrhoea there could be different alternatives like health education, water supply and sanitation, medical care including ORT etc.

9) Listing of Activities

The activities could be categorised under preventive, promotive, curative and rehabilitative aspects. Besides that, the activities to be undertaken at various level also need to be defined.

10) **Making an Implementation Plan**

Once the activities have been listed out (i.e., what needs to be done), for a proper implementation it is necessary to spell out as to how would it be done, where would it be done, who would do it and when it is required to be undertaken e.g. orientation of PHC Medical Officers in an activity for which working out the total numbers and batches is important, the place (may be SIHFW) where it needs to be imparted by whom and within what time frame would the whole thing be completed for the district.

11) Monitoring and Control of Operations

This is a continuous process of observing, recording and reporting of various activities in order to measure the level of performance, identify deviations if any, and taking corrective measures.

12) Evaluation

Evaluation is in terms of what has been set forth to achieve. Periodic and mid-term reviews are part of it and this has to be done at different levels in the district. Ideally evaluation should include aspects such as accessibility, coverage, community participation, intra and inter-sectoral coordination, cost and quality of services etc.

13) Replanning

Planning is a continuous learning experience. Objectives and activities need to be constantly reviewed as health problems get modified, new opportunities may evolve for optimisation of resources and there may occur a shift in priorities.

A good District Health Plan document should thus have:

- Background and situational analysis (including health needs and problems being tackled).
- Clearly specified objectives (along with outputs required to meet the objectives).
- Strategies and the resources required (including the ways to get the resources).
- Activities to be performed (along with setting out responsibility for the activities).
- Monitorable time-table (and if possible, specification of foreseeable constraints and risks).

Check Your Progress 2

1) List out the merits of decentralised planning.

.....

.....

2) What are the various modes of planning?

.....

.....

.....

3) The first step for planning is .....

4.4 DISTRICT WEALTH INFORMATION SYSTEM

By now it would have become clear to you that information is vital for the district level managers for working a situational analysis and eventually preparing a plan of action. Health information is thus a basic tool of management and a key input for bringing about an improvement in community health. A health information system is defined as "a ***mechanism for the collection, processing, analysis and transmission of information required for organising and operating health services, and also for research and training***"

The primary objective of a health information system is to provide reliable, relevant, up-to-date, adequate, timely and reasonably complete information for health managers at all levels and to assist planners in studying their current functioning and trends in demand and workload.

4.4.1 Sources of Health Information

As already indicated in the earlier section of this unit, the district has a weak data system. Still it is very difficult to get the information where it matters most, i.e., at the community level. Service statistics and beneficiary records are usually the basis for planning. If couple or household registers are accurately maintained by the health workers and are suitably analysed, then they can be useful for segmenting beneficiary population, exercising selectivity in activities and sequencing programme planning.

A district health planner has to identify all the sources of information. There are two sources of information: programme and non-programme. Both the sources are essential and in a way, complementary to each other. Information collected through non-programme machinery, in the form of assessment surveys and studies, help in

filling the gaps found in the information collected through the first source and has a long lasting impact.

The various sources of health information are briefly described below:

1) Census: The census is an important source of health information. The census is conducted in India at the end of first quarter of the first year in each decade. Census Commissioner and Registrar General of India directs, guides and operates the census. Without census data, it is not possible to obtain quantified health, demographic and socio-economic indicators. However, district-wise figures take sometime to be made available to district authorities.

2) Civil Registration System: Whereas census is an intermittent counting of population, registration of vital events (e.g. births, deaths) keeps a continuous check on demographic changes. Registration agencies vary from state to state e.g., (i) health agency in Kerala and West Bengal, (ii) panchayat agency in Uttar Pradesh, Rajasthan, Bihar and Madhya Pradesh, (iii) Police agency in Haryana, Punjab, Madhya Pradesh, Jammu & Kashmir and Assam; and (iv) Revenue agency in Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. The extent of under registration makes this system as not too reliable a system for district health managers.

3) Sample Registration System: Since civil registration system is deficient in India, a Sample Registration System (SRS) is being operationalised by the Registrar General of India, to provide reliable estimates of birth rate, death rate and infant mortality rate.

4) Survey of Causes of Death: The Registrar General of India also undertakes survey of causes of death.

5) Notification of Diseases: List of notifiable diseases vary within the country, between the states and between urban and rural areas. However, it has serious limitations as it covers only a small part of total sickness and at the same time accuracy of diagnosis is also questionable.

6) Hospital and Health Centre Records: The main drawback is that such records only constitute a tip of the iceberg. Such sources could be governmental as well as non-governmental.

7) Epidemiological Surveillance: As part of the national health programmes, surveillance system are often set-up (e.g. malaria) to report the occurrence of new cases and on efforts to control diseases (e.g. spraying done).

8) Survey Data: In India, the Central Statistical Organisation (CSO) and National Sample Surveys Organisation (NSSO) conduct various surveys, which also include certain aspects related to health

4.4.2 Flow of Routine Health Information

The Government of India has set-up National Informatics Centre (NIC) to promote informatics culture in the government departments and to develop computer based management information system for decision support at various levels. NIC has set up a nation-wide satellite based computer communication network (NICNET) covering all the districts, state capitals and the centre, in order to facilitate the development of District Information System (DISNIC) at district level and essential data base for the states and central government departments.

A computer compatible version of Health Management Information System (HMIS version 2.0) has been developed for implementation all over the country. This version consists of the following data input in the district computer system.

i) PHC Report,

ii) District/Sub-district/Special Hospital Report,

iii) Private Hospital/Nursing Home Report, and

iv) Camp Information Report.

The District Computer System processes the data and produces the decided output reports.

For the compilation of PHC report, the health worker (male) and health worker (female) fill in the sub-centre form for the respective month and submit it to PHC Computor/Compiler. The PHC Computòr/Compiler aggregates the sub-centre data and also collects the PHC clinic and laboratory data to be reflected in the PHC format.

The PHC reports are sent to District Health Statistical Cell. The District Statistical Assistant feeds the PHC data in the NIC computer available at the District Collectorate Office. In addition. he also feeds data related to hospitals, nursing homes and camp activities.

Once the data entry is completed, the output table is made available to the district programme managers. Further, the transmission of information to the state headquarters and national level is through the NICNET. The information flow is depicted in the figure below:

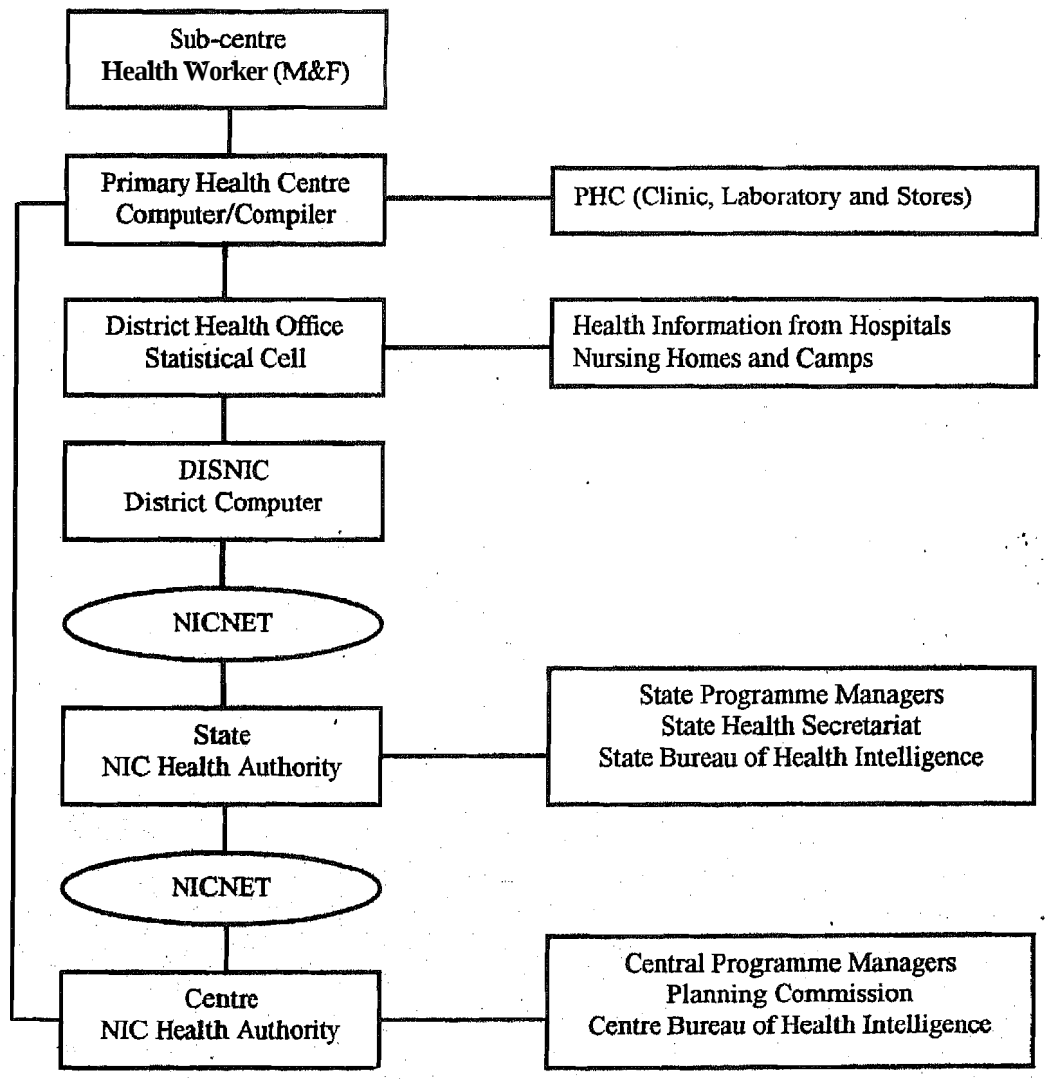

Chart 4.4: Information Flow in HMIS (Version 2.0)

Check Your Progress 3

1) Write True/False:

   a) Sample Registration System provides reliable estimates of birth, death and infant mortality rate. (T/F)

   b) District Computers are available at the CMO's Office. (T/F)

2) Write the fill form:

   a) NICNET .....

   b) DISNIC .....

   c) HMIS .....

4.5 LET US SUM *UP*

In this unit you have learnt about the district health organisation with details about the organisational structure and functions of the district health office. It would have become evident to you that district is the basic unit of administration in the country and how vital it is for the chief medical officer to play the role of a district level planner and a manager. You would have also got an insight into the procedure for developing a decentralised district health plan and the importance of a proper health information for the purpose. A district chief of health organisation (CMO) does not have to bank only on the programme sources of health information, but also on the non-programme sources.

4.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your **Progress 1**

1) Chief Medical Officer (CMO), Chief Medical and Health Officer (CMHO), District Medical and Health Officer (DMHO) or even Civil Surgeon.

2) a) F

   b) T

Check Your Progress 2

1) • It is realistic
   • There is participative commitment
   • Ensures better implementation
   • Involves meaningful utilisation of data collected
   • Encourages creativity
   • Presents multisectoral package of area specificity

2) i) Supply oriented

   ii) Strategically managed

   iii) Community centred

3) situational analysis.

Cheek Your Progress 3

1) True
2) National Informatics Centre
3) False

4.7 FURTHER READINGS

Health Care **Delivery System,** *Distance Learning in Health and Family Welfare Management, Module 1.0,* **New** Delhi, National Institute of Health and Family Welfare, 1996.

Health Management **Information** System. *Implementation in States/UTs at District Level. Version 2.0, New* Delhi, Ministry of Health and Family Welfare, GOI, 1990.

Joshi C.B., *Organisational Network for the Health and Family Welfare Services in India: A Historical Background & Present Scenario,* New **Delhi.** National **Institute** of **Family Welfare, 1990.**

Management Information **System** for Health Care, *Distance Learning in Health and FW Management, Module 6.0,* New Delhi, National **Institute** of Health **and Family Welfare, 1996.**

Management Training Modules for District Level Health Officers, New Delhi, National **Institute** of Health and **Family** Welfare, 1990.

Park, K., Park's Textbook of Preventive and Social Medicine, 15th *Edition,* **Jabalpur, Banarsidas Bhanot,** 1997.

Planning for District Health **Organisation,** *Distance Learning* in *H&FW Management Module 7.0,* New Delhi, National **Institute** of Health **and Family** W e b , **1996.**

UNIT 5 REGIONALISATION OF HEALTH CARE

Structure

5.0 OBJECTIVES

After going through this unit, you should be able to:

- describe the concept of regionalisation;
- list the points in favour of demarcation of a region;
- describe the basis of hierarchy within the region;

  list the problems in implementation; and
- explain the overall benefits of regionalisation.

5.1 INTRODUCTION

In the earlier units of this block you have learnt about health care delivery system in the country and also the district health organisation. In this unit you will learn about another concept of health care delivery system which aims at providing comprehensive health care services in a defined geographical area and this is known as regionalisation.

This unit will help you to understand the concept of regionalisation as it applies to health care. It explains the basis and purpose of regionalisation and also considers the other elements which have to be given weightage in regionalisation. The advantages and disadvantages of regionalisation have also been discussed briefly.

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In this unit you will also learn about the basis of evolving of a region, the level of services provided within the region and also about the hierarchy of services necessary to ensure free flow of information and services both up and down.

5.2 CONCEPT AND HISTORY OF REGIONALISATION

You must have studied in Geography that a country, a state or even a district may be divided into regions which are homogeneous areas. The same concept is applied to the provisions of health care. This process of regionalisation of health care in a region helps in assessing the requirements of health care in the region and then based on this a system is evolved, for providing the required health services considering the available resources too. It is of course necessary to exercise the greatest economy on the resources, as they are limited and should, therefore, be used optimally.

In the provision of health care, the District level is often taken as a region as it is administratively, functionally, structurally, generally and geographically too a distinct entity. Since Independence we have tried out many methods of bringing health care to the people who need it most and the three tiered system of the Gram Panchayat, Taluk Panchayat (block level) and the Zilla Parishad has proved to be the best working system that has stood the test of time so far.

You will also appreciate that vertical health programmes did not meet with the success which was expected over a period of time. This was because health is a matter which is closely linked with many other associated disciplines or departments. It is linked to food, water supply, forestry, environment, poverty removal, employment and so on. Many of these areas are handled by diverse departments. It has generally been found that the District is the region where all these departments and their activities interface. You must be knowing that the Zilla Parishad is the top tier of the Panchayat Raj Institutions (PRIs). This therefore forms a good homogeneous platform from which a region can be formed and controlled as all the lines of communication are established ones.

As a region, a district provides good scope for coordination and integration of services. This of course refers not only to health services but to all the allied services too. It is an established system and delivery of health care should also conform to these lives for effective, economical and successful implementation.

The concept of regionalisation of health care follows closely in the footsteps of the regionalisation process which took place in general administration. You must have heard the saying that India lives in its villages. This was true hundreds of years ago and is true even today. The village Panchayat originally consisted of five members but that has been subject to change, in numbers, depending on the size of the village.

For a while after Independence there was a great deal of centralisation of power and therefore all the decisions were taken at high levels. Plans were announced and implemented at the National level and at the State level. The implementation of many of these plans left much to be desired as the man in the village, the actual beneficiary was left out of the decision making process. This realisation dawned on the planners when the expected results did not materialise out of so called well planned and well financed programmes. The basis for most of the early schemes on health planning as you know is the Health Survey and Development Committee Report (Bhore Committee) of 1946. The Community Development Programme was launched on 2nd October, 1952 and it was planned to set up a Primary Health Centre in every Community Development Block. The Mudaliar Committee in 1961 recommended the reduction in the population covered by each PHC, among other things. In 1964 the Govt. of India reviewed the functioning of the PHC and

strengthened the staff therein, while integrating Maternal and Child Health into the health services. Subsequently health care infrastructure was strengthened based on the recommendations of various committees constituted from time to time and you have already learnt about this in the first unit of this block.

The first idea of local self-government was with the government resolution of Lord Rippon (1882). We have come a long way since then. Being a newly Independent country we have had to find the system which was most suitable to our setting and so we have taken some time to establish this. As stated earlier, the concept of regionalisation of health care followed closely on the heels of regionalisation of the administrative machinery.

A change of Government in the centre in 1977 brought about a renewed interest in Panchayat Raj. However it was only in 1992 that the Constitution (73rd Amendment) Act, was enacted. This act envisages the establishment of panchayats as units of self-government. The gram panchayat was to be the foundation of the system and the three tier system was built on this is the Gram Panchayat (GP), the Taluk (Block), Panchayat (TP), and the Zilla Parishad (ZP). The GP, TP and the ZP, constitute the backbone of the Panchayat Raj Institutions (PRIs) in the country.

You must have also seen how the concept of the Panchayat Raj is historical reality and how the concept of the Panchayat Raj and Panchayat Raj Institution (PRIs) has been brought back into the administrative machinery and working through the 73rd and 74th Amendments. The 73rd Amendment brought in the formalised concept of the Panchayats as units of self administration and the 74th Amendment brought in the concept of working of the District Planning Committee (DPC). These two processes really formalised the understanding and the application of the concept of regionalisation with the District as the nodal point for the region. Since the panchayats and DPCs had elected representatives of the people, the schemes were user friendly. The DPC and the various panchayats within the district were to monitor the progress of the various schemes and programmes within their area of responsibility and health care was one of them. This has the distinct advantage of promoting coordination between the different departments which are involved in overlapping and mutually beneficial schemes.

So over a period of almost 50 years we have come to realise that the District is a strong and viable unit of decentralisation of the administrative system and also the health care. It is at this level that there is an integration of services and also the coordination. The TP and GP are viable for local administration but lack the funds and resources for implementation of programmes with a larger perspective. Regionalisation then is a viable and positive step taken to fulfil the objectives that we had in various programmes that authorities have conceived for the benefit of the villagers. Regionalisation also makes the plans more implementable from the point of view of the health worker too.

It was envisaged that adequate powers and responsibilities would be devolved upon these panchayats at the appropriate level to enable them to prepare and implement schemes for economic development and social justice.

The gram sabha or the village council has been envisaged as the foundation of the panchayat raj system. There shall be three tiers of panchayats at the village, intermediate and district levels, All seats are to be filled by direct elections from territorial constituencies, with the ratio between the population and the number of seats being the same throughout the panchayat area. SC/ST reservation in proportion to their population in the panchayat—women 1/3rd of the seats for a term of 5 years.

A new schedule called the Eleventh schedule comprising 29 items has been added to provide an effective role to the PHs (Panchayat Raj Institutions) in the planning and implementation of works of local significance ranging from drinking water,

agriculture, land and water conservation to communications, poverty alleviation programmes, family welfare, education, libraries, cultural activities etc.

Check Your Progress 1

Fill in the blanks:

a) The concept of regionalisation of health care closely follows the regionalisation of .....

b) The concept of regionalisation of health care and administration are based on the .....System.

c) The Panchayat raj system is a ..... tier system, with the ..... as the foundation and the ..... as the intermediate level and the ..... as the top level.

5.3 ELEMENTS OF REGIONALISATION

In this section you will learn about various elements of regionalisation, namely, structure, demarcation of a region and hierarchy.

5.3.1 Structure

The structure of regionalisation consists of three basic components:

i) the demarcation of a region;

ii) presence of a graded hierarchy of services; and

iii) ensuring coordination of services through an integrated authority system.

The structure should also ensure that there are no hindrances to the process and that the flow of information and services up and down the system is smooth and continuous. The elements of regionalisation are the levels and as mentioned earlier there are three levels and these are the GP, TP and the ZP in the region of the District, Based on the information that was given in the previous section you now know the history and the concept of regionalisation and you will now be able to correlate that with the structure of a region. This will help you to get an overall view of the concept and the elements as they would appear in a region. The district has been chosen as the region as it is so in actual practice and you can relate the information given to your district where you live and work and this will help you to understand the concept and the structure better. You will be able to conceptualise the principle of regionalisation of health care better if you relate it to the district that you know while going through the unit.

5.3.2 Demarcation of a Region

This is the first step and should be a very carefully thought out and weighted decision. Each area should be capable of a level of autonomy both in resources and personnel. There should also be a homogeneity in the region.

Demarcation of the region could be done by time tested criteria of geography, economy, culture, ecology, and being a nodal centre. Since we are considering a district as a region for the purpose of delivery of health care and also for administrative purposes, most often the demarcation has already been done and generally the demarcation conforms to one or more of the principles enunciated above. However, in recent times there have been times when political

considerations have been overriding in the formation of a district. These are generally the exceptions and are bound to create problems.

Most of the older and geographically determined districts have an inherent homogeneity and are culturally and economically uniform too. In these districts and regions it is easy to implement a new programme once the local population has been taken into confidence. The cultural and ecological homogeneity makes for easier implementation. Such regions are also capable of functioning in a self contained way.

Some regions are nodal regions i.e. it is based on the headquarters being a communication centre and thereby the region around grows under its influence. This generally happens when the district is built around a large city or large commercial centre and all the surrounding area is dependent on and subsidiary to the centre. Such centres and regions often produce a lot of employment and facilitate establishment of high-tech centres for medical and health care too.

Where a region does not conform to the above mentioned characteristics the region could be considered as a planning artifact which has been created to meet certain other needs. However, it has been found that even such dissimilar regions when brought under a uniform authority tend to become homogeneous over a period of time.

A region should be large enough to be self-sufficient in providing a broad range of services. Besides the size the population also is an important determining factor in provision of health facilities. Provision of highly specialised services require a population base for establishment. For example, it is generally believed that for establishment of neurosurgery or open heart surgery a population of one million is the minimum per unit. This could then be established only in the third tier of the system that is at the district headquarter hospital if such a requirement is visualised.

Transportation is another important determining factor in establishment of medical and health care services. Travel time has become a more accurate measure than distance in kilometers, as it takes into account of state of available transport and road conditions in addition to the distance itself. Then is the index to be used when expansion of health care facilities in a region are contemplated.

Demarcation of the region is fundamental to the success of the region as an administrative unit. Each region should have a degree of autonomy both in resources and in personnel. This happens automatically when the district or region is carefully planned. Most of the districts have also a certain homogeneity which is also essential for the smooth functioning of the machinery. A district headquarter is the hub of activity and hence there should be a smooth flow of information and resources out from it and of information and patients and patient related activity to it. Culturally and economically too there is this homogeneity in a district. However, in newly formed districts which have been created for political or economic reasons this homogeneity takes considerable time and efforts to develop. Most district headquarters are geographically homogenous too, this makes for ease of transportation and interaction between the functionaries at different levels. Some district headquarters are demarcated because they are nodal centres, this also makes sense as they have come up as commercial or communication centres and so they automatically assume the function of being in the hub or centre of the region. The broad principle of primary care at the village level and secondary care at the taluk or panchayat level and tertiary care at the district hospital level is a smooth and time tested system which works well.

Population and transport facilities within the region also need to be studied carefully before the demarcation of a new district is made.

Check Your Progress 2

1) List the criteria for demarcation of a region?

.....

.....

.....

.....

.....

.....

2) Name the **factors** which are essential for a region to be self contained.

.....

.....

.....

.....

5.3.3 Hierarchy of Services

Now, you will learn about the hierarchy of services. Once regionalisation has been decided upon, it is essential that the region functions as a cohesive and coordinated unit. This implies that information and services and statistics should flow smoothly up and down within the region. By up and down we mean that it should follow the natural flow of administrative channels. In any administrative set-up there is always a hierarchy. The dictionary defines the word hierarchy as "A body classified in successively subordinate grades". In our application it **means** the step ladder type of levels that we have established in the system for optimal function.

You **have** already learnt about the three tier system of **structure** in Health Care. This consists of the Primary Health Centre (PHC); Community Health Centre (CHC) and the District Hospital. These three levels roughly coincide with the three administrative levels of control, the Gram Panchayat (GP), the **Taluk** Panchayat **(TP)** and the Zilla **Parishad** (ZP). The PHC being population based may not coincide with every village level, however the other levels would coincide. The level of care provided at these three levels are known **as** primary, secondary and **tertiary.**

Location Level	**Administrative Level**	**Health Care Level**	**Type of Health Care**
District Headquarters	Zilla **Parishad**	**District** Hospital	Tertiary.
Taluk/Block Headquarters	**Taluka Panchayat** or Panchayat Samiti	Community Health Centre	Secondary
Village	Gram **Panchayat**	**Primary** Health **Centre/Sub** Centre	**Primary**

The above table explains the hierarchical system in health **care**. It **may** however be subject to minor **modifications depending** on geographical, topographical and communication line locations. The administrative levels are based on the Karnataka model which **has shown** a good degree of success.

The hierarchical system whether in health care or in administration are generally based on population figures. Population is the **overriding** deciding factor **as** it determines the resources available and the type of services that could and need to be

provided. Complex, costly and infrequently used facilities should be made available at a place where the catchment area is large and where the facilities would be adequately utilised. For example, complex surgeries and investigative facilities would be better utilised at the tertiary level hospital in the District Headquarters. Quite often this may be associated with a Medical college too which would enhance the provision and utilisation of these facilities.

In any large organisation it is necessary to lay down a hierarchy of services. You have learnt about the hierarchy of services as it exists in health care at district level, panchayat level and at the level of the village. You have also learnt of the three tiered system of the District Hospital, the Community Health Centre and the Primary Health Centre, and how these three levels are complimentary to each other. Cooperation and coordination between these three levels is essential and integral to the success of the entire process and will also ensure smooth and uninterrupted flow of information up and down the three levels. This will help to coordinate flow of patients for referral from the PHC to the CHC and then on to the District Hospital if necessary and then back to his village with the necessary follow up notes. You have also learnt how the structuring of authority and rceponsibility takes place between these levels. You have also touched upon the type of differencesthat could arise in such a system if total cooperation and coordination is not present between the different levels and if the person at the helm of affairs does not have the necessary authority, or if this has been delegated to persons who are unable to implement them.

You will agree to that health care administrative set up closely follows that of the district hierarchy itself. The District Medical Officer or the District Health Officer is located in the headquarters where the District Collector or Commissioner is also located. This hierarchical ladder goes right down to the village level where the functionaries arc at the same level too. The care afforded to the patient is also in the same hierarchical pattern depending on the facilities available. Tertiary care being available at lower levels, secondary carc is provided at the CHC and primary care at the village level in the PHC.

5.3.4 Primary Level

These services generally constitute the first contact of a patient with the health care facility and organisation. The PHC and the Sub Centres (SCs) cater to the needs of the villagers and need to be given due attention. They should be adequately staffed and also properly equipped to carry out the necessary function. It is planned to give the three tiers greater autonomy in order that their functioning is not interfered with in any way.

You would be visiting a Primary Health Centre as a part of practical activities. You should take this as an opportunity to see for yourself the working of the PHC and make an assessment of the level of regionalisation. Find out if the PHC has gained any degree of autonomy after 1993. Has there been any difference in the function of the centre? Has the staffing and the equipment position improved and is the PHC doing all that it is capable of?

Health programme management at a micro level is done by the Gram Panchayat. Are the members of the GP capable of this? Health programmes have to be managed judiciously and with care. At times GPs are staffed by illiterates, neoliterates or even first-time-ever-office bearers and this often causes a bit of stagnation in the process and lack of progress. You should be able to assess this and if you think that this requires to be rectified then you should suggest corrective steps. Do you think that the members of the GPs should go through some sort of training? Should they be introduced to the health programmes and the functioning of the PRI (Panchayat Raj Institutions)? These questions need to be answered by you in your assessment of the programme.

5.3.5 Secondary Level

Here we are dealing with the Taluk Panchayat as it is called in Karnataka and in many other states, It is also referred to as the Panchayat Samiti in some states. This is the middle level and generally the medical facility available here is the Community Health Centre of the Community Hospital. The effect of the concept of Regionalisation of health care could be felt here. There should be enough staff and equipment here for the patient to receive secondary level of treatment. If this centre or hospital is well equipped and staffed it would take the load off the District Hospital. At present due to poor staffing and equipment often it is seen that the patient goes from the PHC directly to the District Hospital and thereby puts a strain on the system of tertiary care which that centre is meant to provide.

5.3.6 Tertiary Level

The tertiary level services are provided at the tertiary level hospital, that is the District Hospital. Here there is a concentration of the more specialised services like sophisticated laboratory and investigative facilities, here there are better facilities for treatment too. More complicated and high tech operations and treatment of a higher order are offered. This is the apex of the pyramid of regional care as has been earlier started. Cases are referred from the Primary Health Centre at the village level to the Community Health Centre at the block of Taluk level and then from there, the more complicated cases are referred to the District Hospital.

Manning of these centres by technical personnel is also dependent on the level of technical expertise expected of them. In the concept of regionalisation it will be seen that the more highly trained manpower is required at the tertiary level and medium trained persons at the middle level and basic training is imparted to the personnel at the primary level. This is true of all technical manpower. Doctors also follow the same pattern, an MBBS doctor in the PHC and possibly a new post graduate at the CHC and an experienced post graduate with higher specialisation at the District Hospital. This fits in with the overall concept of regionalisation as you have understood it too.

Check Your Progress 3

1) What do you understand by the term hierarchy?

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2) What are three levels of Health care facilities within a District?

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3) Where would you expect the highest level of we, and where would you expect the most modest type of care within district?

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5.4 STRUCTURING OF AUTHORITY AND RESPONSIBLITY

In the previous sections of this unit you have learnt of the three tier system of health care division and how this works. It works well because it is structured in lines with the administrative set-up. If these PRIs (Panchayat Raj Institutions) are to work well, then there should be a smooth structure in their authority and responsibility. Empowerment of the PRIs will hasten the decentralisation or the regionalisation process. You must have heard of decentralisation which is basically another term for regionalisation.

The concept of decentralisation or regionalisation implies delegating authority and responsibility from the central (National level) to the regional level. Within a region there is again delegation of responsibility and authority to the local level to the extent possible. The region is seen as the logical and desirable level for the planning and administration of health services.

"Midway between the local level—where highly technical problems cannot be solved, and the national level—where sometimes a theoretical equilibrium is sought—the region is the platform *on* which the public health plan can be fashioned, far enough from local contingencies to regard them with detachment, but near enough to appreciate their importance; far enough from the central authorities for objectivity, but near enough to influence them."

You will realise from the above that while control of the region is exercised from the centre of the region, in our case the District Headquarters, there has to be a sense of participation from the local level. The largest user of the services is the man at the local level and therefore it is imperative that he or his representative take part in the decision making process in so far as it deals with the local level of the region. This is where the gram panchayat as elected representatives come into play and have a say in the type of care that is provided. This of course would depend on the finances that are available. All this has to be planned at the District level. It is in this process of empowerment of the PRIs that the 74th Constitutional Amendment was passed.

Constitution for the District Planning Committee (DPC)

In accordance with the provisions of the 74th Constitutional Amendment, a District Planning Committee is envisaged in each District to prepare and consolidate the plans prepared by the Panchayats and the municipalities in the district and to generate a draft development plan for the district as a whole. While preparing the district plan, the DPC is expected to note the locational aspect of project, care for integrated development of infrastructure and environmental conservation and evolve criteria for sharing of the natural and financial resources. However, the composition of the DPC has been left to the discretion of the state, but it has been stipulated that 80% of the members shall be those elected to panchayats and municipalities.

5.5 DISTURBING VARIABLES

Regionalisation has not always been easy to implement. There have been instances where a "well planned" system has gone away because the so *called* "well planned" system was not actually well planned. There have been instances where for lack of involvement of the right persons the scheme has failed. When you try to study the working in your PHC, TP and ZP, you should also see how the scheme is working and whether there are hindrances.

A few bureaucratic hurdles that were encountered in one district where one N W had decided to try and implement the scheme of regionalisation on a small scale. These are only examples and there could tie many more such bottlenecks.

There could be many more such factors and they could differ from place to place. It would not be possible to list them all. They have to be looked for and tackled on a day-today basis. You must look for these in your PHC, TP, ZP. It has quite often been seen that projects fail, not due to lack of funds as is commonly thought, but due to bad planning and poor implementation and also lack of involvement of the grass-root level workers and beneficiaries.

Well documented schemes which failed listed some of the reasons as below:

a) The State authorities did not feel it necessary to be involved in a district scheme which was being planned by an NGO.

b) District Health Officers who were to oversee the working of the scheme were transferred frequently.

c) Panchayat members were not involved and the state authorities had expressed a degree of caution by noting that "Elected members vary in caliber and attitudes, Consult the District Health Officer before involving them". This sort of negative suggestion with a frequently transferred District Health Officer, left the whole programme without an impetus.

d) Dynamic leadership was lacking as *seen* by the fact that even when workshops were held and suggestions made they were not implemented for very trivial bureaucratic reasons. Repairs to vehicles were not carried out though funds were available, but the procedure for releasing funds was long. Contingency funds were not given to the PHC. Drugs available in the stores did not reach the sub-centre.

e) Passing of bills related to travel expenditure was delegated to the Taluk officers but most of these posts were vacant and hence these bills remained unpassed.

Implementation of any programme or concept always needs careful planning and motivated and dedicated personnel. It is necessary that time should be spent on familiarising worker at all the three levels on the benefit of regionalisation and to explain how this system works to the benefit of all levels.

Problems crop up in *the* system when functionaries at different levels are not sure *of* their duties or assume duties of other levels.

Problems *can* occur in the smooth flow of patients from the PHC to the CHC and then on to the District Hospital. This should be looked into and any obstacles) cleared, like transport, staffing (drives) and *so* on. For this purpose you need to check what happens to the patient when he is discharged from the District Hospital, Does he come back in an organized manner? Does he have notes for the PHC Doctor on the follow up of his clinical condition? All these are to be built into the system or regionalisation if it to *succeed.*

Assigning of responsibilities in implementation of the National programme at the grassroot level also causes problems. All these need to be looked into. A common sense approach with an open mind generally yields simple and practical solutions to most of these problems of implementation. It is also best to involve the functionaries affected in the decision making process or at least to consult him/her before a final decision is taken, otherwise some simple hurdles are missed out when these are discussed in higher levels. Taking decision making to the periphery and to the concerned person, pays great dividends. In fact this itself is the basis for regionalisation.

5.6 THE REGIONALISATION PROCESS

The process of regionalisation has been introduced to effect better efficiency in the system and if this has to work as planned, then there should be a free flow of information and of patients within the region. This includes referral of patients from the periphery to the centre that is from the PHC to the CHC and then on to the District Hospital. After the necessary treatment these patients should be able to go back to their villages with the necessary feedback on the treatment given and also the diagnosis and treatment for necessary follow up of the treatment.

5.6.1 Coordination within the Region

For the regionalisation or decentralisation process to be successful, it is necessary that there should be cooperation between all the levels of the three tiered system and its agencies. The district level is the most crucial in the chain of command of the various departments of the district. This is so for the Public Health Department and also for the affiliated departments which are concerned with the general welfare of the people of the district and the taluks and the villages. Coordination does not take place spontaneously. It will also not take place if the process of coordination is left to one of the agencies involved. "There has to be a carefully designed administrative structure which will oversee the function of coordinating the various departments and particularly the large areas where there is an overlap of the functions of these departments, so that the common man may benefit the maximum through optimal utilisation of resources. The coordination mechanisms itself will entail costs. However, these will be offset by improved functioning and eliminating duplication of effort and resources."

5.6.2 Monitoring

Any system which involves the participation and the cooperation of three different levels of functionaries and also keeping open channels of communication between all these levels should also be carefully monitored so that mid-stream corrections can be applied so that the scheme has the right impact on the people who are to be the beneficiaries, that is the last villager should feel the impact of the scheme. Monitoring is better done by an agent independent of the functioning of the scheme itself as otherwise there is a tendency for bias in the interpretation of the results, distribution of resources, funds etc.

5.6.3 Basis of Regionalisation

You also learnt that the district serves very well as the nodal centre for the regionalisation process. It occupies a central place in the three tiered system from both sides. It is at the bottom of the three tiered system when you consider the three tiers of the Centre, State and District. It is at the top of the regionalisation three tiers, that is the District, the Taluk and the Village. This unique feature gives the concept of regionalisation and has various advantages. Principal among these is the fact that the entire governmental administrative machinery too is district based. It is ideal, therefore, that the health care machinery too follow the same system. This makes coordination between the various departments which are closely associated with health care, like food, water supply, environment, poverty removal and so on smooth and easy.

5.6.4 Panchayat Raj

We have also seen how the concept of the Panchayat Raj is historical reality and how the concept of the Panchayat Raj and Panchayat Raj Institutions (PRIs) has been brought back into the administrative machinery and working through the 73rd

and 74th Amendments. The 73rd Amendment brought in the formalised concept of the Panchayats as units of self administration and the 74th Amendment brought in the concept of the working of the District Planning Committee. These two processes really formalised the understanding and the application of the concept of regionalisation with the District as the nodal point for the region. Since the panchayats and DPCs had elected representatives of the people, the schemes were user friendly. The DPC and the various panchayats within the district were to monitor the progress of the various schemes and programmes within their area of responsibility and health care was one of them. This has the distinct advantage of promoting coordination between the different departments which are involved in overlapping and mutually beneficial schemes.

It has been amply demonstrated that a well organised and coordinated three tiered hierarchy of the Zilla Parishad and the Panchayat Samithi and the Village Panchayat and their corresponding Panchayat Raj Institutions of District Hospitals, Community Health Centres and the Primary Health Centres, are currently the best institutions for providing health care at the various levels. This concept and practice of regionalisation has been seen to work well and smoothly where there is good coordination at all levels and between the functionaries of the different levels. Since elected bodies are involved in their implementation, it ensures involvement of the beneficiaries through their elected representatives too. The process of regionalisation of Health Care which closely follows the regionalisation of administrative machinery is therefore a successful step towards the provision of health care.

5.7 LET US SUM UP

In this unit you have learnt about the concept and process of regionalisation. The concept came up when it was realised that concentrating all the administrative, financial and such other powers in the centre and taking all the decisions there, did not take into account the needs and felt needs of the last beneficiaries that is the villagers for whom the health care activities were meant.

You have also learnt about the basis of evolving of a region, the level of services provided within the region and also about the hierarchy of services within the region. Further you learnt that district serves a nodal point for the regionalisation process and it occupies a central place in the three tiered system from both sides. Subsequently you learnt how the concept of panchayat raj and panchayati raj institutions (PRIs) has brought back into administrative machinery and working through 73rd and 74th amendments.

Towards the end you learnt about the problems/disturbing variables in implementation of the regionalisation process as well as the monitoring and coordination within the region.

5.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

a) general administration.

b) Panchayati Raj

c) three, Gram Panchayat, Taluka Panchayat, Zila Parishad

Check Your Progress 2

1) • geography,

- economy,
- ecology,
- culture, and
- nodal centre

2)
- cultural homogeneity
- ecological homogeneity

Check Your Progress 3

1) The dictionary defines the world hierarchy as "a body classified in successively subordinate grades." In our application it means the step ladder type of levels that we have established in the system for optimal function.

2) Primary level—PHCs and Sub-centres

   Secondary level—CHCs

   Tertiary level—District Hospital

3) Highest level of care is available at district hospital.

   Most modest type of care is available at PHCs and Sub-centres.

UNIT 1 PROGRAMMES RELATED TO COMMUNICABLE DISEASES

Structure

1 . OBJECTIVES

After going through this unit, you should be able to:

- explain the evolutional background of programmes related to select communicable diseases;
- identify major strategic components of those programmes; and
- outline the organisational structure of select programmes.

1.1 INTRODUCTION

In the preceding block you have learnt about the health system in India. Under various units in that block, you have learnt about an overview of: health care delivery system; alternate system of medicine, including indigenous system; health policy and strategies; district health organisation; and regionalisation of heal* care.

In the present block you will learn about various ongoing national health programmes. For the convenience of understanding, these programmes have been classified into four categories: programmes related to communicable diseases; programmes related to non-communicable diseases; reproductive and child health programme; and other programmes. Through the opening unit of this block, you will be learning in brief about some important health programmes related to communicable diseases.

Since your learning needs are related to management, the focal points of discussion will be about evolutionary, strategic and organisational features of these programmes instead of details of technical (bio-medical) aspects. In this unit you will learn about the salient features in historical evolution, strategic components and organisational structure of the programmes directed towards vector-borne diseases, tuberculosis, leprosy, AIDS and STDs, and guinea worm disease in India.

1.2 PROGRAMMES AGAINST MALARIA AND OTHER VECTOR-BORNE DISEASES

In this section you will learn about the programmes related to vector borne diseases. You will appreciate that, development of malaria control activities in India can be taken as a specimen to understand the development of health care in India in many regards. You can realize it by briefly reviewing the evolution of anti-malaria programme in our country.

1.2.1 National Anti-Malaria Programme (NAMP)

Most of you must be aware of that the first systematic anti-malaria activity started in India under National Malaria Control Programme (NMCP) which was launched in 1953. It was a result of one of the recommendations of Bhore Committee (1946) that was endorsed by Planning Commission in 1951. The main NMCP strategies were:

- Residual insecticide spray of human dwellings and cattle sheds.
- Survey and monitoring of malaria incidence by malaria control teams under state anti-malaria organisation.
- Provision of anti-malarial drugs for patients reporting to health facilities.

This strategy appeared to work and significant progress in malaria control with regard to morbidity and mortality was observed all across the country. So were the experiences in several other countries as well, creating an optimistic sentiment among the policy makers world over. In 1955, World Health Assembly reflected this sentiment by recommending a shift from control to eradication of malaria. India responded to this shift by starting National Malaria Eradication Programme (NMEP) in 1958. The objective was to eradicate malaria in next 7-9 years. Outstanding achievements followed and India reported zero death in 1965.

Setbacks in malaria eradication started from 1968 onwards. It was realized that urban areas could not receive adequate attention. Urban Malaria Scheme was launched in 1971 with source reduction and anti-larval measures as its main strategic components but the resurgence of malaria could not be stopped. Burden of malaria attained huge proportions by 1976. The approach of malaria eradication was reviewed and a Modified Plan of Operation (MPO) was adopted in 1977, with following objectives:

- Prevention of malaria deaths.
- Reduction in malaria morbidity.
  Maintenance of industrial growth and green revolution through freedom from malaria.
- Consolidation of achievement gained so far.

Following major activities were undertaken during this phase:

- Insecticide spray during the transmission period in rural areas having Annual Parasite Incidence (API) ≥ 2.
- Active surveillance by fortnightly domiciliary visits and blood smear collection.
- Presumptive and radical treatment.
- Decentralization of laboratory services to PHC level.
- Establishment of Drug Distribution Centre (DDC) and Fever Treatment Depots (FTDs).
- Control of *Plasmodium falciparum* and checking its spread through *Plasmodium falciparum* Containment Programme (*Pf*CP).

Malaria Action Plan (MAP)

Till early nineties, the MPO was able to control malaria problem but since 1994 many areas have shown proneness to outbreaks of epidemic proportions with high mortality. The programme has been reviewed again by an expert committee and proposed Malaria Action Plan is in the process of implementation, The expert committee also deliberated on evolving paradigms of malaria in the country and identified five problem areas:

- Hard-core (Tribal) areas
- Epidemic prone areas
- Project areas
- Triple insecticide resistance areas
- Urban areas

This new action plan has following objectives:

- Management of serious and complicated malaria cases.
- Prevention of mortality with particular reference to high risk groups.
- Reduction in morbidity.
- control of outbreaks/epidemics.
- Reduction in *Plasmodium falciparum* resistance and containment of drug resistant malaria.
- Maintenance of low incidence status.

For seven North-Eastem states, malaria control has been made 100% centrally sponsored since 1994. Besides this, Enhanced Malaria Control Project (1997) is providing additional resources to several other malaria prone states.

Enhanced Malaria Control Project **(EMCP)**

This project has been planned to cover problematic Primary Health Centres where:

- API is >2 for last 3 years,
- *Pf* cases are >30% of the total malaria cases,
- >25% of the population is tribal, and
- The area has been reporting deaths due to malaria and has the flexibility of directing resources to other areas during outbreaks.

Besides benefiting core tribal populations in seven states, EMCP will strengthen anti-malaria activities all over the country through augmented IEC, training and management.

In the year 1999, NMEP has been redesignated as National Anti-Malaria Programme (NAMP).

Organisational Structure of NAMP

Integration of a national health programme with general health care system is best visible in NAMP. In fact, the history of development of NMEP (now NAMP) correlates with the history of development of primary health care in India. So much so that many experts say that the problem of malaria can be used as a concurrent indicator of primary health care in the area. Since vector-borne diseases have a very high epidemic potential, integration of their control activities with primary health care is very essential, at least for surveillance and chemotherapy.

Modified Plan of Operation (1977) made a big leap forward in this regard and the trend continues. Responsibility of case detection and treatment rests with the PHC staff, Health Worker (Male) carries out active surveillance and administers presumptive and radical treatment under the supervision of Health Assistant (Male). Laboratory Technician at PHC examines all blood films collected from the area. Medical Officer at PHC is the overall in-charge of anti-malaria activities in his area, besides taking care of serious fever cases. At the district level, a team lead by District Health Officer (DHO) and District Malaria Officer (DMO) is responsible for implementation of the programme in whole district. District Malaria Officer supervises the operational and evaluational components and is assisted by an Assistant Malaria Officer, who arranges and coordinates insecticide spray operations in various PHC areas of the district through a group of insecticide spray teams.

At the state level there is a State Malaria Officer, who coordinates between Regional and District Malaria Officers along with Urban Malaria Units in his state. State Malaria Officer is

also assisted by an Entomologist and his team. Directorate of NMEP/NAMP at the central level is the nodal agency for planning, implementation, review and evaluation of the programme.

1.2.2 National Filaria Control Programme (NFCP)

This programme was started in India in 1955 with three major components:

- Delimitation surveys.
- Recurrent anti-larval measures in urban areas.
- Anti-parasitic treatment to clinical cases and microfilaria carriers.

Operational components of NFCP have been merged with Urban Malaria Scheme since 1978. Training and research components continue to be with National Institute of Communicable Diseases (NICD).

Filariasis was generally considered to be more associated with urbanization. Now it is rapidly establishing itself as a major endemic in several rural areas as well. Now the filaria control activities are being tried to get integrated with primary care system. In this regard, peripheral health workers and volunteers are going to be key persons for training and involvement in anti-larval activities in the rural areas.

1.2.3 Kala Azar Control Programme

In our country the main burden of *leishmaniasis* or Kala Azar is confined to three states: Bihar (northern areas), West Bengal and Uttar Pradesh (some parts). It has re-emerged as a significant public health problem in these areas. The assistance for the programme is borne by the budgetary provisions of National Anti-Malaria Programme (NAMP). However, some additional resources are now being channelized to sustain planned activities against Kala Azar in the affected areas. These activities include:

- Vector reduction by indoor fesidual insecticidal spray, twice a year.
- Early diagnosis and complete treatment of Kala Azar cases.
- Health education for community participation.

1.2.4 Japanese Encephalitis Control Programme

Japanese encephalitis (JE) has rapidly spread to various parts of our country making several newer areas prone to outbreaks. Programme to control JE does not have separate budget of its own but gets assistance from National Anti-Malaria Programme (NAMP) for investigation and containment of epidemics in affected states. Following measures are taken to prevent and control the JE outbreaks:

- Vector control by aerial or ground fogging with the ultra-low volume insecticides.
- Prevention of man-mosquito contact.
- Prevention of animal reservoir-mosquito contact.

Health education.

1.3 NATIONAL TUBERCULOSIS CONTROL PROGRAMME

In this section you will learn about another important national programme i.e. Tuberculosis Control Programmes.

You must be knowing that Tuberculosis is today's global health emergency. Further, in our country, this problem has acquired threatening proportions inspite of four decades of programmed efforts to control it.

National Tuberculosis Control Programme was started in India in 1962. It has always been given due priority in health sector. Central Government financially supported the states on

50:50 basis. District was identified as the key unit for tuberculosis control activities and the District Tuberculosis Centres (DTCs) were established to develop District Tuberculosis Progamme (DTP). DTCs were assisted and strengthened by state level organisation. Main strategic components of the programme were:

- Early detection and treatment for converting infectious cases to non-infectious.
- Preventing non-infectious cases from becoming infectious with complete treatment.
- Diagnosis through radiology and sputum microscopy.
- Free domiciliary care through primary health care.
- Establishing District Tuberculosis Centres (DTCs) in every district.
- Extending coverage under Short Course Chemotherapy (SCC).
- Strengthen State TB Training and Demonstration Centres.

Revised National Tuberculosis Control Programme (RNTCP)

Though the National Tuberculosis Control Programme was very successful in creating an infrastructure for tuberculosis control throughout the country, it could not achieve the desired results in actual control of disease. Because of this reason and in consideration of changing situation and emerging threats in tuberculosis, the programme was comprehensively reviewed in 1992. As a result of this exercise Government of India adopted a new strategy in the form of Directly Observed Treatment, Short-course (popularly known by thk acronym DOTS) in 1993. The programme that has adopted DOTS strategy is known as Revised National Tuberculosis Control Programme (RNTCP). DOTS is a systematic strategy and has five major components in it:

a) Political and Administrative Commitment: Appreciation of the gravity of problem and giving it due priority.

b) Good Quality Diagnosis: Improvement in the quality of sputum microscopy. All the subjects having cough for ≥ 3 weeks will be subjected to sputum microscopy.

c) Good Quality Drugs: An uninterrupted supply of good quality anti-TB medicines to be made available. For every registered patient a box of medicines for the entire treatment is earmarked. So that the treatment will never fail for lack of drugs.

d) Right Treatment, Given in the Right Way: The heart of DOTS strategy is the component of 'directly observed treatment' in which a health worker or another trained person, who is not a family member watches as the patient swallows the daily dose of anti-TB medicines in his presence.

e) Systematic Monitoring and Accountability: Cure rate and other key indicators are monitored at every level.

In the RNTCP, the responsibility for cure has been shifted from the patient to the health care system.

Organisational Structure of NTCP

At the peripheral level, tuberculosis control activities are conducted through Primary Health Centres/Community Health Centres in the rural areas. For every 5 lakh rural population, there is a TB Unit situated at one of the CHCs. Medical Officer (TB control) is also working at sub-district level. There are TB Centres and Chest Clinics for urban areas.

At district level, a District Tuberculosis Centre (DTC) works under District Tuberculosis Qfficer as a nodal body for planning, organisation and implementation of TB control activities in the entire district. There are separate Tuberculosis Officers for metropolitan cities,

Besides the national TB institutions, State TB Training and Demonstration Centres are also strengthening the programme. The overall supervision of the programme is done by Deputy Director General (TB) at the national level.

1.4 NATIONAL LEPROSY ERADICATION PROGRAMME

In this section you will learn about another important national health programme related to a .chronic disease which is leprosy.

In 1955, National Leprosy Control Programme was started. Early detection of cases and depsone monotherapy were the mainstays of the programme. But, due to very long duration of treatment and irregular compliance, it could not register much success. After the successful piloting of multi-drug therapy (MDT) in two districts of our country, the programme was redesignated as National Leprosy Eradication Programme (NLEP) in 1983 with the objective to eliminate leprosy as a public health problem by 2000 AD. MDT has shown good results and the prevalence of leprosy has declined from 5.711000 population in 1981 to 0.5911 000 population in 1996.

The broad strategy of NLEP has two major components:

- Interruption of transmission through early detection and prompt and adequate treatment using MDT.
- Case holding and surveillance.

Strategy for Endemic Districts with Complete Vertical Set-up

There is a separate cadre of health functionaries in the districts with prevalence of ≥ 5 per 1000 population. It works with following strategic components:

- Strengthening of leprosy control infrashucture in the district.
- Adequate training of staff in MDT operations.
- Rapid surveys to enlist undetected cases.
- Screening of all cases to delete cured, left, died cases; categorizing others as multibacillary or paucibacillary cases; and preparing individual case cards.

Strategy for Endemic Districts with Inadequate Infrastructure

In the districts where vertical set-up is yet to be established, a modified approach for MDT has been adopted. It differs from the vertical programme in following areas:

- District Leprosy Unit worksunder the overall charge of District Medical Officer.
- Leprosy control activities are done by primary health care staff, when separate cadre of health workers is not available.
- MDT operations are under the charge of Medical Officer of the PHC.

Strategy for Districts which have Completed ≥ 7 Years with MDT

- Half of the paramedics from the separate vertical cadre are redistributed to make them a part of PHC.
- District Leprosy Unit is retained at district level.
- Infrastructure created under leprosy is retained. In addition to NLEP, it starts sharing some work for tuberculosis control.

Strategy for Next Phase

- Bringing modified MDT districts under regular vertical MDT for 5 years by hiring extra manpower.
- Introducing modified MDT in moderately endemic districts having prevalence between 2 to 5 per 1000.
- Introducing MDT in endemic pockets of remaining low endemic districts.
- Establishing zonal set-up to cover endemic pockets cutting across several districts.
- Establishing IEC cell at national headquarter to coordinate health education activities.

Organisational Structure of NLEP

The programme is headed by National Leprosy Eradication Board and Leprosy Division of the Directorate General of Health Services at the central level. This leadership is augmented by central and regional Leprosy Training and Research Centres and a number of voluntary organisations. At the state level, there is a State Leprosy Officer under the Directorate of Health Services of the respective state.

At the district level, tlie programme is supervised by the District Leprosy Officer who coordinates the activities of Leprosy Control Units (LCU) in the district. His/Her efforts are assisted by following other leprosy control facilities at district level:

- Leprosy Training Centres
- Urban Leprosy Centres
- Teniporary Hospitalisation Wards
- Reconstructive Surgery Units
- Sample Survey with Assessment Unit
- Leprosy Rehabilitation Promotion Unit
- Mobile Leprosy Treatment Units

Leprosy Control Units function as the key agencies in conducting programme activities. It is staffed by a medical officer with his team of non-medical supervisors, trained leprosy paramedics, laboratory technicians, physiotherapist, health educator and statistical assistant. In the rural areas with prevalence 1-511000, there is provision of Survey Education and Treatment (SET) Centres. One SET centre covers 25000 population. It is staffed by a trained leprosy paramedic and is attached to a PHC.

Check Your Progress **1**

1) Enumerate the major activities undertaken through Modified Plan of Operation (MPO) of NMEP after 1977.

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2) List tlie problem areas that have emerged in malaria after 1984.

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3) Explain tlie strategic shift in Revised National Tuberculosis Control Programme (RNTCP).

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4) Use the Five coniponents of RNTCP.

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5) List the two major components of broad strategy of NLEP.

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6) Enumerate the staff members of a Leprosy Control Unit (LCU).

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. Activity

Draw a graphic presentation of organisational set-up of National Leprosy Eradication Programme from primary care level upwards.

1.5 PROGRAMMES AGAINST AIDS AND STDs

You must already be knowing that infection with Human Immuno-deficiency Virus (HIV) is a world-wide problem and has been reported from all parts of our country. There has been a considerable rise in the seropositivity rate during last two decades. The burden of Sexually Transmitted Diseases (STDs) is an old problem with us and we have been tackling it through one of our oldest health programmes. In both of these diseases, risk behaviour is similar and unsafe sex plays a very important role in transmission and maintenance of pool of infection in population. Moreover, presence of STDs facilitates both acquisition and transntission of HIV infection. These considerations create a need for development of an approach that tackles both of these problems under a unified or integrated programme. Efforts have already began to achieve this integration at both, national and primary care levels.

1.5.1 National AIDS Control Programme

The HIV infection is spreading from high risk to low risk groups and from urban to rural areas. Today, there are over 7000 identified cases of AIDS in India and the probable source of infection in three fourth of them is heterosexual contact. The overall seropositivity rate in our country is 24.61 per 1000 persons screened.

A concerted activity to contain the spread of this terminally fatal disease started in 1987 when National AIDS Control Programme was initiated with following objectives:

- To prevent infection with HIV.
  To reduce the personal and social impact of HIV infection.
  To mobilize and unify national and international efforts against AIDS.

The plan of action consists of following strategic components:

Strengthening of Programme Management: The salient features of this component have been described under the organisational structure of NACP.

Surveillance: HIV/AIDS surveillance is being done through I-IIV sentinel surveillance at selected centres for specific population groups e.g. STD clinic attenders, injecting drug users and also pregnant women at certain centres; and surveillance of AIDS cases through all medical institutions.

Information, Education and Communication (IEC): For the dissemination of correct and consistent messages through interpersonal channels, health workers, group activities, and mass communication.

Targeted Interventions: Specifically designed for specific high risk groups with an aim of behavioural modification.

Control of Sexually Transmitted Diseases (STDs): STD control activities are being integrated with AIDS control programme. You should also go through the sub-section on National STD Control Programme at the end of this section,

Cohdom Programming: To ensure easy access for people to good quality, acceptable and affordable condoms and providing the right and adequate information about safe sex and condoms to people,

Blood Safety Programme: To ensure safety of blood and blood products. This programme was started in 1989-90. Now it has become an integral part of NACP. National Blood Transfusion Council, established in 1996, looks after this progranune.

Organisational Structure

National AIDS Committee and a Multisectoral Committee have been constituted at the national level to create intersectoral collaboration. National AIDS Committee is the highest body to give policy direction and supervise programme performance. It has representatives from various ministries, non-government, private and voluntary organisations and is chaired by the Union Minister of Health and Family Welfare.

Three more bodies have been set-up at national level, under the National AIDS Committee: National AIDS Control Board (NACB), National AIDS Control Organisation (NACO) and Technical Advisory Committee (TAC). National AIDS Control Board works under the chairmanship of secretary (health). Its functions arc to approve the NACO policies, expedite financial sanctions, approve procurcment and to undertake and award contracts to private bodies. NACO was established under Ministry of Health and Family Welfare for effective implementation and monitoring of the programme. The TAC works as an advisory body to NACO, and has eight sub-committees to cover key programme areas.

At the state level, State AIDS Cells, Empowered Committees and State Technical Advisory Committees supervise the programme activities and coordinate with the national bodies.

1.5.2 National STDs Control Programme

Started in 1949, it is one of the oldest health programmes in India. I-lowever, in today's reality, the STD control has been integrated with AIDS control activities considering the relationship between HIV and STD. To accomplish this integration STD Programme Officers have been appointed in the NACO at national level and in the State AIDS Cells at state level. Syndromic approach has been adopted as the main strategic component in treating STDs at peripheral level.

The syndromic approach has substantively simplified the treatment of STDs even at a place where proper diagnostic facilities for STDs are not available. In this approach, a combined treatment is given for all pathogens that can create a particular clinical picture (syndrome). Treatment prescribed is the one which is simple, short and still very effective. Most of the time STDs manifest as one of the following syndromes:

- Genital ulcer
- Urethral discharge
- Vaginal discharge
- Inguinal swelling
- Lower abdominal pain

A flow chart, with recommended treatment regimens, has been developed against each of these syndromes that helps in clinical decision making and in the selection of a suitable prescription for the patient.

1.6 NATIONAL GUINEA WORM ERADICATION PROGRAMME

After small pox, guinea worm is the next disease that has been virtually eradicated from India through deliberate human intervention. The last case of guinea worm in India was reported in August, 1996. This is a result of concerted activities through a quickly established eradication programme. In 1980, approximately 45000 guinea worm patients from seven states of our country (Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka, and Tamil Nadu) were estimated. Most of the cases were coming from rural areas. Ours was the first country to launch a National Guinea Worm Eradication Programme in

1983-84. It is a centrally sponsored programme which adopted following eradication. strategies:

- Case detection through three active case search operations during April, June and December every year followed by inter-search surveillance and regular monthly reporting.
- Case management.
- Vector (Cyclops) control by treatment of unsafe drinking water sources with Temephos, eight times a year along with use of fine mesh nylon/double layered cloth strainers to filterthe drinking water.
- Health education and community involvement.
- Continued training for manpower development for eradication activities.
- Provision and maintenance of safe drinking water supply on priority in endemic villages.
- Concurrent evaluation and operational research for efficiency and effectiveness of the programme.

Organisational Structure of **NGWEP**

GWEP activities have been integrated with the primary health care system of endemic states, and have been implemented by respective State Health Directorates. Each endemic state has a GWEP-Officer who is assisted by a Technical Officer. The District Medical Officer and PHC Medical Officer are responsible for local planning, implementation and monitoring of eradication activities.

Check Your Progress 2

1) List the strategic component's of National AIDS Control Programme.

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2) How the case detection activity was performed under National Guinea Worm Eradication Programme?

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1.7 LET US SUM UP

In this unit you have learnt about the historical evolution, strategic components and organisational structure of the programmes related to vector-borne diseases, tuberculosis, leprosy, AIDS & STDs, and guinea worm disease in India.

You have also learnt that how the history of development of a programme against one particular communicable disease (malaria) correlates with the history of development of primary health care in India. And also that the control activities targeted to other vector-borne diseases like filaria, kala-azar and JE are closely associated with NMEP/NAMP. Similarly AIDS control activities work in tandem with STD control activities. You have also learnt about the strategic shift in Revised National Tuberculosis Control Programme as it is applying the DOTS. The change brought by MDT in our approach towards leprosy control and distinctive organisational features in NLEP have been highlighted. The strategies and achievements of National Guinea Worm Eradication Programme have also been outlined.

It was also highlighted that most of the national health programmes need to be integrated with primary care system to be effective and sustainable.

In the next unit you will learn about the programmes related to non-communicable diseases.

11.8 KEY WORDS

Annual Parasite Incidence (API) : A measurement of malaria incidence calculated by the formula: (Confirmed cases in one year ÷ Population under surveillance × 1000.

Presumptive treatment *(in malaria)* : Antimalarial treatment given on assumption that all fever cases are due to malaria. It is administered before the blood film is examined.

Radical treatment *(in malaria)* : Anti-malarial treatment given to blood film positive cases during follow-up visit, It is definitive treatment to ensure complete cure and make the patient non-infective.

Reservoir *(of infection)* : Any part of living or inanimate environment which harbours the pathogenic organisms capable of being transmitted to humans or animals.

Syndrome : A group of symptoms creating a clinical picture. Standard definition of the term 'syndrome' is: *the aggregate of signs, symptoms or other manifestations considered to constitute the characteristics of a morbid entity.*

Veotor *(in infective diseases)* : An animal, commonly an arthropod, capable of transmitting an infective organism from one host to another.

1.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1)
- Insecticide spray during the transmission period in rural areas having Annual Parasite Incidence (API) ≥ 2.
- Active surveillance by fortnightly domiciliary visits and blood smear collection.
- Presumptive and radical treatment.
- Decentralization of laboratory services to PHC level.
- Establishment of Drug Distribution Centre (DDCs) and Fever Treatment Depots (FTDs).
- Control of *Plasmodium falciparum* and checking its spread through ***Plasmodium falciparum Containment Programme*** (*Pf*CP).

2)
- Hard-core (Tribal) areas
- Epidemic prone areas
- Project aregs
- Triple insecticide resistance areas
- Urban areas

3) Because of a comprehensively review of National Tuberculosis Control Programme in 1992. Government of India adopted a new strategy in the form of Directly Observed Treatment, Short-course (DOTS) in 1993. The programme is redesignated as Revised National Tuberculosis Control Programme (RNTCP), The responsibility for cure has been shifted from the patient to the health care system. In DOTS strategy, an uninterrupted supply of good quality anti-TB medicines is ensured and the patient swallows the daily dose of anti-TB medicines in the presence of a health worker or another trained person, who is not a family member.

4)
- Political and administrative commitment
- Good quality diagnosis
- Good quality drugs

- Right treatment given in the right way
- Systematic monitoring and accountability

5)
- Interruption of transmission througth early detection and prompt and adquate treatment with MDT
- Case holding and surveillance.

6)
- Medical Officer
- Non Medical Supervisiors
- Trained Leprosy Paramedics
- Laboratory Technicians
- Physiotherapist
- Health Education
- Statistical Assistant.

Check Your Progress 2

1)
- Strengthening of programme management
- Surveillance
- Information, Education and Communication (IEC)
- Targeted interventions
- Control of Sexually Transmitted Diseases (STD)
- Condom programming
- Blood safety programme

2) Case detection was performed through three active case search operations during April, June and December every year followed by inter-search surveillance and regular monthly reporting.

1.0 FURTHER READINGS

Kishore, J., *National Health* Programmes of India, 2nd ed., New Delhi, Century Publications, *1999.*

Park, K., Concepts of Health and Disease, In K. Park's Textbook of Preventive *and Social* Medicine, 15th ed., Jabalpur, Banarsidas Bhanot, 1997.

Taneja, D.K., Health *Policies and Programmes* in *India,* 1st ed., New Delhi, Doctors Publication, 1998.

- Right treatment given in the right way
- Systematic monitoring and accountability

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- Case holding and surveillance.

9 • Medical Officer
- Non Medical Supervisiors
- Trained Leprosy Paramedics
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Check Your Progress 2

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1.10 FURTHER READINGS

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Park, K., Concepts of Health and Disease, In K. Park's ***Textbook*** *of Preventive and* ***Social*** *Medicine*, 15th ed., Jabalpur, Banarsidas Bhanot, 1997.

Taneja, D.K., ***Health Policies*** *and Programmes* ***in*** *India,* 1st ed., New Delhi, Doctors Publication, 1998.

UNIT 2 PROGRAMMES RELATED TO NON-COMMUNICABLE DISEASES

Structure

2.0 OBJECTIVES

After going through this unit, you should be able to:

- explain the importance of control programmes for non-communicable diseases;
- describe the historical aspects, objectives, infrastructure and activities of various National Health Programmes for control of non-communicable diseases;
- describe the indicators for monitoring of these programmes; and
- explain the role and responsibilities of community health administrators and hospital administrators in these national programmes.

2.1 INTRODUCTION

Non-CommunicableDiseases are likely to become a major future public health problems in the country due to changing life-styles, increasing stress and tensions due to changes in social and cultural systems in the society. Other factors like increase in life expectancy, resulting primarily from decline in child mortality, control of infectious diseases, extensive use of antibiotics, improvement in nutritional standards and access to health services etc. have contributed to increase life expectancy in the population. With increase in the number of aged people, there will be higher incidence and prevalence of diseases like Hypertension, IHD, Diabetes, Cancers and the whole range of geriatrics problems. The percentage of elderly (60 years and above) is projected to increase from 6 per cent to 12 per cent by 2025. This demographic transition would result in an ageing society, with elderly people having multiple illnesses, loss of vision, loss of hearing, impaired mobility, social isolation, mental stress, loneliness, depression, etc. in this age group.

The estimated number of cancer cases in India are 2 millions and every year 7 lakh cases are detected and 3 lakh die due to cancer in the country. The prevalence of mental disorders is estimated to be 15-20 per thousand population. Various studies put the prevalence of diabetes to be ranging from 0.95 per cent to 3.8 per cent in urban areas and 0.6 to 1.93 per cent in rural areas of the country. About 40 millions are estimated to suffer from coronary vascular diseases. The prevalence of IHD is estimated to be varying from 4.6 to 14.1 per 1000 population.

Besides, there are approximately 12.5 millions economically blind in India and 80 per cent of this blindness is due to cataract. Nearly 60 millions have endemic goitre and an estimated 8.8 millions have mental or psychomotor handicap due to iodine deficiency.

In this unit, you will leam about various national health programmes related to these non-communicable diseases. You will learn about the importance, historical development objectives, infrastructure activities of five important national health programmes viz. blindness control, Iodine deficiency control mental health, cancer control and diabetes control. You will also learn about the indicators for monitoring these progrmme. Towards the end of this unit you will learn about the role of health and hospital management in these programmes.

2.2 NATIONAL PROGRAMME FOR CONTROL OF BLINDNESS

2.2.1 Importance

Of the total estimated 30 million blind persons in the world, 6 million are in India. In India, as per the National Survey results, it is estimated that there are more than 12 million economically blind persons. Of the total 80 per cent are blind due to cataract, 7.35 per cent due to refractive errors, 1.70 per cent glaucoma, 1.52 per cent due to central corneal opacities, 0.39 per cent trachoma and the remaining 4.35 per cent suffer from other causes.

2.2.2 Historical Development

The Government of India established a Trachoma Control Pilot Project in 1956. From the survey on prevalence of infection it was noted that the States could be classified in three groups according to the trachoma endemicity:

Group I: Highly endemic having trachoma prevalence above 50 per cent, comprising the States of the Punjab (74.3 per cent), Uttar Pradesh (68.1 per cent) and Gujarat (56.0 per cent).

Group II: Moderately endemic with prevalence between 50.20 per cent comprising the States of Madhya Pradesh (41.3 per cent), Bihar 35.0 per cent, Assam (25.2 per cent) and Mysore (22.6 per cent).

Group III: Low endemicity with prevalence under 20 per cent were the State of Jammu and Kashmir (16.8 per cent), Maharashtra (11.3 per cent), Kerala (8.7 per cent), Andhra Pradesh (5.3 per cent), Tamil Nadu (4.6 per cent), Orissa (2.7 per cent), and West Bengal (0.5 per cent).

In the launching of the National Trachoma Control Programme priority was given to the high endemic areas where the prevalence was over 50 per cent. By the end of December 1973, a total of 81.07 million population from the 16 States had been brought under the control activities covering 968 Community Development Blocks/Primary Health Centres. Stress was laid on the control measures in the most vulnerable age group i.e. children up to 10 years of age.

In 1973-75, after the Indian Council of Medical Research Survey results were received and the causes of blindness came into focus, the thrust of the strategies of the programme underwent extensive modifications. The Central Council of Health and Family Welfare, at its meeting held in 1975, resolved that one of the basic human rights was the right to see. National Blindness Control Programme was launched in the year 1976 as a 100 percent centrally sponsored programme.

2.2.3 Objectives of the Programme

To reduce the prevalence rate ofblindness from 1.49 per cent to 0.3 per cent by the year 2000 AD.

2.2.4 Programme Strategies, Infrastructure and Activities

Strategy

The four pronged strategy of the programme is:

- strengthening service delivery,
- developing human resources for eye care,
- promoting outreach activities and public awareness,
- developing institutional capacity.

Strengthening Service Delivery

The programme aims to improve the physical, teclinical, and managerial capabilities of medical colleges, district hospitals, community health centres, primary health centres and selected non-profit institutions to provide high quality cataract treatment in institutions or through camps. The programme is implemented through a combination of service delivery models: medical colleges, camps in fixed facilities; camps in iniprovised facilities, (in exceptional case) and if necessary in private facilities, in collaboration between the Central Government, the State Governments, Non-Government organisations.

Strengthening of service delivery is ensured through:

- adhering to the norms for service delivery,
- increasing the output of resources allocated,
- regularisation of organisation of camps,
- involvement of NGOs and private sector, and
- expansion of coverage to tribal and remote rural areas.

4

Development of Human Resources

This component intends to strengthen medical colleges and Regional Institutes of Ophthalmology (RIOs) to train ophthalmologists and selected health personnel on cataract diagnosis, screening, surgery and follow up care as required, and these also provide management training for Central and State Project Managers, District Society Members, Project Co-ordinators and other project staff requiring managerial and administrative skills. training.

Promoting Outreach Activities and Public Awareness: Beneficiary assessment have revealed a variety of factors deterring potential patients from seeking surgery in the different areas. The component aims to generate patient demand for surgery through outreach camps and promotional campaigns.

Infrastructure at Tertiary Level: At the tertiary level of ophthalmic care there are Regional Institutes of Ophthalmology including the Apex institute Dr. R. P. Centre in the All India Institute of Medical Sciences, New Delhi. These centres have been established as centre of excellence in the field of eye care.

In addition, 82 medical colleges have been upgraded under NPCB.

There are 39 medical colleges which have been designated as training centres for Paramedical Ophthaimic Assistants.

Eye banks have been developed in government and non-government sector for promotion of eye donation and collection of eye for corneal transplantation.

Infrastructure at Secondary Level: Districts Hospitals have been equipped for ophthalmic services under NPCB. These districts have been given ophthalmic equipment and requisite manpower have been posted. Central mobile units have also been formed.

Recently, the District Blindness Control Societies scheme has been extended to cover the entire country. These societies have multi-disciplinary structure in which representatives of Government, non-government and private sector.

The concept of District Blindness Control Society (DBCS) is to de-centralise management of ophthalmic services and evolve a partnership among Government, non-government and private sector.

As many as 497 District Blindness Control Societies have been formed till date.

Infrastructure at Primary Level: The problem of blindness in rural areas and hence the programme has tried to expand accessibility of ophthalmic services.

There are 80 central mobile units (attached to medical colleges) and 316 district mobile units which cater mobile eye camps for eye care in general and performance of cataract surgery in particular. These units have a vehicle, ophthalmic surgeon and other para-medical staff. Most of the cataract operations in rural population are conducted through these mobile camps.

Primary health centres are the basic units in the rural areas. Primary health centres have been equipped with ophthalmic equipment and by posting para-medical ophthalmic assistants (PMOA's).

District Blindness Control Society

The society acts under the chairmanship of District Magistrate together with other medical personnel and NGOs with funds directly from the centre.

The objectives for these societies are as follows:

- Providing comprehensive eye care, including school eye screening programme, and rehabilitation of the blind.
- Developing institutional capability for eye care management at the Central, State and District levels.
- Developing collaborating mechanisms for co-operation between the Government and the private/voluntary sector.
- Introducing, monitoring and feedback mechanisms to facilitate implementation and maintain quality control.
- Building institutional capacity for human resources development.

Various activities of the programmes are:

- establishment of Regional Institutes of Ophthalmology,
- up-gradation of medical colleges and district hospitals,
- development of mobile eye units,
- recruitment of required ophthalmic manpower, and
- provision of various ophthalmic services.

Under the IX Plan

The National Blindness Co-ordination Committee recommended the following schemes for implementation for the IX Plan (1997 – 2002).

- Strengthening of the existing infrastructure for eye care, including voluntary sector.
- Strengthening management of eye care programmes through the establishment of the National Eye Care Resource Centre and strengthening Central and State management Cells and DBCSs.
- The school eye screening programme to be extended to all the blocks in the country.
- A policy shift from camp approach to Base Hospital is envisaged to ensure quality of eye care.
- Introduction of comprehensive services for the other major causes of blindness and ocular morbidity in India in addition to cataract.

Check Your Progress 1

1) Magnitude of Blindness in India is .....

2) The Objective of Blindness Control Programme is:

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3) Major Strategies adopted for Blindness Control Programme are:

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4) List the Objectives of District Blindness Control Societies.

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2.3 NATIONAL IODINE DEFICIENCY DISORDERS CONTROL PROGRAMME (NIDDCP)

2.3.1 Importance

Iodine, as you know is a micro-nutrient which is required in the amount of 100-150 micro-grams daily for normal human growth and development. Its deficiency results in abortion, still-birth, mental retardation, deaf-mutism, squint, dwarfism, goitre in all ages; neuro-motor defects etc. Iodine deficiency thus directly affects the "Human Resource Development" which in turn greatly affects the human productivity as well as country's development.

It is estimated about 200 million people are in our country are at risk of developing Iodine Deficiency Disorders (IDD), There is an increasing evidence of wide-spread occurrence of environmental iodine deficiency not only in the Himalayan Tarai areas, but also in river-line areas and even the coastal regions. Surveys conducted by the Central and State Health

Directorates, ICMR and medical institutes have clearly demonstrated that not even a single State/UT is free from the problem of IDD. Sample surveys have been conducted in 25 States and 4 Union Territories of the country which revealed that out of 275 districts surveyed, so far, IDD is a major public health problem in 235 districts where prevalence is more that 10per cent.

In India it is estimated that 71 million population are suffering from endemic goitre and other IDDs.

2.3.2 Historical Development

In India the classical goitre belt extended from Kashmir in North West to Naga Hills in the North East, a stretch of 2400 km. Between 1956-62 Iodised salt was used in the Kangra Valley for mass prophylaxis of goitre and the success of the experiment led to the initiation of the 100 per cent centrally sponsored National Goitre Control Programme in 1962 by the Government of India. The strategy followed was supply of Iodised salt to the endemic areas.

In 1984 the Government of India adopted the policy of Universal Iodisation of salt in the whole country and accordingly modified the organisation and management of National Goitre Control Programme.

The Prevention of Food Adulteration Act was amended in 1988 and as per this the Iodised Salt was to contain 30 ppm Iodine at production level and 15 ppm at retail level.

The Government of India changed the nomenclature of the Goitre Control Programme to National Iodine Deficiency Disorders Control Programme in 1992 to ernphasise the wider implications of Iodine deficiency. The focus centred around the fact that universal iodisation of salt was the most effective measure in terms of human resource development with a cast benefit ratio of 1:8.

2.3.3 Objectives of the Programme

The main objective of the programme is to eliminate IDD to less than 10 per cent by the year 2000.

2.3.4 Programme Strategies, Infrastructure and Activities

Strategies

Programme strategies include:

- use of iodised salt in place of common salt.
- monitoring and surveillance.
- manpower training.
- mass communication.

Programme Infrastructure and Activities

- The policy of iodated salt production has been liberalised and thrown open to private sector. 641 private manufacturers have been licensed by the Salt Commissioner. Annual production capacity of iodated salt is more than 60 lakh metric tones for the entire country.
- The Salt Commissioner in consultation with the Ministry of Railways arranged for the transportation of iodated salt from the production centres to the consuming States under priority category 'B' which is second to that for defence.
- In order to ensure use to only iodated salt, 27 States /UTs have completely banned the sale of salt other than iodised salt while two other State viz. Andhra Pradesh and Maharashtra have issued partial ban.
- For effective monitoring and proper implementation of NIDDCP the States/UTs have been advised to set up IDD Control Cell in the State Health Directorates and Central Government provides cash grants for this purpose. Provides 26 States/UTs have established such cells.

- A National Reference Lab for monitoring of IDD has been set up at the National Institute of Communicable Diseases, New Delhi for training both medical and para-medical personnel and monitoring'iodine content in salt and in urine samples.
- For ensuring the quality control of iodated salt at cansumption level testing kits for on the spot qualitative testing have been developed and distributed to all district health officers in endemic States for awareness.
- It has been proposed to set up district level IDD monitoring labs in all the States who have issued ban notification for iodine. The content of salt and urinary iodine excretion are the most effective tools for proper monitoring of implementation of IDD Control Programme. An allocation of Rs. 75,000 per lab have been provided for this purpose.
- Cash grants are provided by the Central Government for conducting surveys/resurveys of IDD and to carry out Health Education and Publicity campaigns to promote the consumption of iodated salt.
- Realising the importance of control of iodine deficiency in relation to Human Resource Development, NIDDCP has been included in 20 Point Programme.
- The standards for iodated salt have been laid down under PFA Act, 1954. These stipulated the iodine content of salt at the production and consumption level to be at least 30 and 15 Parts Per Millions (ppm) respectively.

Check Your Progress 2

1) Magnitude of Iodine Deficiency Disorders in India is .....

2) The Objective of Iodine Deficiency Disorders Control Programme is:

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3) Major Strategies adopted for Iodine Deficiency Disorders Control Programme are:

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2.4 NATIONAL MENTAL HEALTH PROGRAMME

2.4.1 Importance

In various morbidity surveys, mental illness in India are estimated to vary from 18-20 per thousand population, which is not less than that in developed countries. Mental health as you know is not only related to relations between persons, but also to individuals' relations with community, social institutions, the way of living and working.

2.4.2 Historical Development

The National Mental Health Programme was initiated into the Central Scheme in 1982 considering the magnitude of the problem in the country. As had been recommended by the Central Council of Health and Family Welfare in October 1995, the District Mental Health Programme with a community based approach was launched in four districts, one each in the states of Andhra Pradesh, Assam, Rajasthan and Tamil Nadu in 1996-97 on a pilot basis under the National Mental Health Programme.

The District Mental Health Programme was further ektended to seven more districts in 1997-98 covering one district each in the states of Arunachal Pradesh, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Punjab and Uttar Pradesh. During 1998-99 it was further extended to five more districts in the country.

The annual meeting of the Central Mental Health Authority was held in December 1998 and reviewed the implementation of Mental Health Act, 1987. The authority also reviewed the

implications arising of inclusion of mental illness as a disability in the persons with Disabilities Act, 1995.

2.4.3 Objectives of the Programme

The objectives of the National Programme for Mental Health are:

- To ensure availability and accessibility of minimum mental health care for all in future.
- To encourage applications of mental health knowledge in general health care.
- To promote community participation in mental health services.

2.4.4 Programme Strategies, Infrastructure and Activities

Strategies

Strategies for the programme include

- Training of all workers in the mental health team at identified nodal institutions.
- Health education to increase public awareness and to reduce social stigma
- Services for care of mentally ill patients in OPDs and indoors.
- Collection of related data for future planning, monitoring and research.

Infrastructure and Activities

Following infrastructure and activities have been envisaged in the programmes

- Village health guide at village level identifies and refers/follow-up the case.
- Health worker at Sub-centre level provides first aid and refers/follow up.
- Health assistants help in early detection and management of such cases under the supervision of medical officers.
- Medical officers of Primary Health Centres have overall responsibility of organising and supervising the primary level mental health care.

Various services provided under this programme are:

- Treatment of cases of Schizophrenia, psychosis, paranoid reactions, dementia, anxiety, hysteria, neurotic depression etc.
- Rehabilitation by opening community, district and higher level rehabilitation centres.
- Health education activities to increase awareness.

Check Your Progress **3**

1) Magnitude of Mental Problems in India is .....

2) Main Objectives of Mental Problems Control Programme are:

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3) Major Strategies adopted for Mental Problems Control Programme are:

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2.5 NATIONAL CANCER CONTROL PROGRAMME

2.5.1 Importance

Cancer has become one of the ten leading causes of death in India. In India it is estimated that there are nearly 1.5 – 2 million cancer cases at a given point of time. Over 7 lakh new cases of cancer and 3 lakh deaths occur annually due to cancer. Nearly 15 lakh patients

require facilities for diagnosis treatment and follow up at a given time. Data frompopulation based registries under National Cancer Registry Programme indicate that the leading sites of cancer have remained unchanged over the years, namely oral cavity, lung, oesophagus and stomach amongst men and cervix, breast and oral cavity amongst women. Cancers namely those of head and neck in males, and cervix and breast in females account for over 50per cent of all cancer deaths in India. WHO has estimated that 91 per cent of oral cancers in South-East Asia are directly attributable to the use of tobacco and this is the leading cause of oral cavity and lung cancer in India.

Cancer usually occurs in the later years of life and with increase in the life expectancy to more than 60 years, an estimate shows that the total cancer burden in India for all sites will increase from 7 lakh new cases per year to 14 lakh.

2.5.2 Historical Development

The Government of India, considering the gigantic problem of cancer, launched the National Cancer Control Programme in 1975-76, but at that time priorities were given for equipping the premier cancer hospital/institutions. Central assistance at the rate of Rs. 2.50 lakhs was given to each institution for purchase of cobalt therapy units.

A total of Rs. 19.34 crores was released by the Government for the implementation of the programme during the VIIth Plan period. At the same time ten major institutions were recognised as Regional Cancer Centres which received financial assistance from the Government.

However, it was realised soon that facilities for cancer control in the country at that time were grossly inadequate. The ten regional cancer centres covered only 10per cent of the population for treatment purposes. Some screening programmes were being carried out in a haphazard manner for common cancers e.g. cancer cervix. Public awareness about cancers and measures for tobacco control were patchy. The measures taken so far had been mainly directed towards treatment in advanced stages when it is least effective.

The strategy was revised in 1984-85 and the Cancer Control Programme was made a National Programme.

2.5.3 Objectives of the Programme

The objectives of the programme are:

Primary prevention of cancers by health education regarding hazards of tobacco consumption and necessity of genital health for prevention of cervical cancer.

- Secondary prevention i.e. early detection and diagnosis cancers, for example, cancer of cervix, breast cancer and of the oropharynageal cancer by screening methods and patients' education on self examination methods.
- Strengthening of existing therapeutical services.
- Palliative care in terminal cancers.

2.5.4 Programme Strategies, Infrastructure and Activities

The strategies, infrastructure and activities under this programme include:

Development of Oncology Wings in Medical **Colleges/Hospitals:** This scheme had been initiated to fill up the geographical gaps in the availability of cancer treatment facilities in the country. Central assistance was provided for purchase of equipment which included one cobalt unit. The civil works and manpower were provided by the concerned State Government/Institution. The quantum of central assistance was increased from Rs. 1 crore to Rs. 1.50 crore per institution under the scheme.

Scheme for **District** Projects: It is known that a large number of cancer cases can be prevented with suitable health education and the cases detected early are curable without much expensive treatment. Accordingly the scheme for district projects, preventive health education, early detection and pain relief measures was started. Under the scheme one time

financial assistance of Rs. 15.00 lakh is provided to the concerned State Government for each district project selected under the scheme with a provision of Rs. 10.00 lakh per year for each district for the remaining four years of the project period. The project is linked with a Regional Cancer Centre or an institution having good facilities for treatment of cancer patients. The patients are provided treatment at the conce ned Regional Cancer Centre or the nodal institution.

Financial Assistance to Voluntary Organisations: Under the scheme financial assistance upto Rs. 5.00 lakh is provided to the registered voluntary organisations recommended by the State Government for undertaking health education and early detection activities in cancer.

Cobalt Therapy Installation: To strengthen the treatment facilities the financial assistance has been raised to 1 crore from 1994-95 per unit, and other radio therapy equipment were also bought under the scheme.

Development and Dissemination of Health Education Materials: Health education materials for education of the public not to take tobacco and improve the general hygiene especially of the genitalia to prevent cervical cancers and how to palpate the breast i.e. self exaniination is advocated. For oral cancers people can examine themselves by opening the mouth and seeing in the mirror. Any abnormality if found by this can be further checked by the health workers and senior health officials.

Procurement, Supply and Distribution of Pain Relief Medicines: Under the Cancer Control Programme, Government of India is trying to procure oral morphine tablets for needy cancer patients to relieve their pain?So far it is being given to the Regional Cancer Centres recognisedby the Government of India and to some of the teaching medical colleges which have been recognised under the development of Oncology wing. Wherever the district programme is going on, Regional Cancer Centre are helping them if morphine tablets are needed in those areas.

Assistance for Regional Research and Treatment Centres: There are 12 Regional Research and Treatment Centres recognised by Government of India and recurrent expenditure to the tune of Rs. 50 lakhs is being given to these Regional Cancer Centres.

Role of Regional Cancer Centres

The functions of the regional centres are:

- diagnosis treatment and follow up,
- surveys of mortality and morbidity,
- training of personnel both medical and para-medical,
- preventive measures with emphasis on mass examination, health education and industrial hygiene, and
- research fundamental and applied.

National Cancer Registry Programme (NCRP)

It was realised way back in 1964 that authentic data on cancer was lacking in the country. So, the first Indian Cancer Registry was set up in Bombai. Subsequently the National Cancer Registry Programme was established in 1981-82 by the Indian Council of Medical Research (ICMR) to provide information for the National Cancer Control Programme in India. A need; therefore, was recognised for organisation of cancer registries in different regions of the country and strengthening of the existing cancer registry at Bombai.

The main objectives of NCRP are:

- to generate authentic data on the magnitude af the cancer problem,
- to undertake epidemiological investigations and advice control measures, and
- to develop human resource for research in cancer epidemiology.

The original network of NCRP consisted of three population based cancer registries at Bangalore, Bomb9 and Chennai and three hospital cancer registries in the Chandigarh,

Dibrugarh and Trivandrum. Later on, hospital cancer registries at Bangalore, Bombai and Chennai were strengthened. The network was subsequently expanded by addition of three population-based cancer registries one each at Delhi and Bhopal and a rural registry at Barshi (Maharashtra).

Check Your Progress 4

1) Magnitude of Cancer in India is .....

2) List the Objectives of Cancer Control Programme.

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3) Enumerate major Strategies adopted for Cancer Control Programme.

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4) What are the functions of Regional Cancer Centres?

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2.6 NATIONAL DIABETES CONTROL PROGRAMME

2.6.1 Importance

Epidemiological studies show 1-2 per cent prevalence of diabetes mellitus in India. The multicentric study conducted by ICMR shows that in persons over 15 years of age, the overall prevalence rate of 1.73 per cent. In urban population it is between 0.95-3.8 per cent and for rural population it varies between 0.6 to 1:93 per cent.

2.6.2 Historical Development

An Expert Committee was constituted by the Government of India in 1986 to formulate a national plan of action for the implementation of the National Diabetes Control Programme during the Seventh Five Year Plan.

2.6.3 Objectives of the Programme

The objectives of the National Diabetes Control Programme are:

- identification of high risk subject at an early stage, and imparting appropriate health education with focus on primary prevention.
- early diagnosis of disease and institution of appropriate management so as to reduce morbidity and mortality.
- prevention, arrest or slowing of acute metabolic as well as chronic cardio-vascular-renal complications of the disease,
- identification of subject with partial or total physical handicaps due to the disease, and to ensure their rehabilitation with emphasis on optimal organ or body function.

2.6.4 Programme Strategies, Infrastructure and Activities

It is envisaged to implement the programme at three levels.

- Level one is early identification of the cases by health workers, doctors at PHC, CHC and hospital specialist doctors through surveillance.
- Level two is case detection at hospital level through specialists and manpower training,.
- Monitoring and evaluation at national level by All India Institute of Medical Science,(' Department of Medicine.

A Steering Committee was constituted, to annually review the progress during the Eight Five Year Plan. The committee recommended that a National Diabetes Documentation Centre should be established in conjunction with the Co-ordination and Monitoring Centre located at the AIIMS, New Delhi.

The National Diabetes Documentation Centre is given the responsibility to collate and distribute all available information on the prevalence management and control of diabetes mellitus.

Check Your Progress 5

1) What is the Prevalence of Diabetes in India'?

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2) Main Objectives of Diabetes Control Programme are:

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3) List the implementation levels of N.D.C.P.

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2.7 ROLE OF HOSPITAL AND DISTRICT HEALTH MANAGERS

Hospital Managers

The National Programmes or Control of non-communicable diseases are based on Hospital based facilities to a large extent. A hospital manager can help in these programmes by way of:

- Training of manpower (medical and other technical support manpower) in clinical and diagnostic aspects of non-communicable diseases.
- Carrying out of surveys and screening programmes in the communities for early detection of these disorders.
- Providing Sentinel Surveillance for these diseases for the cases reporting at Hospitals.
- Ensuring adequate care of case referred from peripheral institutions for diagnosis and treatment and proper feedback.
- Organisation of health education activities in hospital areas such as OPDs and Indoors.
- Rehabilitation services for disability due to these non-communicable diseases.

District Health Managers

The District Health Managers also have a crucial role to play in the implementation of the National Health Programmes including the programmes for control of non-communicable diseases.

Being mid-level managers in the hierarchy, they have to ensure optimal allocation of resources provided to them in the district for programme activities.

They need to develop'suitable monitoring parameters/indicators based on:

- Field visits reports
- Meetings and review of reports generated from the peripheral institutions
- Special surveys carried out in area.

The basic steps are as follows:

Defining an Indicator for Monitoring

An indicator as you know has a numerator, a denominator and is multiplied by a suitable constant. The various types of monitoring indicators may be:

Input Indictors

These are related to inputs or resources. Some of the examples of input ind'icators are:

- Manpower sanctioned for various categories of personnel as per the suggested norms and number of persons actually available in various categories for services under the programme.
- Amount of money required, sanctioned, released and actually used during# year for the programme activities.
- Cost per service delivered under the programme in the district.
- Equipment availability as per the suggested norm under the programme
- Equipment in working order
- Use co-efficient for the equipment. This is given by number of hours an equipment is actually used during the given period divided by the total hours when equipment is available for use.

Process Indicators

These are related to various processes and procedure involved in a progranune. These include percentage of processes and procedures done during a period as per the standard/ suggested norm for various activities under the programme.

Output Indicators

These are related to performance and include the number and types activities performed under the programme during the given period per unit persons or per unit institution in the given district.

Outcome Indicators

These are related to the ultimate effect on impact of the programmes. Some of the examples of outcome indicators are:

1)
   - Degree to which the objectives of the programme have been achieved.
   - Decrease in Morbidity or Mortality in the area.
   - Increase in awareness among clients/beneficiaries/community.
   - New cases detected, diagnosed, and treated.

2) Measure the performance level on these parameters for the programme to be monitored.

3) Compare the performance level with the standards or norms and find out the deviation if any.

4) Find out the causes for deviation and possible solutions.

5) Select the best or optimal solution and implement that solution.

Check Your Progress 6

1) Enlist the roles of Hospital Manager in National Health Programmes?

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2) What is the role of Community/District Health Manager in National Health Programmes?

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3) List the various types of the indicators which are used for monitoring a programme.

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2.8 LET US SUM UP .

In this unit you have learnt that Non-Communicable Diseases are likely to become a major future Public Health Problems in the country due to changing life-styles, increasing stress and tensions due to changes in social and cultural system in the society.

You have also learnt about the magnitude of problem of various non-communicable diseases which include blindness, IDD, mental illness, cancer and diabetes. Government of India has launched various national health programmes for control of these non-communicable diseases.

The estimated number of cancer cases in India are 2 millions and every year 7 lakh new cases are detected and 3 lakhs die due to cancer in the country. The prevalence of mental disorders in estimated to be 15-20 per thousand population. Various studies put the prevalence of diabetes to be ranging from 0.95 to 3.8 per cent *in* urban areas and 0.6 to 1.93 per cent in rural areas of the country.

You have been apprised about the importance, objectives and strategies for control of these. disease under respective national health programmes. Towards the end, you have learnt about the role of hospital and health managers.

Besides, there are approximately 12.5 millions economically blind in India and 80 per cent of this blindness is due to cataract. Nearly 60 millions have endemic goitre and an estimated 8.8 millions have mental or psychomotor handicap due to iodine deficiency.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) 6 million

.2) To reduce the prevalence rate of blindness from 1.49 per cent to 0.3 per cent by the year 2000 AD.

3)
- strengthening service delivery,
- developing human resources for eye care,
- promoting outreach activities and public awareness,
- developing institutional capacity.

4)
- Providing comprehensive eye care, including school eye screening programme, and rehabilitationof the blind.
- Developing institutional capability for eye care management at the Central, State and District levels.
- Developing collaborating mechanisms for co-operation between the Government and the private/voluntary sector.
- Introducing, monitoring and feedback mechanisms to facilitate implementation and maintain quality control.
- Building institutional capacity for human resources development.

Check Your Progress **2**

1) 200 million people are at risk.

2) To eliminate IDD to less than 10 per cent by the year 2000.

3)
- use of iodised salt in place of common salt.
- monitoring and surveillance.
- manpower training.
- mass communication.

Check Your Progress **3**

1) 18-20 per thousand population.

2)
- To ensure availability and accessibility of minimum mental health care for all in future.
- To encourage applications of mental health knowledge in general health care.
- To promote community participation in mental health services.

3)
- Training of all workers in the mental health team at identified nodal institutions.
- Health education to increase public awareness and to reduce social stigma
- Services for care of mentally ill patients in OPDs and indoors.
- Collection of related data for future planning, monitoring and research.

Check Your Progress **4**

1) 1.5-2 million.

2)
- Primary prevention of cancers by health education regarding hazards of tobacco consumption and necessity of genital health for prevention of cervical cancer.
- Secondary prevention i.e. early detection and diagnosis cancers, for example, cancer of cervix, breast cancer and of the oropharynageal cancer by screening methods and patients' education on self examination methods.
- Strengthening of existing therapeutical services.
- Palliative care in terminal cancers.

3)
- Development of oncology wings in medical colleges/hospitals.
- Scheme for district projects,
- Financial assistance to voluntary organisations.
- Cobalt therapy installation.
- Development and dissemination of health education materials.
- Procurement, supply and distribution of pain reliefmedicines.
- Assistance for regional research and treatment centres.

4)
- diagnosis treatment and follow up,
- surveys of mortality and morbidity,
- training of personnel both medical and para-medical,
- preventive measures with emphasis on mass examination, health education and industrial hygiene, and
- research fundamental and applied.

Check Your Progress **5**

1) 1-2 per cent.

2)
- identification of high risk subject at an early stage, and imparting appropriate health education with focus on primary prevention.
- early diagnosis of disease and institution of appropriate management so as to reduce morbidity and mortality.

- prevention, arrest or slowing of acute metabolic as well as chronic cardio-vascular-renal coniplications of the disease.
- identification of subject with partial or total physical handicaps due to the disease, and to ensure their rehabilitation with emphasis on optimal organ or body function.

3)
- Level one is early identification of the cases by health workers, doctors at PHC, CHC and hospital specialist doctors through surveillance.
- Level two is case detection at hospital level through specialists and manpower training.
- Monitoring and evaluation at national level by All India Institute of Medical Science, Department of Medicine.

Check Your Progress 6

1)
- Training of manpower (medical and other technical support manpower) in clinical and diagnostic aspects of non-communicable diseases.
- Carrying out of surveys and screening programmes in the communities for early detection of these disorders.
- Providing Sentinel Surveillance for these diseases for the cases reporting at Hospitals.
- Ensuring adequate care of case referred from peripheral institutions for diagnosis and treatment and proper feedback.
- Organisation of health education activities in hospital areas such as OPDs and Indoors.
- Rehabilitation services for disability due to these non-communicable diseases.

2)
- To ensure optimal allocation of resources provided to them in the district for programme activities.
- To develop suitable monitoring parameters/indicators based on field visit reports, meetings and review of reports and special surveys.

3)
- Input
- Process
- Output
- Outcome

2.10 FURTHER READINGS

Government of India ***1998-99, Annual Report***, DGHS, New Delhi.

Government of India ***1985, National Programme for Control of Blindness in India – A Report,*** DGHS, New Delhi.

Government of India ***1995, Conference of Central Council of Health and Family Welfare***, Ministry of Health and Family Welfare, New Delhi.

Government of India ***1996, National Cancer Control Programme India: Present Status,*** DGHS, New Delhi.

Government of India ***1994, Report on Advocacy Policy Meeting on Iodine Deficiency Disorders,*** Ministry of Health and Family Welfare.

ICMR ***1988-89, Biennial Report National Cancer Registry Programme–An Epidemiological Study.***

ICMR ***1996, Salt consumption Pattern in India –An ICMR Task Force Study***, New Delhi

ICMR Bulletin ***1996, Control of IDD through Safe Use of Iodised Salt***, Vol. 26, No. 6.

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- identification of subject with partial or total physical handicaps due to the disease, and to ensure their rehabilitation with emphasis on optimal organ or body function.

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Check Your Progress 6

1)
- Training of manpower (medical and other technical support manpower) in-clinical and diagnostic aspects of non-communicable diseases.
- Carrying out of surveys and screening programmes in the conmiunities for early detection of these disorders.
- Providing Sentinel Surveillance for these diseases for the cases reporting at Hospitals.
- Ensuring adequate care of case referred from peripheral instihltions for diagnosis and treatment and proper feedback.
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- To ensure optimal allocation of resources provided to them in the district for programme activities.
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3)
- Input
- Process
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Government of India 1998-99, ***Annual Report,*** DGHS, New Delhi,

Government of India 1985, *National* ***Programme for Control of*** *Blindness in India* - *A* ***Report,*** DGHS, New Delhi.

Government of India 1995, ***Conference of*** *Central* ***Council of Health and*** *Family Welfare,* Ministry of Health and Family Welfare, New Delhi.

Government of India 1996, ***National Cancer Control*** *Programme India:* ***Present*** *Status,* DGHS, New Delhi.

Government of India 1994, ***Report on Advocacy Policy Meeting*** *on Iodine Deficiency* ***Disorders,*** Ministry of Health and Family Welfare.

ICMR 1988-89, *Biennial* **Report National Cancer** *Registry Programme–An Epidemiological Study.*

ICMR 1996, ***Salt consumption*** *Pattern in India* - ***An ICMR*** *Task Force Study, New* Delhi

ICMR Bulletin 1996, *Control of IDD* **through Safe Use of** *Iodised Salt,* Vol. *26,* No. 6.

UNIT 3 REPRODUCTIVE AND CHILD HEALTH PROGRAMME

Structure

3.0 OBJECTIVES

After going through this unit, you should be able to:

- describe briefly the evolution of RCH programme in India;
- explain the paradigm shift in the programme;
- describe components of the programme and packages of services under the each component;
- explain the role of hospitals in the implementation of the programme;
- explain various programme management dimensions; and
- list measures for improving the quality of services under the programme.

3.1 INTRODUCTION

In this unit you will learn about the genesis and components as well as service packages in relation to one of the most important national programmes, viz. Reproductive and Child Health (RCII) Programme. You will also learn the organisational set-up and infrastructural facilities for delivery of services under the programme. In addition, you will also be briefly oriented to some of the special projects and facilities envisaged under the programme. Further, you will learn about the role of hospitals in implementing the RCH programme. Towards the end you will learn about the specific managerial dimensions of the programme as well as measures to be taken for improving the quality of RCH services so as to ensure client satisfaction with the services.

3.2 EVOLUTION OF THE RCH PROGRAMME

3.2.1 Transition from MCW and FP to Family Welfare CSSM Programme

Poor health status in terms of high mortality and morbidity among women and children in India had been a major concem for public health professionals even before attainment of independence. Efforts to provide services to this vulnerable section of the population were initiated under Maternal and Child Health (MCH) services. Major hospitals in urban areas as well as Primary Health Centres (PHCs) in the rural areas were responsible to render these services since independence. The rapidly growing population of the country and its social and economic consequences on development and quality of life of people was another concern for the socio-economic development planners. The result was the launching of the National Family Planning Programme since the first five year plan period. With the advancement of technology, various other interventions for the improvement of the health of this section of population could be possible and during the seventies, programmes/schemes like imrnunisation against vaccine preventable diseases, nutritional interventions like iron and folic acid supplementation, vitamin A supplementation ctc. were initiated.

Even though the family planning programme and MCH programme were being implemented in a vertical manner, it was understood that fertility regulation was extremely important for maintenance of health of the mother and child. Similarly, it was also appreciated that couples will accept contraceptive services to prevent pregnancy, only if survival of their existing children is ensured. This realisation of the close inter-relationship between family planning and MCH programmes led to the government's major policy decision to integrate family planning with MCH and nutrition services.

Later during the seventh five year plan period, separate programmes were also initiated towards controlling two major killer diseases among children. These were Oral Rehydration Therapy for preventing deaths among children due to dehydration from diarrhoea and acute respiratory infection control programme to control morbidity and mortality due to pneumonia. Objectives of all these programmes were convergent and aimed at improving the health of mothers and young children and to provide them facilities for prevention and treatment of

major disease conditions. These programmes were implemented in the country separately, though concurrently. While all the above mentioned programmes did have beneficial results, the separate identity of each programme was causing problems for their effective management and their impact on health status of women and children could not be as visible as expected. Therefore, during the 8th five year plan period, all these programmes and services viz. antenatal, intranatal and postnatal care; child health services including immunisation, management of diarrhoea, and ARI were all integrated under the Child Survival and Safe Motherhood (CSSM) Programme which was implemented since 1992.

3.2.2 Need for Holistic Approach towards Women's Development

Even though CSSM programme was implemented all over the country with equal emphasis, the position regarding its performance and achievements was not uniform throughout the country. States like U.P., M.P., Bihar, Rajasthan, Orissa and J&K which showed performance at much lower level than the national level were also those which were more populous and hence, unless performance in these states did not improve, the national level performance also would have remained depressed. Integrated efforts towards improvement of the health status of women and children with infrastructural strengthening and resource inputs commensurate with the specific needs of the states/region became essential with a holistic approach towards overall socio-economic development and in particular for women's empowerment.

3.2.3 International Conference on Population and Development (ICPD) and Programme of Action (POA)

In the context of evolving a holistic approach to child survival and safe motherhood as explained above, the International Conference on Population and Development (ICPD) which was 3rd in the series of decadal population conferences, held in Cairo in 1994, came at an opportune time. At this conference, representatives of about 180 countries reached a new consensus about how world population issues should be approached. It was agreed that population policies should address social development beyond family planning, especially the advancement of women, and that family planning should be provided in the context of comprehensive reproductive health care. The Cairo Programme of Action (POA) defined reproductive liealth in a comprehensive fashion for the first time.

The definition states that *"reproductive health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity in all matters relating to the reproductive system and to its functions and processes".*

Reproductive health therefore implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. Implicit in this last condition are the right of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law, and the right of access to appropriate health care services that will enable women to go safely through pregnancy and child birth and provide couples with best chance of having healthy infant. In line with this definition, *reproductive health should broadly include family planning; safe pregnancy and delivery services; prevention and treatment of RTIs and STIs; information and counseling on sexuality; and other women's health services.*

3.2.4 India's Commitment towards XCPD, POA and Launching of RCW Programme

Even though the sustained efforts in implementing the family welfare programme had benefited large number of people, over the years, it has been increasingly realised that more need to be to completely address the health needs of women and children. It has also been felt that the workload has been not set for the functionaries in accordance with the actual needs of the population. In response to these needs, government had decided to reorient the programme. At this juncture, the international consensus developed in the

ICPD, Cairo 1994, for a holistic approach to reproductive health also helped the country to develop the Reproductive and Child Health Programme in India. The RCH programme was formally launched on 15th October, 1997 in India.

Check Your Progress 1

1) Why was the need felt for integration of different components of services into the RCH programme?

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2) What was the major cqnsensus arrived at ICPD Conference in Cairo in 1994?

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3) When was the RCH programme formally launched in India?

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3.3 OBJECTIVES OF RCW PROGRAMME

Objectives of the RCH programme are:

1) Nationwide improved quality, coverage, and effectiveness of RCH services;
2) Improved management performance by:
   i) expanding existing monitoring system and decentralised participatory planning
   ii) institutional strengthening
   iii) enhanced programme management capacity
3) Local capacity enhancement.

3.4 PARADIGM SHIFT IN THE RCH PROGRAMME

The reproductive health approach extends beyond the narrow limits of family planning to encompass all aspects of human sexuality and reproductive health needs during various stages of life cycle. A paradigm shift is needed for operationalising the reproductive health programme. A change in focus from the population control approach of reducing numbers to a client based approach of addressing the reproductive needs of individuals, couples, and families is necessary.

An ideological shift is needed which in turn would necessitate a change in the existing culture of programme from one that focuses on achievements of targets to one that aims at providing a range of good quality services. It means that instead of remaining responsible for reducing the rate of population growth, reproductive health programme becomes responsible for reducing the burden of unwanted and unplanned child bearing and related morbidity and mortality.

It is important to note that RCH programme is a more sharply defined form of family welfare programme. It does not seek either to disband earlier programmes or to bring into a wholly new programme in a vacuum. *The* RCH *programme only seeks to fine tune the earlier programmes in an incremental manner with addition of certain service components and giving special emphasis on certain other service components already being provided. It seeks to bring about a holistic approach to programme*

implementation so that health functionaries are constantly conscious of whether good quality services are reaching the people to meet their needs.

3.4.1 Target-free Programme Based on Community Needs Assessment

Being a signatory to the ICPD Programme of Action ratified at Cairo in 1994, some major programme and policy initiatives had already been taken earlier since 1994, to give shape to the concept of reproductive health. In April 1996, even before the formal launching of RCH programme, Government of India took a landmark decision to withdraw the system of estimating workload and work allotment as well as monitoring the programme, based on centrally deteimined, method-specific contraceptive targets. Instead, it adopted a Community Needs Assessment (CNA) based; bottom up approach, where self-estimated workload/goals were used by the health personnel themselves.

3.4.2 Decentralised Participatory Planning

Planning for the services actually begins at grass-root level with members of panchayat and Mahila Swasthya Sangh (MSS) and other villagers closely interacting with the ANM and male health worker for deciding about the actual requirement of various family welfare services. This improves the sustainability of the programme on one hand, by generating a sense of involvement and ownership among the community towards the programme thereby increasing utilisation of services as well as on the other hand, by ensuring sense of responsibility and accountability among the workers. The plans prepared for tlie subcentres by the local health workers which are aggregated lo make the PHC plan in turn are aggregated at the district level to prepare the district plan.

3.4.3 Integrated RCH Package

The process of integration of various related programmes for improving health of women and children had been seriously attempted with the implementation of CSSM programme. However, with the implementation of RCH programme, this has taken a step further. It is also highly desirable to have an integrated approach since it would not only be more acceptable to the community, but would also help in reducing the cost inputs to some extent because overlapping of expenditure will not be necessary and integrated implementation would optimise outcome at the field level. This integrated package includes essential RCH package which gives basic minimum model framework of RCH services at different levels in the district viz. community, subcentre, PHC, FRU and district hospital. The essential components are:

- prevention and management of unwanted pregnancy;
- maternal care including antenatal, intranatal and postnatal as well as safe abortion services;
- child survival services including care of new born;
- management of RTI/STI.

3.4.4 State/District Specific RCW Strategy

The main focus of RCH programme is, implementation based on actual needs of people. Considering the variations in regard to different parameters/indicators of RCH and corresponding service needs among states and districts in the country, area specific approach has been worked out separately for different groups of states and districts. States and districts are classified based on indicators like, Crude Birth Rate (CBR), Total Fertility Rate (TFR), female literacy level, percentage women registered for antenatal care, percentage of hospital deliveries, percentage delivered by untrained attendant etc. For backward districts which have additional needs, additional resource inputs as per requirement are envisaged to be provided.

3.4.5 Greater Emphasis on Quality of Care

Provision of good quality care is the crux of RCH programme. Good quality care is difficult to be defined. However, a working definition of quality may be evolved incorporating few elements related to services i.e. choice of service, information provided

to clients, technical competence of service providers, interpersonal relation between service provider and clients, mechanism to ensure continuity of care etc. It may be assumed that good quality care would increase client satisfaction which is one of the major goals of the programme. This in turn would be expected to increase the service utilisation and thereby would enable achievement of the programme goals and may determine the success of the programme.

3.4.6 Comprehensive Integrated Training with District as Coordinator

In-service training of health personnel with due focus on practical clinical, managerial and communication skills is a major input under the programme towards improvement of quality of services. An important feature of the training in future would be involvement of the field functionaries and the Anganwadi workers as well as functionaries from other health related development sectors. Planning and management of the training programmes will be the responsibility of the district health authorities. Central and state governments are to support the district in training of trainers and in producing training materials,

3.4.7 Involvement of Panchayati Raj System

Panchayati raj system is expected to play a significant role in planning for RCH services particularly for identification of needs of local population for RCH services. The system is also to play a role in the implementation, particularly, financial support and transport support for referral of women to hospitals for obstetric services. In addition, for evaluation of the programme, the panchayat system is expected to extend support in assessing the client satisfaction from services. Therefore special efforts to provide RCH awareness to panchayat members are envisaged.

3.4.8 Iucreased Involvement of NGOs and Private and Corporate Sector

The programme envisages to involve personnel from NGO and private and corporate sectors in delivery of RCH services as well as in undertaking various types of training activities.

3.4.9 Area Specific IEC Campaigns

Information, Education, and Communication (IEC) activities have to play a major role in RCH programme for demystifying the RCH and population issues among public. Therefore, the Department of Family Welfare has been implementing a large IEC programme involving various government departments, NGOs and private agencies. While there is an attempt to evolve a national IEC strategy for RCH, emphasis is placed on development of local area – specific communication strategies to create more demand for RCH services and to promote informed decision making on health matters. Thus health personnel are trained in IEC skills to motivate people to use the right kind of services for meeting their needs. Special emphasis is also placed on interpersonal communication (IPC) and use of local traditional media for increasing acceptance and understanding of messages and thereby their effect and impact through behaviour change.

3.4.10 Gender Concerns

All efforts are being made to make the programme as gender sensitive as possible. Women's groups are involved in its planning and monitoring. In addition, the government has already initiated efforts which trigger changes in societal attitudes towards women. Women's empowerment and awareness about gender issues in relation to various developmental projects and programmes among all concerned are to be promoted.

3.4.11 Increased Male Participation in the Programme

Need for increased male participation in the RCH programme and on all issues related to reproductive health is being increasingly recognised. More responsibility in child rearing practices by males i.e. more responsible parenthood among males, increased acceptance of contraception by males as an evidence for acceptance of increased responsibility towards fertility regulation, informed decision making jointly by male and female partners on

reproductive health issues, male participation in RCH service provision etc. are very important.

Check Your Progress 2

1) What was the major policy decision taken by GOI before launching the RCH programme for giving shape to RCH concept?

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2) Why do we say that there is a paradigm shift in the RCH programme?

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3.5 (COMPONENTS AND PACKAGES OF SERVICES UNDER RCW PROGRAMME

Reproductive health approach means that:

- people have the ability to reproduce and regulate their fertility;
- women can go through pregnancy and childbirth safely;
- the outcome of pregnancy is successful in terms of maternal and infant health and well being; and
- couples can have sexual relations free of fear of pregnancy and of contracting disease.

3.5.1 Recommended Package of Services under RCH Programme

The RCH programme incorporates the components covered under CSSM programme and includes two additional components, one relating to reproductive tract infection and the other one relating to sexually transmitted infections. As there are enormous diversities in India, among regions and states, as well as between rural and urban areas, no single package of services can be recommended for nationwide implementation. Basically there are two types of packages:

1) A comprehensive package which at present would have limited application.

2) An essential package which is recommended for nationwide implementation.

Even if the facilities for implementing the comprehensive package are inadequate in most parts of the country, the goal should be to expand the implementation of services incrementally and in a phased manner, by utilising the lessons learnt from programme experience.

The following services are included in a comprehensive reproductive health service package:

- prevention and management of unwanted pregnancy
- services to promote safe motherhood
- services to promote child survival
- nutritional services for vulnerable groups
- prevention and treatment of reproductive tract infections and sexually transmitted diseases
- prevention and treatment of gynaecological problems
- screening and treatment of breast and cervical/uterine cancer
- reproductive health services for adolescents

- health, sexuality and gender information, education and counseling
- establishment of effective referral systems

The essential reproductive health package however excludes the management of gynaecological problems as well as screening and management of cancers.

3.5.2 Programme Interventions

The RCH programme is implemented in India based on a differential approach. Inputs in all districts have not been kept uniform because efficient delivery will depend upon the capability of the health system in a district. Therefore, basic facilities are proposed to be strengthened and streamlined specially in the weaker districts as the better-off districts already have such facilities and the more sophisticated facilities are proposed for the relatively advanced districts which have acquired the capability to make use of them effectively. All the districts have been categorised into A (best performance), B (medium performance), and C (poor performance) on the basis of CBR, and female literacy rate which reasonably reflect the RCH status of the district.

Following are the interventions in all the districts:

- Child survival interventions (as available under CSSM programme)
- Safe motherhood interventions (as available under CSSM programme)
- Facilitation for operationalisation of target-free approach
- Institutional development
- Integrated training package
- Modified Management Information System
- IEC activities and counseling on health, sexuality and gender
- Urban and tribal areas RCH package
- District subprojects under local capacity enhancement
- RTI/STI clinics at district hospitals where not already available
- Facility for safe abortions at PHC by providing equipment, contractual doctors etc.
- Enhanced community participation through panchayats, women's groups and NGOs
- Minor civil works
- Provision of lab technicians for lab diagnosis of RTI/STI and for EOC
- Adolescent health and reproductive hygiene.

3.5.3 Safe Motherhood Components

Some of the programme components are briefly described below:

1) Antenatal Care

All pregnant women should get registered with the health facility and should receive routine care and timely screening for identification of risk factors through at least three check up. Each pregnant woman should also receive two doses of Tetanus toxoid immunisation at interval of at least one month. In addition, special emphasis is given on control of anaemia among pregnant women through promoting consumption of Iron and Folic Acid (IFA) tablets and also by educating women regarding consumption of iron rich food. All pregnant women are expected to consume prophylactic dose of IFA and when found anaemic on screening through haemoglobin estimation, therapeutic dose of IFA is to be consumed.

2) Natal Care

One of the essential requirements for preventing maternal mortality and morbidity is to ensure safe delivery by every pregnant woman. It is safest to deliver babies in a health institution/hospital under care by trained personnel. In case it is not possible, it is to be ensured that deliveries at home take place under safe and hygienic surroundings and are assisted by trained personnel, preferably by ANM/LHV or at least by trained birth attendants. Delivery by relatives and friends and untrained dais are not safe and are to be discouraged. In case of any complications, referrals should be made to the First Referral

Units (FRU) for management of obstetric emergencies. Thus under RCH programme, these services are ensured under "essential obstetric care".

3) Essential Obstetric Care

Essential obstetric care includes those items of obstetric care which any pregnant woman requires if there is no complication during pregnancy or delivery. These items basically include:

- registration of pregnancy in the first 12-16 weeks of pregnancy
- at least three prenatal check ups by ANM or in dispensary or other health facility for providing check up for essential body parameters through blood pressure checks, routine investigations like urine, haemoglobin etc.
- counseling
- detection of complications of pregnancy if any
- referral to PHCIFRU in case of pregnancy complications
- assistance during delivery and three postnatal check ups
- detection of complications during delivery and referral.

4) Emergency Obstetric Care

Emergency obstetric care is an intervention for preventing maternal mortality and morbidity. The complications of pregnancy such as anaemia, haemorrhage, obstructed labour, and sepsis are major causes of maternal mortality and morbidity. If these complications are detected early and managed appropriately, maternal mortality and morbidity can be reduced substantially. If three check ups by ANM at antenatal and three at postnatal stage are ensured by competent supervision, most of such complications can be detected and managed before they become life threatening. The ANM is expected to refer the cases with complications during pregnancy or delivery to PHCIFRU. For ensuring effective emergency obstetric care under RCH programme, the FRUs are strengthened through supply of equipment kits, emergency obstetric care drug kits, provision of consultant anaesthetist etc.

5) Postnatal Care

Postnatal period which starts from delivery of placenta upto 42 days from delivery also requires special attention for preventing maternal mortality and morbidity. Postpartum haemorrhage and puerperal infection are major causes of maternal mortality. At least three postnatal check ups are to be ensured for each pregnant woman.

3.5.4 Child Survival Components

Ensuring survival and proper growth and development of every new born baby is extremely important. Inspite of various efforts made in the past and achievement of reduction in infant mortality in India, mortality and morbidity among children are still major concerns for health care providers and administrators.

Major causes of infant and child mortality and morbidity include:

- prematurity,
- respiratory infections,
- diarrhoea1 diseases,
- umbilical cord infection in the new born babies,
- birthinjuries,
- congenital malformations,
- nutritional deficiencies, and
- certain vaccine preventable infections etc.

Accordingly, the strategies for improving child survival and development include:

- strengthening essential new born care,
- appropriate management of diarrhoea,

- appropriate management of ARI,
- sustaining high levels of immunisation coverage,
- nutritional interventions like nutrition supplementation e.g. vitamin A prophylaxis, supplementaiy feeding etc.
- improved maternal care, and
- promotion of birth spacing.

1) Essential New Born Care

Inspite of decline in infant mortality, neonatal mortality still contributes to a major proportion of infant deaths. High incidence of low birth weight among babies is a common contributory factor in neonatal deaths. Major causes of neonatal mortalitv have been identified as hypothermia, asphyxia and infections. Simple cost effective indigenous technology is available to provide essential new born care at the field level to manage the direct causes of neonatal mortality. Provision of essential new born care will thus not only improve overall quality of services provided by peripheral health facilities but also contribute to decreasing neonatal mortality and morbidity.

Emphasis is placed on the following:

- Ensure five cleans i.e. clean hands, clean surface, clean razor blade, clean cord tie, clean cord stump (no applications).
- Eye care.
- Cleaning new born by wiping with soft and clean clothes and not by bathing to avoid hypothermia.
- Assessment of birth weight to identify low birth weight babies who need special attention.

  Resuscitation of new born baby who does not cry soon after birth.
- Early breast feeding initiation and exclusive breast feeding for initial 3-4 months
- Prevention of infection through clean hygienic practices.
- Immunisation against vaccine preventable diseases.

2) Control of Diarrhoea

Diarrhoea is a major cause of mortality and morbidity among young children. Dehydration caused by loss of fluids from the body is the main cause of death and hence under the programme, efforts are made to ensure prcvcntion and correction of dehydration in children through Oral Rehydration Therapy (ORT). Through health education to mothers, messages regarding need for cleanliness during handling of food as well as on how to manage diarrhoea at home by mothers and when to seek help from health personnel are also disseminated.

3) Control of Vitamin A Deficiency

Vitamin A deficiency is responsible for night blindness and in certain cases, irreversible blindness among children. Deficiency of vitamin A also can increase the risk of death among children particularly when they are suffering from measles or diarrhoea. Prevention and management of vitamin A deficiency is an important intervention under RCH programme.Every child between the age of 9 months and 3 years is given 5 doses of vitamin A concentrate i.e. first dose of 100,000 International Units (IU) at the age of nine months, second dose of 200,000 IU at the age of 16 months and thereafter 3 more doses of 200,000 IU each at six monthly intervals. Nutrition education regarding use of colostrum, use of vitamin A rich food etc. are also ensured.

4) Acute Respiratory Infection (ARI) Control

Acute Respiratory Infection (ARI) is a major cause of morbidity among young children. Majority of ARI are self-limiting. However, pneumonia, a serious manifestation of ARI is a major cause of mortality also. Timely and correct diagnosis, treatment and referral can save most children with pneumonia. Therefore, prevention and management of ARI has been

included as another important intervention under the RCH programme. The primary health care personnel should detect the case of pneumonia among children based on guidelines on signs and symptoms and provide treatment with effective antibiotics viz. Cotrimoxazole as per guidelines for doses. Serious cases of pneumonia should be identified and timely referral be made to save children's lives.

5) **Immunisation Services**

In addition to the routine imrnunisation services expected to be provided to all infants and young children as per approved schedule, the Government of India have accepted the goal of achieving eradication of poliomyelitis and elimination of neonatal tetanus from this country. The strategy adopted for polio eradication is through pulse polio programme being implemented all over the country. Importance is also given on surveillance of vaccine preventable diseases.

3.5.5 Safe Abortion Services

As you might be already knowing, complications of abortions performed under unhealthy surroundings using unhealthy and crude procedures is one of the major causes of maternal mortality and morbidity. Medical Termination of Pregnancy (MTP) is therefore made possible under certain conditions laid down under the MTP Act (1971). However, MTP should not be considered as a mechanism for restricting family size or as method of contraception for avoiding unwanted births in a routine. In India, it has been observed that often MTPs are still performed in unauthorised places where the required essential facilities are not available and sometimes even the person performing is also neither qualified nor experienced and thus cause maternal deaths and morbidity on a much larger scale. Under RCH programme specific emphasis is given on ensuring women's access to safe abortion services by increasing improved facilities and trained manpower for provision of MTP services.

3.5.6 Contraceptive Services for Eligible Couples

Since couples have to be assisted in deciding about the right time for having children, they have to be informed and have access to safe, effective, affordable and acceptable methods of contraception of their choice. Thus provision of contraception services is an important intervention under RCI-I programme. There is a growing concern among policy decision makers and planners in India that the overemphasis laid on females as the main target groups for accepting contraception services, particularly sterilisation services, in the past, is not likely to achieve the desired demographic goal. Hence more emphasis is now being placed on increasing method choice including reversible contraceptive methods both for females and males. For increasing male participation in acceptance of contraception, facilities for providing Non Scalpel Vasectomy (NSV) are also being expanded. Added importance is also being given to strengthen sexuality and gender information, edqcation and counseling with the aim of ensuring informed choice of methods by clients. Supportive counseling and follow up services are also being organised for acceptors.

3.5.7 Prevention and Management of RTIs and STIs

RTIs and STIs form a major group of infections which cause considerable extent of morbidity among both males and females and prevention and appropriate clinical management of these conditions have been included as important components under RCH programme. RTIs include a variety of bacterial, viral and protozoal infections in thereproductive tract. Some of these RTIs are sexually transmitted and pose threat to lives of both sex, particularly for women. RTIs may result from unhygienic procedures related to delivery and abortions and infections due to overgrowth of organisms normally found in genital tract, in addition to sexually transmitted infections.

Screening/diagnosis of RTIs/ STIs is based on identifying groups of easily recognised signs and symptoms (syndrome). Even though some men and many women remain asymptomatic, common signs and symptoms observed are:

- vaginal discharge in women which look and smell differently from normal discharge.
- genital ulcers in both men and women,

- lower abdominal pain in women.
- scrota1 swelling when testis is affected.
- enlarged, inflamed inguinal lymph glands in men and women.
- neonatal conjunctivitis.

Apart from individual suffering, RTI/STI can also lead to complications and long-term sequelae like:

- infertility;
- ectopic pregnancy;
- irregular menstruation;
- cancer of anus and genitals;
- abortion and stillbirth;
- infections in new born; and
- increased risk of transmission of HIV infection.

Provision of services for prevention and management of RTI/STI has been included as an important intervention under RCH programme by increasing facilities for diagnosis and management as well as through health education and counseling.

3.5.8 Adolescent Health Services

The adolescent period is important for several reasons. Not only that they are the future parents who need to be prepared for future parenthood, because of the practice of marriage of very young girls in many parts of the country, adolescent girls are exposed to hazards of pregnancy when they are not emotionally and physically ready for child bearing. Health programme for the adolescent girls have special significance because their effects are not only on the health and nutrition of the adolescent girls themselves, but also have long-term intergenerational effects by reducing the risks of low birth weight and minimising child mortality. It is felt that integrated p r o g r a m s for family life and reproductive as well as general health, education, employment and other related services need to be provided for, this hitherto neglected some segment of population.

3.5.9 Special Care Components – Cancer and Infertility Services

1) Screening and Treatment for Cervical Cancer and Breast Cancer

Cancer is one of the important causes of morbidity and mortality in both developed and developing countries. Most common among cancers of reproductive system in developing countries is cervical cancer and breast cancer is also not uncommon. Cervical cancer screening is one important intervention for prevention but at present, limited screening facilities are available for Indian women. Facilities for breast cancer also are inadequate except advice for self-examination by women as well as routine examination by professional and auxiliary personnel in different health institutions,

2) Prevention and Treatment of Infertility

Since child bearing is highly valued and can have serious social consequences in Indian women, infertility is perceived to be a very serious problem. Since infertility could be a sequel of STIs, interventions for management of STIs would be helpful in tackling infertility. Diagnosis and management of infertility due to major causes require sophisticated facilities and therefore services for treating infertility can be provided only in limited health facilities in India,

Check Your Progress 3

1) List the components of comprehensive packages of RCH services

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2) What are the reasons for classifying districts into A, B, and C categories?

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3) What are the components of essential obstetric care?

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4) What are the special inputs for emergency obstetric care under the RCH programme?

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5) Mention the major causes of maternal mortality in India.

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6) Mention the major causes of infant and child mortality in India.

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7) List the important components of child survival service package.

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8) What are the common signs and symptoms of RTIs/STIs?

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9) Mention one major health hazard among female adolescents in India.

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3.6 ORGANISATION AND INFRASTRUCTURAL FACILITIES FOR IMPLEMENTATION OF RCH PROGRAMME

3.6.1 Organisational Set-up for Delivery of RCH Programme

Even though the family welfare programme has been reoriented with a new name and new focus as already explained, the machinery for implementation of the programme remains more or less the same except that there are few changes in terms of the nature of support and assistance from Central Government to the State Governments. Further, the focus is also on more active involvement of the community and local panchayat with the aim of decentralised approach to the programme planning and implementation. The major inputs under the RCH progrmme will be directed more towards improving the already existing facilities and services to bring them within easy reach of the community, and the traditional items for creation of additional posts in health institutions and construction of new buildings will be only minimal.

At the national level, the programme is being steered by the Department of Family Welfare. The major responsibility of implementing the programme lies with state governments under tlie Directorate of Health and Family Welfare and Department of Family Welfare, specifically, with programme management responsibility assigned to the State Director of Family Welfare and State RCH Officer. It is also realised that for seeking larger and faster improvement in RCH indicators, it is important to treat districts as units of implementation. This is because, in most states the RCH service needs as well as implementation situation differ from district to district. Further, the emphasis on decentralised programme planning and management also necessitates this special focus on districts.

Tlie district health administration system with the District Civil Surgeon/Chief Medical and Health Officer assisted by the District RCH Officer is responsible for planning, implementation and monitoring of these services with the active participation of the panchayati raj system.

3.6.2 Infrastructural Facilities for Delivery of RCH Services

The national health policy of India (1983) clearly indicated that goal of Health For All (HFA) in this country is to be achieved through comprehensive primary health care approach. RCH services are no exception to this. The health infrastructure for delivery of primary health care in rural areas of the country is responsible for delivery of RCH services (as one component of priniary health care) to the rural population through the vast network of Primary Health Centres (PHCs), Subcentres, Community Healtli Centres (CHCs) as well as FRUs established over the years.

While general obstetric and child care will be provided by medical, paramedical and auxiliary personnel viz. Medical Officers, LHVs, ANMs, male health workers and male supervisors, Lab technicians etc. at tlie level of PI-IC and subcentres, specialised care from obstetricians and paediatricians will be available from the CHCs/FRUs onwards. The Anganwadi worker under the ICDS scheme also plays a very iniportant role in rendering tlie ECH services, particularly the nutrition component, through growth monitoring of children and supplementary feeding to children and pregnant and lactating mothers.

The next higher level of specialised services are available at the district level from district hospital specialists. MTP services are envisaged to be made available froni PHCs and efforts are being initiated to strengthen the existing facilities with additional inputs at these levels of institutions to fulfil the prescribed criteria according to MTP Act, for ensuring that adequate, good quality services are available to tlie needy. Referral of suspected cases of RTI/STI by the ANMs is supported by diagnosis and management by Medical officers with assistance of laboratory technicians at the PHCs. Specialised facility for RTI/STI will be made available in all district hospitals and even in some of the subdivisional hospitals.

In addition, the NGOs medical system will be involved in providing many RCH services and facilities. The Indian Systems of Medicine and Homeopathy (ISM and H) which are known to be efficacious will also be used in a substantial manner in providing RCH services. With regard to contraceptive services, the PHC and CHC functionaries and medical officers will render all possible services. The postpartum units at the sub-district and district levels will also participate in rendering these services. Special teams will be prepared with appropriate training and additional facilities (equipment and other supplies) for undertaking sterilisation operations, both laparoscopic and minilap, for females and NSV for males.

In the urban areas, due to the availability of big hospitals with adequate general and specialised facilities, RCH services are available to the majority of population within easy reach. However, the slum dwellers in urban areas, whose number is gradually increasing in India, are at a disadvantageous position regarding RCH services and special efforts are required for making services available to then;. Urban Health Posts under the Urban Revamping Scheme and the Urban MCH & FW Centres are expected to render these services with referral support from the urban hospitals. Due to the inadequacies in their functioning, special schemes are being envisaged to be initiated for the urban slums.

Similar schemes are also envisaged for the tribal population, which again constitutes a sizeable segment in India and are often not sufficiently covered by the existing health care delivery system.

3.6.3 Special Facilities and Projects under RCH Programme

In order to ensure availability of specific services and facilities to all under theprogramme, special efforts are made to give special support on selected components to certain needy and backward areas. Some of these are briefly described below.

1) Twcnty-four Hour **Delivery** Scrviccs at PHC

One of the major causes of maternal mortality and morbidity is lack ofattention by trained hands at the time delivery in the rural areas. This is particularly so in the case of deliveries taking place during night time when trained personnel like ANM or Medical officers are not available at PHC. It has been a major criticism that health personnel posted at PHCs and subcentres do not have their night halts at these institutions, and usually they stay somewhere away from these institutions. Under the RCI-I programme institutional deliveries are encouraged and attempt is being made to set up 24 hour delivery services in CHCs/PHCs in as many districts as feasible.

The arrangement in this regard would involve a mechanism for a doctor to be available on call, a nurse being available beyond normal working hours in the CHC/PHC and cleanliness service being available beyond normal working hours. The latter two can be arranged on contract basis or by appointing some recently retired persons available in the same locality. There is provision for payment of honorarium to the doctor of CHCIPHC at the rate of Rs. 200/- per delivery conducted between 8 p.m. and 7 a.m. on duty and also to the contractual nurse.

2) Referral System and Transport to Indigent **Families** through **Panchayats**

, Lack of timely and appropriate referral services has been one major responsible factor for high maternal mortality in rural areas, and many cases requiring such referral, fail to receive specialised care when needed. Therefore, under the RCH programme, strengthening of the FRUs has been taken up as priority activity. A total of 1748 FRUs were identified and equipped under CSSM programme, but many of them have not become fully functional because of shortage of specialists, equipment and drugs. Under **RCH** programme, FRUs are being strengthened through:

- supply of drugs and medicines.
- provision for appointment of contractual staff.
- provision of laparoscopes.
- provision for providing emergency obstetric care, and for those requiring surgical interventions, blood transfusion and anaesthesia.
- provision for consultant anaesthetist for emergency obstetric care etc.

The weakly performing states and particularly of the C category districts, the communication infrastructure is weak and the economic status of many families is also very low. Because of this, even when women are referred for delivery to higher specialised institutions away from the village, often they don't avail this service and deliveries get conducted by untrained hands available in the village which often end in undesirable outcomes for the mother and the baby. In order to overcome this problem, under **RCH** programme, provision is made to make available some fixed amount with the local panchayat in selected subcentre areas through District Family Welfare officers, so that arrangements for referral of women from indigent families can be made. This assistance is to be used only for procuring and paying for the transport for carrying the women to CHC/PHC for delivery.

3) Additional Programme for Urban Slums

With the increasing number of slums in the urban areas, and with the realisation that health status of women and children in these slums is paorer than even the national average due to poor sanitary and health facilities, special efforts are being taken to improve the RCH

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3) Additional Programme for Urban Slums

With the increasing number of slums in the urban areas, and with the realisation that health status of women and children in these slums is poorer than even the national average due to poor sanitary and health facilities, special efforts are being taken to improve the RCH

services in these areas. The Urban Health Posts and Urban Health and Family Welfare Centres are expected to provide comprehensive integrated services of MCH and family planning to the slum dwellers. They are also supposed to function in close coordination with the Urban ICDS projects. However, since their functioning has been found to be unsatisfactory, a special committee was appointed to examine the situation and give suggestions for improvement. The following have been recommended:

i) A primary health centre for each slum with population of 15,000 having a doctor and 2-3 paramedics to provide outdoor services. These would be set up and managed by the concerned urban local body on a project basis.

ii) For clusters of slums having smaller population, a mobile clinic to be sanctioned to medical NGO and having facilities at par with a centre mentioned above and it will visit each slum on a fixed day during fixed hours to provide primary health care services.

iii) Some selected health NGOs may be assisted if they set up maternity clinics in or near urban slums.

State governments are requested to submit project proposals prepared in this regard for each city for consideration for sanction by GOI.

4) Special Programme for Tribal Areas

Because of the poor communication, low literacy status, as well as poor socio-economic conditions, despite having basic health infrastructure in place in most part of the tribal areas in the country, the situation regarding reproductive health of the tribal population is generally poor. Hence, under the RCH programme, special RCH care package is envisaged to be provided to this population group. A special committee was appointed to examine the situation and make recommendations for the provision of services to the tribal population.

Major recommendations of the conunittee are:

i) Despite having infrastructure like CHC/PHC etc. many staff positions in these institutions remain'vacant due to want of accommodation. Also availability of drugs and consumables is poor in these institutions. Thus, the programme would provide for financing construction of housing for staff and also for provision of drugs in these institutions.

ii) The state government will authorise committees at district level under chairmanship of District Magistrate, to advertise locally and appoint doctors and other staff on contract basis against vacancies till regular appointments are made.

iii) Due to the communication gap between the tribal population and the government staff, tribal population do not generally avail the available services. In order to bridge this gap, district level committees are envisaged to assist local NGOs to engage tribal youth after training to work with local community for promoting RCH information and to act as link between the health infrastructure and the community.

5) Special Programmes for Adolescents

Adolescents (10-19 years) constitute a large segment of the population (21.4% of the total estimated population) of India which is of special significance for whom reproductive health programme should be designed and implemented. Teenage pregnancy poses serious health hazard for both mother and child. Further, in the context of increasing prevalence of STIs and HIV infection, it is important that adolescents and youth are adequately informed about safe sex and sexuality. It is important to remember that the reproductive health needs of married and unmarried adolescents are different, which are mostly unmet needs and also that the adolescents' behaviour gets influenced seriously by various types of messages from different media, which are often conflicting and confusing.

Programmes directed to address the above mentioned problems of adolescents are almost nonexistent except some programmes by certain NGOs. These cover HIV/AIDS education and sexuality for youth as well as on reproductive and sexual health programme for women including adolescent girls. However, government has initiated some activities like ICDS

scheme which has recently extended its activities to include adolescent girls, particularly out of school girls who cannot be reached through the school health activities. Training is the major component for adolescent girls in the prograinme under ICDS, which focuses on motherhood skills such as nursing, first-aid, child health and nutrition care. Fresh packages of services for this group are under consideration. A draft policy on youth/adolescent issues is under debate which proposes measures to ensure young people to have access to all information and services including reproductive health and to promote social environment that prevents diseases/problems like HIV/AIDS, substance abuse etc. Under the RCH programme, specialised counseling and IEC materials are envisaged to be provided by NGOs and proposals are being invited from NGOs in this regard.

3.6.4 Role of Hospitals in Implementation of RCH Programme

Hospitals are important component of the health care delivery system which may be classified into different categories. This grouping may be based on size of hospital in terms of number of beds available; types of services'provided (generallspecialised); by location (urban/rural); according to the system of medicine practised (Allopathy/Ayurveda/ Homoeopathy); by ownership (public/private/NGO/corporate) etc. Irrespective of the type of a hospital, it is involved in providing outpatient and inpatient services and provide generally promotive, preventive and curative, and in some cases rehabilitative services also. Hospitals generally can play very important roles in implementation of various national health programmesincluding RCH programme.

Hospitals form important element of the referral system wherein the referred cases from the primary care facilities can get consultative as well as curative services from specialists from the hospitals. Obstetric and paediatric cases referred from peripheral institutions are treated on general or emergency basis at hospitals.

Hospitals having enough clinical cases and competent clinical experts in different specialities, can be actively involved in providing clinical skill based training to various health care personnel. Under RCM programme, training in integrated RCH service for primary health care personnel, MTP, laparoscopic sterilisation. minilap, NSV, IUD insertion etc. can be provided from hospitals.

Details of information on births and deaths that take place in the hospitals including reliable data on causes of deaths are expected to be reported to the health administrative authorities regularly. This information is very valuable for preparing action plan for RCH services in districts.

Patients suffering from various epidemic prone diseases attend the hospitals for medical care. Hospitals can play a very important role in preventing the epidemic by sending timely information about unusually increased number of cases to the health authorities in the district.

Hospitals can play an important role in surveillance of important diseases i.e. routine reporting of selected disease conditions even when not an epidemic. Certain hospitals have been identified as sentinel surveillance centres for specific diseases. For example, vaccine preventable diseases, diarrhoeal diseases, HIV infection etc.

I-Iospitals can also be involved in rendering health education/IEC/counseling to patients, relatives etc.

Hospitals can also contribute to the improvement of service components under RCH programme through conducting clinical and operational research.

Check Your Progress 4

1). Mention the important health infrastructure facilities for delivery of RCH services in the rural areas.

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2) What arrangements are provided for ensuring 24 hour institutional delivery services at PHCs under RCH programme?

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3) How is the panchayat involved in provision of referral services under RCH programme?

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4) What are the special provisions for delivery of RCH services in the urban slums?

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5) Mention the different roles which hospitals can play for effective implementation of RCH programme.

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3.7 MANAGERIAL DIMENSIONS OF RCH PROGRAMME

The RCH programme is being implemented all over the country by the different health institutions and personnel of the health care delivery system at various levels in the hierarchy. As already mentioned, there has been a major paradigm shift in the programme which needs to be understood by all concerned with its implementation. Health and hospital managers who are responsible for implementing the programme have to perform number of management functions. In view of the objectives of the programme as well as the paradigm shift in the programme and approach, it becomes clear that special attention needs to be placed on programme management at different levels. The major managerial dimensions include:

- participatory, decentralised, community needs assessment based programme planning.
- organising special programmes/schemes/projects under RCH.
- resource procurement and their management.
- ensuring quality of care.
- management information system.
- monitoring and supervision etc.

3.7.1 Community Needs Assessment Based Decentralised Planning

From 1st April, 1996, the Family Welfare Programme was implemented all over India based on Target Free Approach (TFA). Till then, the workload under the programme at different levels in the health care delivery system and the achievements of the programme were assessed on the basis of targets given from the central government for different individual contraceptive methods. This led to a situation where, achievement of contraceptive targets in pure numbers became an end in themselves. Not only that this top-down approach did not consider the clients' felt needs and choices, it also undermined the importance of quality of services and even forced many health personnel to over-report their achievements and inflate their performance. It is under this background that the GOI stopped the practice of fixing targets for services from above. It is important to understand that TFA does not mean the license to do no work. The population goals still remain the same as before and after targets from above

are withdrawn, the health workers are expected to consult families and local communities in the beginning of every year in order to assess their needs and preferences and then work out for themselves the workload and activity plan for the coming year. This is to be done by the ANM with the help of Male health worker, through consultation by her with the Anganwadi worker, TBA, members of the Mahila Swasthya Sangh, as well as local panchayat members. The ANM is to work out the requirements for each service, based on estimates made by her, using the data on various local relevant events like births, deaths, etc.

For example, to estimate the probable number of pregnancies that may occur in any area, the following formula may be used:

Probable Number of Pregnancies = Population of the Area × Birth rate of the area (district/state)

Once the probable number of pregnancies is estimated, this also will be the probable number of deliveries that an ANM can expect in her area. The number of antenatal registrations to be expected would be the probable number ofpregnancies with an additional 10% of that number to account for abortions.

The workload of different ANMs under one PHC when added up along with appropriate addition ofrequirements for specific activities bf the PHC also like MTP, institutional deliveries at PHC, would determine the workload or requirement for that PHC. Similarly, requirement at district level would be worked out by adding up the requirements for all PHCs along with requirements for specific activities undertaken at district level institutions like district hospitals etc.

After implementing the TFA approach for about 18 months, the experience was reviewed and based on the feed-back and deliberations among experts, certain modifications to improve the approach were made and it was renamed as Community Needs Assessment (CNA) Approach and the manual provided for helping the ANM in her performance was also accordingly modified and renamed.

A number of forms are prescribed under the programme, for enabling the preparation of action plan at different levels in which the reports must be made by the ANM for the subcentre plan, in-charge medical officer for the PHC, by incharge doctor for the FRU/ subdistrict hospital, and by incharge medical officers at the district hospitals, and by District Family Welfare Officer for the whole district, which ultimately will be sent to the state government and Department of Family Welfare, GOI.

After identifying the needs and resource requirements for meeting the identified needs, an activity plan needs to be developed wherein the persons responsible for various activities are identified and a logical framework indicating sequence of activities as well as indicators of achievement along with means of verifying the indicators are spelt out.

3.7.2 Human Resource Development and Capacity Building

For implementing RCH programme, a large number and categories of health personnel at different levels in the hierarchy are involved. One of the major responsibilities of the offtcials responsible for implementing RCH programme is to manage the human resource involved and ensure their professional capacity developnlent. One essential component of human resource management is to equip them with appropriate knowledge and skills for enabling them to perform their job responsibilities most efficiently through training and retraining.

Even though most of these personnel are trained in the past for providing health care to women and children, there are wide variations in the quantity a'nd quality of training received by them. Moreover, mostly these training efforts were vertical in nature concentrating on individual/compartmental service components and hence lacked in a comprehensive and integrated approach. With the introduction of RCH programme, it is important that all health personnel involved are reoriented to the change/shift in emphasis in the programme as well as to the new additional components of services. It has also been felt that a deviation from the previous knowledge based training to a more skill/competency based training is necessary for ensuring delivery of good quality services to the clients to achieve their satisfaction.

Accordingly, major investment is envisaged to be made on proper in-service training of the health personnel with special focus on skill/competency development through practical hands-on training. Because of the large number of personnel to be trained and in view of the complexity of the programme, a need for coordinated efforts for the whole country is felt. Hence, instead of leaving this responsibility entirely to the state health and family welfare department, the GOI have designed a separate training management system for RCH.

This system is to be made functional through the already existing network of training infrastructure in the country. The National Institute of Health and Family Welfare (NIHFW) an autonomous institution in New Delhi has been appointed by the GOI as the National Nodal Agency for coordination of the training activities all over the country. The nodal agency is supported in this activity by 16 Collaborating Training Institutions (CTIs) located in different parts of the country, belonging to both government and non-government sectors. At the peripheral level, various training institutions of health personnel including ANM/LHV training schools, Health and Family Welfare Training Centres (HFWTCs), District Training Teams/Bureau etc. are expected to provide training to the different categories of health personnel.

Under RCH Programme, the training of health personnel should minimally cover the following areas:

1) Reproductive health concepts, components, and new focus in the health programme.
2) Technical knowledge and skills for providing various services related to components of RCH i.e. maternal health, child health, contraception, RTIISTI management etc.
3) Communication skills, especially for communicating with clients for service, community members/panchayat members, functionaries from other health related sectors, adolescents and also for mobilising community resources for RCH etc.
4) Management skills required for planning based on community needs, material resource management like drugs, vaccines, equipment, etc. maintaining records and reports etc.

Accordingly, the different types of training activities envisaged under RCH programme include:

1) Awareness generation training for health functionaries, functionaries from health related sectors including panchayati raj system at grass-root, district and state levels.
2) Skill development training courses which are of four types viz.
   - integrated foundation skill based course for primary health care functionaries to render integrated RCH services as part of primary health care at ANMILHV schools/ HFWTCs;
   - specialised skill development courses like MTP, Laparoscopic sterilisation, minilap sterilisation, NSV for doctors and IUD insertion for ANM/LHV at identified training institutions/hospitals;
   - specialised management training for the state, divisional and district level programme managers at identified management training institutions; and
   - specialised training in communication for skill upgradation among IEC personnel of central, state and district levels at identified communication training institutions.

For integrated training in RCH or primary health care personnel, while the NIHFW will train the master trainers from faculty of CTIs, the CTIs in turn will train trainers from peripheral training institutions who will train the peripheral health functionaries on RCH service components.

Role of Health Administrators in Training under RCH

As already described regarding paradigm shift in the RCH programme, under the new approach adopted for implementation of the programme, it is envisaged to have

comprehensive, integrated training with district as the organiser/coordinator/implementor with support from centre and state. The district is to function as the basic unit and district based training plans are to be prepared for all types of training activities according to the actual training needs. The district authorities are to be assisted by the CTIs in this regard. These plans are to be approved by the State RCH Co-ordination Committee and sent to the national nodal agency, NIHFW for release of funds for implementing the training. The District FW Officer, assisted by the district training centres will coordinate with the training institutions to ensure that the health personnel of the district are nominated and relieved for the training regularly. The DFWO will also coordinate with the related departments and Panchayati Raj system in the district to organise awareness generation training for functionaries from health related sectors.

3.7.3 Management of Material Resources

One other major managerial responsibility of health personnel is that of managing the different types of material resources like drugs, vaccines, other supplies like cotton, linen, lab. reagents, contraceptives, equipment, IEC materials etc. so that effective and efficient services can be provided to the clients. This includes estimating the requirement for these items for a specific period (one year/one month/a quarter of a year) based on the service1 activity load; timely procurement of these items from their sources; their appropriate storage/ distribution to different levels of care as per the needs; maintaining proper records for effective monitoring of their use; appropriate maintenance of equipment; proper disposal of waste materials etc.

Under the RCH programme, there are specific drugs and equipment kits supplied to the subcentre, PHC, CHC/FRU levels based on the types of activities expected at these levels. Some of these are drug kits, equipment kits, surgical sets, IUD insertion kit, normal delivery kit, equipment for anaesthesia, equipment for neonatal resuscitation, blood transfusion set, laboratory diagnosis kit etc. With regard to supply of these kits, in order to enable the institutions to obtain these items issued as per their requirement, system is set up at divisional level (one divisional supply depot for a cluster of 6-10 districts) where suppliers will supply each individual item in reasonably large packing. The district/FRU/PHC can get individual items issued to them as per their entitlement under the scheme in any number of installments throughout the year. This arrangement is expected to minimise wastage of the items.

For supporting immunisation programme, cold chain has been created covering all PHCs. Based on actual requirement, deep freezers and ILRs are also being provided. For repair of cold chain there is provision for Rs. 500 per PHC per year.

For support to emergency obstetric care and MTP, where some cases may require blood transfusion, under the RCH programnle, pilot projects are being initiated with financial support from European Commission to set up regular and reliable blood supply to PHCs and CHCs by linking them with nearest district blood bank.

For essential new born care needed equipment is being provided to all district hospitals1 CHCs/FRUs and PHCs at block level.

In order to make safe abortion services available to the needy, under the RCH programme, MTP equipment is made available at institutions i.e. district hospitals/CHCs and PHCs wherever medical officers are trained and operation theatres are available.

Change in Procurement Procedures

Since the RCH programme has major component funded under World Bank RCH project, many items of procurement under the programme are funded out of this project. In order to obtain reimbursement from World Bank, specific procedural guidelines are to be followed. Accordingly, the procurement capacity would be strengthened by appointing consultants to serve as Procurement Support Agencies (PSAs) at the national and state level to assist MOHFW or state to procure equipment, drugs and materials.

3.7.4 Funding and Reimbursement Procedures under RCH Programme

In order to ensure smooth and timely flow of funds under the programme, funding to the states is being routed through state level registered societies named State Committees of Voluntary Action (SCOVA) with the exception of few states for which funds are provided through the State Budget. All states/UTs and societies, project directors at state, district and city and society level would be required to maintain an identifiable account of project funds and expenditure along with activity-wise expenditure clearly differentiating funds from different sources. All states are required to open a budget head for RCH programme with two subheads viz. National component and District sub-project component irrespective of whether funds are routed through SCOVA or state budget.

3.7.5 Management Information System (MIS)

As already mentioned, the initiation of CNA approach to RCH planning involves collection/ generation of huge volume of data and their use for participatory planning with involvement of stakeholders (women and men). Further, the items of performance to be reported on regular basis for monitoring of the complex and extensive programme have also changed. Accordingly, the MIS also has been modified and strengthened as per needs. This system should also provide relevant information on client satisfaction and the impact of the programme on health status of women and children.

The sources from where relevant data for demographic and vital statistical indicators can be obtained include decennial census, National Family Health Survey conducted all over the country in 1992-93, and Sample Registration Scheme.

For other selected information the sources include routine reporting and district surveys.

Routine reports on prescribed formats are regularly to be submitted by the ANM on prescribed dates to the PHC and PHC in turn is to send the consolidated report to the district. The district after consolidating performance reports from all health institutions submit the report to the state and central government authorities.

District surveys in half the districts on yearly basis is conducted using sample survey methods for generation of information on selected RCH and population indicators including programme process indicators. These surveys are co-ordinated by an identified national level organisation i.e. International Institute of Population Studies (IIPS) and surveys are undertaken by regional level institutions identified for this purpose.

In addition, for assessing the actual availability and utilisation of the RCH facilities from subcentre to district hospital, concurrent evaluation of the programme is also being undertaken regularly at least one district per month. These surveys would also.ascertain quality of services and community satisfaction. For this, information from families in at least 2 villages and one urban ward will be collected through interviews. Introduction of quality and impact indicators for monitoring and evaluation of the programme as well as the initiation of the rapid evaluation procedures are major deviations from the previous monitoring system for the programme.

3.7.6 Monitoring of RCH Programme

Monitoring is the process of measuring and observing changes during implementation of the programme. Monitoring is also a process of assessing progress in implementation in relation to the planned schedule.

The observations/measurements during monitoring may be positive or negative and may relate to resources, activities, outputs and outcome, Thus monitoring will indicate whether,

- the required resources have been provided or not.
- available resources are being optimally utilised or not.
- planned activities are being implemented as scheduled or are in progress.
- expecred results are being achieved or not,
- o any unplanned or unforeseen occurrences have taken place.

The measurement of these changes is based on certain predetermined indicators. An indicator is an indirect measure of an event or a condition. For example, an indicator to measure reduction in neonatal tetanus incidence will be the proportion of births attended by trained personnel.

Indicators could be for inputs (resources), processes (activities), outputs (performance achievements), or outcomes (effect/impact) e.g.:

- health worker population ratio is an input indicator
- frequency of antenatal clinics is a process indicator
- percentage of children receiving measles immunisation is an output indicator
- incidence of neonatal tetanus is an impact indicator

These indicators can be worked out based on data collected regularly through the management information system. As already mentioned, the MIS has been modified to meet the requirements of the programme and emphasis is more on quality aspect of the programme. Information also need to be collected on the additional components of services under RCH programme e.g.. RTI and STI control.

Examples of few RCH indicators are given below:

Service Delivery Indicators

- Percentage of eligible couples having access to contraceptive services
- Percentage of pregnant women who had received antenatal care
- percentage of new borns receiving care
- Percentage of children suffering from pneumonia who received treatment with antibiotics
- percentage of IUD users who are screened for RTIs

Indicators of Quality of Care

- Percentage of pregnant women who had at least three antenatal check ups
- Percentage of laparoscopic sterilisation done adhering to the prescribed protocol
- Percentage of ANMs who have undergone skill based training in IUD insertion
- Percentage males and females with knowledge regarding uses and side effects of cohtraceptive methods
- Percentage of users of oral contraceptives receiving follow up visits from health worker.

Outcome Indicators

- Low birth weight babies11000 live births
- Incidence of neonatal tetanus cases
- Incidence of anaemia in pregnant women
- Proportion of deliveries among mothers less than 19 years old

Monitoring can be undertaken with the help of reviewing the MIS regularly and studying the indicators based on the data. In addition, supervisory visits to service institutions can also be used for monitoring during which supervisor can identify the deviations if any, from the expected and can give appropriate suggestions. Interviews with the community members in the field can also help in monitoring the programme activities when the community's reaction to the services can be understood and if there are any drawbacks in the services they can point them out. Such interviews could be conducted also as a participatory process involving various stakeholders to obtain feed-back on clients' satisfaction with services.

3.7.7 Partnership Development – Intersectoral Cooperation and Involvement of NGOs

As already mentioned under paradigm shift in the programme, the GOI is increasingly involving the NGOs in both service delivery and in training of health personnel under RCH programme. The major strength of the NGOs is the flexibility in their procedures which is different from the restrictions of need for strict adherence to rules and regulations in the government system. Further, they also enjoy better rapport and credibility among the people. GOI expects NGOs to undertake various innovative efforts through special projects in finding solutions to many problems in RCH service provision of best quality. Such projects are funded by the GOI.

The involvement of NGOs in the programme has been done through a decentralised manner. While small NGOs all over the country are being involved in counseling, advocacy and for increasing awareness among people about RCH, mother NGOs identified at regional level extend assistance to these small NGOs. At the same time, national level NGOs are identified which will meticulously evaluate the mother NGOs before they are sanctioned to undertake the different innovative projects. Not only that the NGOs are recognised as partners in RCH programme implementation, for success of the programme there is also need to have close cooperation and coordination between health sector and other related sectors in the government. For example, the Women and Child development department, Rural Development department, the Panchayati Raj system, Department of Education etc. are a few of them which have a major complementary role to play in the effective implementation of RCH programme. RCH administrators have to devise different mechanisms to ensure support from these sectors. Similarly effective implementation can contribute to the health and development of children and mothers empowerment.

Check Your Progress 5

1) What are the specific subject areas covered in training of health personnel under RCH programme'?

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2) Mention the different types of training programmes envisaged under RCH programme.

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3) What are the specific roles of District health administrators in relation to training under RCH programme?

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4) What are the different sources from where data are available for effective management of the RCH programme?

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5) What is monitoring?

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6) What are the methods for monitoring RCH programme?

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7) What are indicators'?

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3.8 IMPROVING QUALITY OF SERVICES

The RCH programme's main emphasis is on provision of clients' need based services and ensuring clients' satisfaction. Therefore, an important requirement for effective implementation of the programme is to ensure that the quality of services is improved. Various efforts have been initiated to ensure quality of services under the RCH programme. Some such initiatives are described below:

- For various service components/procedures, standards have been developed which need to be ensured/complied with by service providers e.g. standards for male and female sterilisation, IUD insertion, Oral contraceptives and MTP services, midwifery practices etc.
- A well designed training strategy which is competency/skill based has been evolved for various health care providers. One essential step introduced in this training is introduction of requirement of proficiency certification for the trainees from trainers after ensuring that the trainee has actually acquired the skills to perform the service activity1 procedure.
- Improved logistics management is another essential effort initiated for ensuring quality of services so that right type of supplies are available of right quantity and quality at the right time. It is envisaged to have a project which has its components like setting up an autonomous corporation at state level with state and regional level warehouses for improved storage and distribution, use of private transport facilities for transporting supplies at regular intervals, development of a logistics management information system which will help tracking supplies and forecasting requirements and training in logistics management.
- Monitoring and evaluation of the programme has also focus on quality with a participatory approach involving all stakeholders and incorporating quality indicators for assessment, particularly focusing on clients' satisfaction.
- Supportive counseling and follow-up services are essential elements of the programme designed to provide quality care. This is particularly so for MTP acceptors, contraceptive acceptors, low birth weight babies etc. Follow-up contacts provide good opportunity for continuing counseling and education and for discussing related reproductive health issues.
- IEC efforts to make the community well informed about various aspects of reproductive health do contribute to enable the clients to make informed choice of services as per their needs which would add to the quality of care.

Check Your Progress 6

What steps have been initiated for improving the quality of care under RCH programme?

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3.9 LET US SUM UP

In this unit, you have learnt that the Government of India have launched the Reproductive and Child Health Programme with a view to adopt a conlprehensive and integrated approach to the population issues and also towards ensuring women's development. The major paradigm shift in the programme which needs to be understood by all concerned with implementation of the programme has also been described in this unit.

While describing the components and service packages under the programme, you have been apprised that, a differential approach is adopted in the programme in terms of cornprehensivelessential components of RCH being implemented in different districts in the country based on their RCH status. You have also been introduced to the organisational and infrastructural set-up for implementing the programme with special emphasis on the various specific schemes and projects under the programme.

You have learnt about certain specific managerial responsibilities including the Community needs based decentralised participatory planning, modified procedures for management of material and finance resources as well as human resource management with special focus on competency based training under the programme. You have also been familiarised with tlie modified MIS and its use in monitoring the programme.

As you have understood, the RCH programme focuses on increasing the coverage and improving the quality of services and thereby ensuring clients' satisfaction and you have learnt about the various efforts initiated by the government in achieving this goal.

3.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Integrated approach is desirable because,
   - couples will accept contraceptive services only if survival of their children already bdrn is ensured;
   - separate identity of each programme component led to problems in their effective management;
   - integrated approach would increase service acceptance by community/clients; and
   - overlapping and additional expenditure can be avoided.

2) Major consensus arrived at ICPD conference in 1994 "that population policies should address social development beyond family planning, especially the advancement of women and that family planning should be provided in the context of comprehensive reproductive health care".

3) RCH programme was launched in India on 15th October, 1997.

Check Your Progress 2

1) The policy decision before implementing the RCH programme was to withdraw the system ofestimating workload and work allotment as well as monitoring the family welfare programme based on centrally determined method-specific contraceptive targets and instead, introducing a community needs assessment based, bottom up approach for the same.

2) There is paradigm shift in the programme because,
   - shift from focus on achievement of target to provision of range of quality services;
   - shift from reducing population in numbers to services to meet reproductive needs of individuals and community;
   - shift from compartmental to an integrated approach to service delivery as well as training;

- shift towards increased involvement of community. non health sector, NGOs etc.; and
- focus on gender issues and increased male responsibility and participation towards reproductive health matters.

Check Your Progress 3

1) Comprehensive reproductive health package includes:
   - prevention and management of unwanted pregnancy,
   - services to promote safe motherhood,
   - services to promote child survival,
   - nutritional services for vulnerable groups,

     prevention and treatment of RTIs and STIs,
   - prevention and treatment of gynaecological problems,

     screening and treatment of breast and cervical/ uterine cancer,
   - reproductive health services for adolescents,
   - health, sexuality and gender.information, education and counseling, and
   - establishment ofeffcctive referral system.

2) Reason for classification of districts for RCH services are:
   - services are to be commensurate with the needs and facilities.
   - interdistrict variations exist in terms of RCH indicators like CBR, female literacy rate etc.

     Poorly performing districts with inadequate facilities need priority attention for resource allocation.

3) Components of essential obstetric care include:
   - early registration of pregnancy,
   - at least.3 prenatal check up by trained personnel at appropriate intervals,
   - antenatal care should include blood pressure check, haemoglobin estimation, urine examination etc. regularly,
   - counseling,
   - detection of complications ofpregnancy if any,
   - referral to PHC/ FRU for complications,
   - assistance during delivery,
   - ensure 3 postnatal check up, and
   - detection of complications during delivery, and referral.

4) Special inputs for Emergency obstetric care include strengthening of FRUs through:
   - supply of drugs and medicines,
   - provision for appointment of contractual staff,
   - provision of laparoscope,

     provision for providing emergency care requiring surgical interventions, blood transfusion and anaesthesis, and

     provision for consultant anaesthetist for emergency obstetric care etc.

5) Major causes of maternal mortality are:
   - anaemia,
   - haemorrhage,
   - obstructed labour,
   - sepsis,
   - eclampsia, etc.

6) Major causes of mortality among infants and children are:
   - prematurity,
   - respiratory infections,
   - diarrhoeal diseases,
   - umbilical cord infections in new born baby,
   - birth injuries,
   - congenital malformations,
   - severe malnutrition, etc.

7) The important components of child survival service package are:
   - essential new born care,
   - prevention and management of diarrhoea,
   - appropriate management of ARI,
   - sustaining high level of immunisation coverage,
   - nutritional interventions, etc.

8) Major signs and symptoms of RTI/STI are:
   - abnormal vaginal discharge in women,
   - urethral discharge in men,
   - genital ulcers in men and women,
   - lower abdominal pain in women,
   - scrotal swelling,
   - enlarged, inflamed inguinal lymph glands,
   - neonatal conjunctivitis etc.

9) Hazards of pregnancy when the adolescent girls are not physically and emotionally not ready for child bearing.

Check Your Progress 4

1) PHC and its subcentres, CHC, FRU, and their medical and paramedical personnel, Anganwadi and anganwadi worker, district and subdivisional hospital.

2) Doctor on call, nurse and cleanliness service available beyond normal working hours through contract service, provision of payment of honorarium for deliveries conducted between 8 p.m. and 7 a.m. on duty and to the contractual nurse.

3) Payment of fixed amount to local panchayat in selected subcentre areas for arranging transport for referral of women to CHC/PHC for delivery,

4) Services through urban health posts, urban MCH and FW centres, urban ICDS projects, referral hospitals, PHCs in slums (proposed) maternity homes and mobile clinics by NGOs etc.

5)
- Referral services,
- clinical skill-based training to health personnel,
- providing information on births and deaths including causes of deaths,
- providing timely information on epidemics, surveillance of selected diseases,
- health education in hospitals,
- research etc.

Check Your Progress 5

1)
- maternal health,
- child health,
- management, and
- communication.

2) i) Awareness generation training for personnel from health and non-health sectors

ii) Integrated skill-based training for primary health care personnel

iii) Specialised clinical skill training on MTP, Laparoscopic sterilisation, Minilap sterilisation, NSV etc. for doctors

iv) IUD training for ANM/LHV

v) Management skill based training for RCH programme managers

vi) Communication skill based training for IEC personnel

3) i) Preparation of district training plans and getting approval

ii) procurement and management of funds.

iii) nomination and deputing staff for training

iv) nionitoring training

v) coordination with health and related sectors for training staff.

4) Sources of data for RCH service management include:

- Decennial census,
- SRS,
- NFHS,
- District surveys, and
- Routine service records and reports.

5) Monitoring is a management function which measures the changes during the implementataion of a programime and it checks the progress to see if activities take place as scheduled/planned. If changes seen are of negative nature then corrective steps can be initiated.

6)
- Review of reports and records
- Supervisory visits
- Interviews and discussions with community

7) Indicator is an indirect measure of an event or condition which can help in measuring the changes.

Check Your Progress 6

Steps for improving quality of RCH services include:

- development of standards for various service components arid ndherence to them,
- appropriate competency-based training for health personnel,
- development of procedures for proficiency certification and adherence to them to ensure acquirement of skills after training,'

- improved logistics management,
- close supervision and monitoring,
- counseling and follow-up services for clients, and
- need-based information, education and communication services.

UNIT 4 HEALTH RELATED PROGRAMMES

Structure

4.0 OBJECTIVES

After going through this unit, you should be able to:

- enumerate various ongoing national programmes related to health;
- list the objectives, services and organisation of ICDS scheme;
- describe the salient features of the rural water and sanitary programme;
- list the various components of minimum need programme; and
- enumerate the national norms under Minimum Need Programme.

4.1 INTRODUCTION

In the earlier three units of this block you have learnt about the national programme for communicable diseases, non-communicable diseases and reproductive and child health care.

In this unit, you will learn about the health related national programmes. To begin with you will learn about the objectives, services and organisation of ICDS scheme which is an important multisectoral programme. Thereafter you will learn about the rural sanitation and waste programme. Towards the end of this unit you will learn about another very important programme namely minimum need programme which was initiated in the fifth five year plan. You will learn about its components and various norms for establishment of rural health care infrastructure.

UNIT 4 HEALTH RELATED PROGRAMMES

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4.1 INTRODUCTION

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4.2 INTEGRATED CHILD DEVELOPMENT SCHEME

The children population is around 17% in India and constitutes an important national asset. This asset in its formative period of life is threatened by a number of preventable diseases of childhood, poor nutrition, lack of education and poor growth and development. The Government of India in the year 1974 adopted a national policy for children from the time before the birth till completion of childhood, so that they will have full physical, mental and social development. Integrated Child Development Services (ICDS) scheme was launched on 2nd October, 1975 in pursuance of National Policy for children in 33 experimental blocks. Success of the scheme led to its expansion to 2996 projects by the end of March, 1993.

ICDS is a multisectoral programme and involves several government departments. The primary responsibilty for the implementation of programme is with the Department of Women and Child Development Ministry of Human Resource Development at the centre and the nodal departments at the states, which may be social welfare, rural development, tribal welfare, health and family welfare or women and child development department.

4.2.1 Aims and Objectives

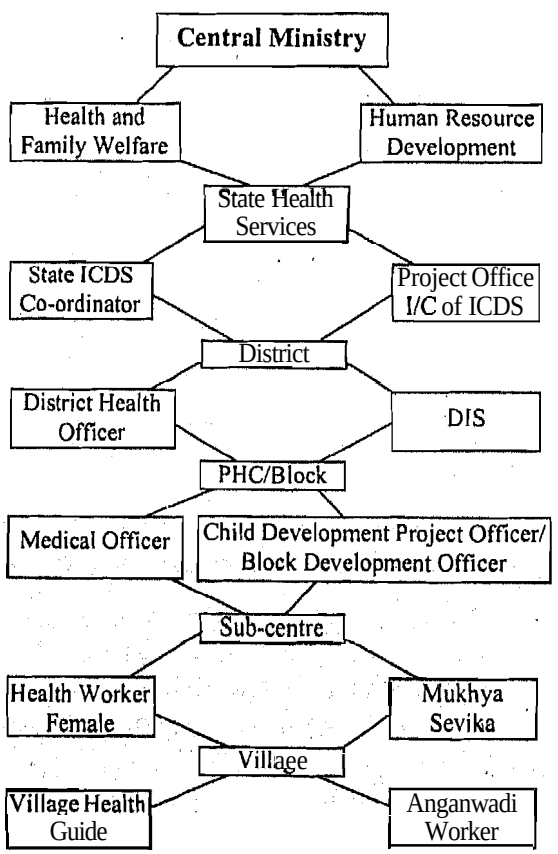
The aims and objectives of ICDS are:

- To improve nutritional health status of 0-6 year age children for proper physical, social and psychological development.
- To reduce the incidence of malnutrition, morbidity, mortality and school drop-outs.
- To achieve inter-departmental co-ordination for effective implementation of policy aiming at child development
- paternal education regarding health and nutritional needs of children.

Towards achieving these objectives, a package of services is provided through the Anganwadi workers at the village centre called "Anganwadi". The supportive supervision is done by the functionaries of the nodal and health departments.

4.2.2 Organisation

The following flow chart depicts the organisation of ICDS and linkages among various functionaries.



4.2.3 Services Rendered

The ICDS package of services includes:

- Supplementary nutrition, Vitamin 'A', Iron and Folic acid
- Immunisation
- Health checkup
- Referral Services
- Treatment of minor illness
- Nutrition and health education to women
- Pre-school education to children in age group of 3-6 years
- Convergence of other supportive services like water supply, sanitation etc.

4.2.4 Beneficiaries

Following are the beneficiaries under the scheme:

- Children below six years of age,
- Expectant and nursing mothers,
- Women in reproductive age group.
- Adolescent girls.

Service Delivery System

An "Anganwadi" is the focal point for the delivery of the services to the children and mothers at their doorsteps and population covered by anganwadi is:

- 1000 in both rural and urban areas, and
- 700 in tribal areas.

But the number of anganwadis in any project can be increased according to local needs on the basis of population, topography, number of villages etc. Services at the Anganwadis are delivered by:

i) Anganwadi Worker: The anganwadi worker, is a part time honorary worker and receives an honorarium. She is assisted by a helper.

ii) Helper: Helper assisted the Anganwadi worker who is also a local woman and is paid an honorarium.

iii) Mukhya Sevikas (MS): The work of Anganwadi workers is supervised by full time workers, the Mukhya Sevikas (MS). They are appointed at the proportion of one for 25, 20 and 17 anganwadi in urban, rural and tribal projects respectively.

iv) Child Development Project Officer (CDPO): For one project there is one CDPO which covers one community development block having a population of 80,000 to 1,20,000 CDPO, coordinates and guides the work of entire ICDS project as an incharge and provide supervision to 4-5 Mukhya Sevikas. CDPO is assisted by one assistant CDPO.

4.2.5 Staff of the ICDS Under Health Department

The following staff from health side monitors the functioning and delivery of services under the scheme.

i) State Co-ordinator: Director in chief or Director health services or Director family welfare and MCH is designated as honorary state co-ordinator of ICDS.

ii) Senior Advisor: A senior officer of the health and family welfare department is appointed as senior advisor.

iii) Officer-in-Charge Data Analysis Cell: Health family welfare department may be appointed to this post of the recommendation of the state co-ordinator.

iv) Divisional Advisor: He/She is a deputy director. or joint director, or additional director who review ICDS programme implementation, co-ordinate with district officials, programme officials and organise meetings.

v) Chief District Advisor: He/She is the head of the medical and health department at the district (CMO) who organises and supervises all activities at district.

vi) District Advisor: He/She is a deputy CMO, additional CMO, district TB, malaria or leprosy officer who supervises one of the 3-4 ICDS projects of the district.

vii) Project Advisor: He/She is the official incharge of the community health centre who supervises and coordinates the continuing education with other medical officers.

viii) Sectoral Advisor: Each ICDS project PHC/CHC is divided into sectors corresponding to the area of one MS, one medical officer is made incharge of one sector, and is designated as sectoral advisor.

4.2.6 Criteria for Project Site

Areas which are tribal/backward, drought/flood prone, predominantly scheduled castes, nutritionally poor, underdeveloped social services, slum population are selected for project site:

- A community development block in the rural areas.
- A tribal development block in the tribal areas.
- A group of slum in urban areas.

Thus, you have learnt that ICDS is a multisectoral programme and involves several governmental departments and the coordination machinery has been set up at all levels of management. You have also learnt that the scheme was launched on 2nd October, 1975 in pursuance of the national policy for children in 33 experimental blocks: Success of the scheme led to its expansion to 2996 projects by the end of March, 1993.

Although scheme is being implemented successfully, there are some drawbacks also:

- There is irregular and inferior supply of supplementary nutrition.
- Children are visiting Anganwadi only at the time of food distribution, which indicate that no other activity of the ICDS scheme is carried out.
- Referral system and home visits are not practical properly and adequately.
- There is hardly serviced coverage of children in the age group of 0-3 years, which is the most vulnerable group.

Check Your Progress 1

I) List the aims and objectives of ICDS programme?

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2) Enumerate the services rendered by ICDS programme?

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3) List the staff of an Anganw .

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4.3 WATER SUPPLY AND SANITATION

In this section you will learn about the importance of safe water supply and sanitation, and also about the Water-borne diseases and water safety procedures and standards have been explained.

4.3.1 Importance of Water and Sanitation

Safe drinking water supply and basic sanitation as you know are essential coniponents of human health and development. As per WHO estimate, 80% of all diseases in developing countries, including India are related to unsafe drinking water and poor sanitation.

Diseases, the common cause of deaths are gastroenteritis, typhoid, cholera, hepatitis, amoebiasis, schistosomiasis and vectors borne diseases like guinea worm, yellow fever, malaria etc.

Emphasising the significance of drinking water supply and sanitation services, the United Nations Water Conference (1977) made a distinction between drinking water and sanitation, and other water issues. The conference reconunended that each country should develop national plans and programmes for community water supply and sanitation, thereafter the national water supply and sanitation programme was launched in 1954. The UN declared 1980-90 as the "International Drinking Water Supply and Sanitation decade". The targets were fixed by the Indian Government for the decade:

- One hundred per cent urban and rural water supply
- 50% urban sanitation
- 25% rural sanitation

In 1987 the National Water Policy was announced that has given high priority to drinking water. Rural sanitation was taken up by the minimum needs programme.

4.3.2 Sources of Water Supply

Selection of source of drinking water, a number of factors may influence the health of consumers. In particular, attention must be given to possible future developments that may influence the continued suitability of the source. Important considerations include:

a) Quantity (Source Capacity)

It is the quantity of water available at the source sufficient to meet continuing water demands, taking into account daily and seasonal variations and projects growth in the size of the community being served'?

b) Quality

It is the raw water quality such that, with appropriate treatment, water can be supplied that meets or exceeds the quality specified in the drinking water standards.

c) **Protection**

The water source should bc protected from pollution with human excreta, industrial discharges and agriculture run off.

d) **Feasibilty**

It is the source available at reasonable cost both in absolute terms and in comparison with possible alternative sources of supply.

e) **Treatability**

It is treating water adequately under locally prevailing conditions.

4.3.3 classification of Water-borne Diseases

Various water-borne diseases which can effect humen beings can be classified as follows:

1) Diseases Caused by the Presence of an Infective Agent

   a) ***Viral:*** Viral hepatitis ***A,*** Hepatitis E, Poliomyelitis, Rotavirus, diarrhoea in infants.

   b) ***Bacterial:*** Typhoid and paratyphoid fever, bacillary dysentery, Esch. coli, diarrhoea, cholera.

   c) ***Protozoal:*** Amoebiasis, giardiasis.

   d) ***Helminthic:*** Round worm, threadworm, hydatid disease.

   e) ***Leptospiral:*** Weil's diseases.

2) Diseases Due to the Presence of an **Aquatic Host**

   a) ***Snail:*** Schistosomiasis

   b) ***Cyclops:*** Guineaworm, fish tape worm

4.3.4 Safe Drinking Water

The WHO has published in 1993 vol. 1 and in 1996 vol. 2 of second edition of Guidelines for Drinking Water Quality intended for use by countries as basis for the development of standards, which is properly implemented will ensure the safety of drinking water supplies.

In developing national drinking water standards based on these guidelines, it will be necessary to take account of variety of local geographical, socio-economic, dietary and industrial conditions. This may lead to national standards that differ appreciably from the guideline values.

The guidelines for drinking water quality recommended by **WHO** (1993 and 1996) related to the following variables:

i) Acceptability aspects

ii) Micro-biological aspects

iii) Chemical aspects

iv) Radiological aspects

Safe Drinking Water at Community Level

i) **Storage:** Storage provides reserve of water from which further pollution is excluded. As a result of storage a very condiderable amount of purification takes place.

ii) Filtration: Impurities and 98-99% of the bacteria removed by filtration. Two types of filters are in use.

- Slow sand or Biological filters.
- Rapid sand or mechanical filters.

iii) Disinfection: Effective disinfection can be done by:

- Chlorination
- Ozonation
- Ultra-violet Irradiation

Chlorination: The disinfecting action of chlorine is mainly due to the hypochlorous acid for proper chlorination:

- All the water should be clear and free from turbidity.
- Chlorine demand for water should be estimated.
- Contact period of free residual chlorine should be at least one hour.
- Minimum recommended concentration of free chlorine is 0.5 mg/1 for one hour.

Ozonation: Ozone is a relatively unstable gas. It is a powerful oxidising agent. It eliminates undesirable odour, taste and colour and removes all chlorine from water. The drawback of ozone is that after it has done its job, it decomposes and disappears.

Ultra-violet Irradiation: Germicidal property of UV rays effective against most micro-organisms known to contaminate water supplies including viruses.

Safe Drinking Water at Household Level

Following three methods are generally available for purifying water on an individual or domestic level:

i) Boiling .

ii) Chemical disinfection

- Bleach powder
- Chlorine solution
- High test hypochloride
- Chlorine tablets
- Iodine
- Potassium permagnate

iii) Filtration

Criteria for Potable Water and Quality of Drinking Water

Following table shows the physical and chemical criteria of potable water and quality of drinking water:

Physical Qualities of Water

Characteristics	Level	Remarks
Turbidity	5 Units	Intcrfcrc with chlornatiers
Colour	5 Units	Caused by dissolved impurities
Odour	Agrceablc	Fishy by uroglenopsis and aromatic by asterionella
Taste	Agrceablc	By putrefaction and by algac

Chemical Qualities of Water

Fluorides	0.5-0.8 ppm	Excess leads to dental, skeletal fluorosis and less to dental caricr deflurodation by SSD carbon
Chlorides	200 ppm	From organic pollution and salt suspect pollution of suddenly increase or decrease
Free Salirie Ammonia	0.5 ppm	From decomposing organic matter by action of ferrous salt or nitrate
Albuminoid Ammonia	0.1 ppm	Indicate organic matter yet to be decomposed
Nitrites	Absent	From decomposing organic matter. In deep well due to action of ferrous salts or nitrates. Indicatcs active decomposition and recent current pollution

Nitrates	1ppm	Give past history of organic pollution cxccss cause mcthacnioglobinaemiain infants
O_2 absorbed	1ppm at 3hrs & 37°C	Indicate amount of organic matter yet to bc decomposed
O_2 dissolved	5ppm	If less indicates bacterial arc still actively reducing organic matter arsenic cyanide lead
Assenic Cyanide Lead	0.65	—

4.3.5 Concept of Total Environmental Sanitation

Under the seventh five year plan, the concept of "total environmental sanitation" was absent only construction of latrine is not enough. There is poor sewerage and lack of waste treatment facilities. In actual implementation of water supply, poor and backward classes of population were often neglected. There was a wide'gap between provisions for safe disposal of waste water and drinking water supply in urban areas. Billing and collection mechánism for water tariff needed considerable improvement. There is a great water wastage and leakage.

Under the eighth five year plan in rural areas, highest priority was to be given to those remaining hard core 3000 problem villages (the one which does not have water within 1,6 km. radius/15 minutes walking distance/a height of 100 meters/depth of 15 meters and water source is biologically or chemically contaminated). Ensure supply of 40 litres of water per capita per day (1pcd). Ensure supply of water to weaker sections of the society. At least one hand pump set/spot-source for every 250 persons in problem villages. Achieve zero incidence of Guinea worm diseases hy 1993 and total eradication by 1995, improving water quality and controlling fluorides, salinity and iron content. Improving sanitation in rural areas through IEC programmes, and introducing the concept of total environmental sanitation. Converting all existing dry latrines to low cost sanitary latrines.

Under the eighth five year plan in urban areas there should be 100% coverage with safe drinking water supply by the turn of this century. 125 litres of water per capita per day (lpcd) where piped and underground sewerage system are available, 70 pcd where underground sewerage system does not exist. Priority to small town for water supply with providing financial support. Converting all existing dry latrines to sanitary latrines. Recycling the treated effluents for horticulture, irrigation and other non-domestic purpose. Developing collection and transport system for solid waste disposal.

4.3.6 Rural Sanitation

Rural sanitation was included as an integral part of the national water supply and sanitation programmes under the first and second five year plans. Simple latrines which require no special servicing were considered suitable. The aim was to provide latrines in each house and only an absolute minimum by way of public sanitary conveniences.

The third plan stated that an effort should be made in each community development block to introduce the use of sanitary latrines in schools and group of houses.

The sixth plan admitted that little attention had been paid to the problem of rural sanitation. Even by the end of sixth plan less than one percent of the rural population is reported to have been covered.

The main element of the strategy in the seventh plan to tackle the problem of rural sanitation included the following:

i) Promotion of total concept of sanitation among the people. This will include environmental sanitation personnel, home and food hygenic solid waste disposal and wastewater disposal.

ii) Intensive programme of rural sanitation in certain selected districts initially which could later be replicated to other areas.

iii) Development of delivery system which is prime importance, and giving high priority to software than hardware. Once the rural masses understand the importance of sanitation through motivational and educational efforts there is not likely to be much difficulty in accepting the hardware provided,

iv) Creation of sanitation cell at the stage, district as well as block levels.

Progress in the implementation of the rural sanitation programme has been slow with the major shortfalls in physical and financial targets.

4.3.7 Organisational Structure

At the central governmental level, the departmental of rural development in the ministry of agriculture has been allocated responsibility for rural water supply and sanitation. In the field of rural drinking water supply the major task are being performed by the technology mission.

The department of rural development collaborates with other ministries, and organisations such as the department of science and technology, ministry of health and family welfare.

The management and organisation of urban and rural water supply and sanitation schemes rests primarily with state governments. But the department/agency dealing with tlie programme varies from state to state.

4.3.8 Water Testing

Now you will learn about various steps of water testing:

Collection

Water samples collected depending upon tlie need or as a routine periodic activity and sample can be collected from public or private sources of water supply.

Physical **and Chemical Examination** of Water Sample

Two litres of water should,be collected in inert glass bottle with stopper and before collecting sample bottle should be rinse it thoroughly with water to be sampled. Stopper it, seal it, label it and indicate area, source, purpose, time, and date of collection etc.

Bacteriological Examinations of **Water Sample**

Collect the sample in 250 nil sterile Mecartney bottle made of neutrol ground glass with stopper rim outstructural. In case such bottles are not available sterile cap bottle can be used.

Sample Collected from ATAP

Tap in regular use – allow the water to run for a couple of minutes. So that the impurities, may get washed out. The leaking tap should be sterilised from outside and no water running on outer surface should enter sample bottle.

The tap in case not in regular use then ignile, its inner and outer surface by spirit swap. Allow the water to run and cool the tap and then collect the sample water.

In case the sample is to be collected from stream, river or tank, collect it from the near centre. At the banks it is likely the water get disturbed. Tie a string to the neck of bottle, and slowly immerse the bottle in the water allow it to fill and take out leave the empty space within bottle then seat it. Each time allow empty air space in sample bottle.

After sealing, label it properly indicating source of water date, place and time of collection of sample quality, collected status of'chlorination and type of examination required.

Bacteriological Examination of Water

1) *Objectives of Examination*

a) Detection of faecal pollution.

b) As certain effects of rainfall drought purification system on water bodies:

c) As certain qualities of the recreational water like swimming pool water.

d) As certain quality of commercial use of water like for aerated water, ice, ice-cream, dairy, dairy products, breweries etc.

2) *Indicators of Faecal Pollution*

Coliform organisms are taken as indicator of fecal pollution of water. E. coli group I are chosen because:

a) They are excreted in abundance of human intestine about 1 lakhs to 1 million per ml of faeces.

b) They cannot survive outside human intestine for long periods, but survive longer than pathogens, and hence their presence is the stongest possibility of presence of pathos of faecal origin.

c) They are easy to detect and culture in laboratory.

d) They are always foreign to natural water fecal streptococci and the claustridium pertringens are the indicators of pollution.

Check Your Progress 2

1) List the target fixed by Government of India for International Drinking Water Supply and Sanitation decade.

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2) Enumerate the variables according to WHO.

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3) What are the objectives of bacteriological examination of water?

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4.4 MINIMUM NEED PROGRAMMES

The Minimum Need Programme (MNP) was introduced in the first year of fifth five plan (1974-78). The objective of the programme is to provide certain basic minimum needs and thereby improve the living standards of the people in term of social and economic development of the community particulary the underprivileged and undergeneral population.

4.4.1 Components

Programme includes the following components:

- Elementary education and adult education
- Rural health service
- Rural water supply
- Rural roads
- Rural electrification
- Housing assistance to rural landless labourers

- Environmental improvement of urban slums
- Nutrition
- Rural domestic cooking energy
- Public distribution system
- Rural sanitation

4.4.2 'Rural Health Services

The main component of MNP is deliveryof rural health services. Delivery of health and family welfare services to rural community through three tier system was adopted Sub-centre, Primary Health Centre and Conlmunity Health Centre.

Consolidation and operationalisation of the network of subcentres, PHCs and CHCs so that their performance is optionalised.

- Strengthening of physical facilities
- Essential equipment supply
- Filling up all vacant post
- Ensuring essential drugs, dressing and other material,

Monitor the progress of implementation of minimum need primary at the district, state and national level, a health information management.system development,

Rural Health Infrastructure

Targets were completed regarding setting up of sub-centre, PHCs, CHCs on the basis of population norm according to the priority area, rural tribal and difficult terrain.

Sub-centre

It is manned by MPW male and one female CMPW female/ANM. There are 1,37,271 sub-centre functioning in the country (June 1999) and majority of them funded by minimum need programme.

Primary Health Centre (PHC)

PHC is the first contact point between villagers and medical officer. It is manned by a medical office (MO), and supported by 14 paramedical and other staff. It act as a referral unit for sub-centres. There are 22,975 PHCs functioning in the country (June, 1999).

Community Health Centre **(CHC)**

It is manned by four medical specialist i.e. surgeon, physical gynaecologist and pediatrician supported by 21 paramedical and other staff. It has 30 indoor beds with one operation theatre, X-rays, labour room, and lab. facilities. It serves as a referral centre for PHCs. There are 2935 CHCs functioning in thecountry (June 1999).

4.4.3 Other Components

The other components of MNP include:

Environmental Improvement *of* Urban Slums

This programme is applicable to improve slums in all urban areas and-aims at provision of basic amenities like water supply, services, storm water drains, community baths and latrines etc.

Rurnl Housing

This programme provides housing plot and construction assistance including Schedule Caste and Schedule Tribe.

Rural Sanitation

A centrally sponsored Rural Sanitation Programme (CRSP) was launched in 1986.

Panchayat and local bodies made responsible for all activities related to rural sanitation. NGOs and women groups were also invplved in the implementation of programme in eigth plan.

Rural Water Supply

Highest priority was given to those hard-core problems villages (approximately 3000) that does not have safewater supply or where water is available more than 40 litres per person or available at a walking distance of more than 1.6 km or elevation difference of 100 meters in hilly areas. At least one hand pump/spot sources for every 250 person was provided.

Rural Electrification

Rural electrification is one of the main assets for rural development. During eigth five year plan it was proposed to electrified around 50,000 villages which included 10000 in remote areas.

Nutrition

In the field of nutrition, the objectives are (a) to extend nutrition support to 11 million eligible persons (b) to expand "Special nutrition programme" to all the ICDS projects and. (c) to consolidate the midday meal programme and link it to health, potable water sanitation.

Health Facilities in India

In the field rural health the objectives to be achieved by the end of eighth five year plan, under the minimum need programme are: One PHC for 30,000 population in plains and 20,000 population in tribal and hilly areas. One sub-centre for a population of 5,000 people in the plains and 3,000 in tribal and hilly areas and one community health centre (rural hospital) for a population of one lakh or one C.D. Black by the year 2000.

Rural Health Infrastructure: Norms and Level of Achievements

Indicator	Nationnl Norms		Achievements
1) Rural Population (1991) covcrcd by a	General	Tribal	
• Sub-centre	5000	3000	4579
• Primary Health Centre (PHC)	30000	20000	27364
• Community Health Centre (CHC)	120000	80000	2.14 lakhs
2) Number of Sub Centres per PHC	6		5.97
3) Number of PHCs per CHC	4		7.82
4) Rural Population (1991) covered by a:			
• MPW (F)	5000	3000	4688
• MPW (M)	5000	3000	8573
5) Ratio of HA (M) to MPW (M)	1 : 6.0		1 : 3.3
6) Ration of HA (F) to MPW (F)	1 : 6.0		1 : 6.9
7) Avcragc Rural Area (Sq. Km) covcrcd by a:			
• Sub Centre	—		22.81
• PHC	—		136.31
• CHC	—		1067.10
8) Average Radial Distance (Kms) covered by a:			
• Sub Centre	—		2.69
• PHC	—		6.58
• CHC	—		18.42
9) Average Number of Villages covered by a:			
• Sub Centre	—		4.27
• PHC	—		25.55
• CHC	—		200.07

Check Your Progress 3

1) What is the objective of minimum need programme?

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2) List the components of MNP.

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3) List the Rural Health infrastructure for health care delivery to the community?

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4.5 LET US SUM UP

In this unit you have learnt about three important health related national programme. To begin with you have learnt about the multisectoral programme of ICDS which is providing various preventive and promotive services to vulnerable section of community i.e. mothers and children. Thereafter. you learnt about water and sanitation programme which aims at providing safe drinking water both in rural and urban areas as well.

You also learnt about the concept of total environmental sanitation and the organisational structure. Towards the end you learnt about various components of MNR which was launching in fifth five year plan and also about the health care infrastructure norms laid down under the programme.

4.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1 ,

1) • To improve nutritional health status of 0-6 year age children for proper physical, social and psychological development.
   • To reduce the incidence of malnutrition, morbidity, mortality and school drop-outs.
   • . To achieve inter-departmental co-ordination for effective implementation of policy aiming at child development
   • Maternal education regarding health and nutritional needs of children.

2) • Supplementary nutrition, Vitamin 'A', Iron and Folic acid
   • Immunisation
   • Health checkup
   • Referral Services
   • Treatment of minor illness
   • Nutrition and health education to women
   • Pre-school education to children in age group of 3-6 years
   • Convergence of other supportive services like water supply, sanitation etc.

3) i) Anganwadi Worker
   ii) Helper
   iii) Mukhya Sevikas
   iv) Child Development Project Officer

Check Your Progress 2

1) • One hundred per cent urban and rural water supply.
   • 50 per cent urban sanitation.
   • 25 per cent rural sanitation.

2) i) Acceptability aspects
   ii) Micro-biological aspects
   iii) Chemical aspects
   iv) Radiological aspects

3) a) Detection of faecal pollution.'
   b) As certain effects of rainfall drought purification system on water bodies.
   c) As certain qualities of the recreational water like swimming pool water.
   d) As certain quality of commercial use of water like for aerated water, ice, ice-cream, dairy, dairy products, breweries etc.

Check Your Progress 3

1) The objective of the programme is to provide certain basic minimum needs and thereby improve the living standards of the people in term of social and economic development of the community particulary the underprivileged and undergeneral population.

2) • Elementary education and adult education
   • Rural health service
   • Rural water supply
   Rural roads
   • Rural electrification
   • Housing assistance to rural landless labourers
   • Environmental improvement of urban slums
   • Nutrition
   • Rural domestic cooking energy
   • Public distribution system
   • Rural sanitation

3) a) Sub-centre
   b) **PHC**
   c) CHC

Academy of Hospital Administration
(Established in 1987)

Mission of AHA

"Developing and maintaining quality training, consultancy and research activities in health care/hospital sector through active involvement of health care organizations and providers, to attain a leading role in continuously improving the performance of health care services in the country."

For one year PG Diploma Programme in Hospital and Health Management. Apart from conducting Seminar/Workshop/Symposia, we are looking forward to spread our message to South Asian and other countries.

UNIT 1 GUIDELINES FOR VISIT TO SUB-CENTRES, PHC, CHC AND DISTRICT HEALTH CENTRE

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- know the infrastructural facilities and functioning of rural health care facilitieslstitutions relevant aspects of health centres for assessment of structure of the establishments and their functioning;

  identify the problem/bottlenecks in functioning of these facilities/institutions; and

- suggest the remedial measures for improving their efficiency and effectiveness.

1.1 INTRODUCTION

In the theory blocks of this course you have learnt about health system management and you may have developed a clear picture of the health care delivery system in the country. In this unit you will be preparing yourself for a visit to health establishments at all levels and carry out study to assess the strengths and weaknesses in the system and thereafter prepare a study report.

1.2 PREPARATION FOR FIELD VISITS

In order to understand the functioning of the institutions/facilities providing Maternal and Child Health Care, you are expected to visit these institutions and acquire first hand infoimation about them and record your observations.

Your Academic Counsellors are expected to perform following functions for facilitating the field visits and making them more meaningful learning experiences:

a) Scheduling of the field visits;

b) Making necessary logistics arrangements for conduction of these field visits including correspondence with concerned authorities and arrangements of transport;

c) Explaining the objectives of field visits to you;

d) Provide the checklist to you for studying the organisation and functioning of various units and recording these in your workbook; and

e) Evaluating and providing feedback to you on the records maintained by you for field visits.

In case you feel confident about making your own arrangements for visting these institutions/facilities, you feel free to visit these of your own and record your observations1 findings as per guidelines given in this manual. You are also expected to inform your academic counsellors about this in advanee and take his approval,

1.3 VISITS TO VARIOUS RURAL WEALTH UNITS

You have already leamt in theory blocks of this course about the delivery of Rural Health Care delivery at various levels, i.e., sub-centres, Primary Health Centre . Community Health Centre and district level. You have also learnt about the staffing pattern and types of activities being carried out at these levels. Now you will learn yourself the operational aspects of these institutions/facilities by making a visit to these places. You have to visit the following places to observe the ongoing activities:

- Sub-centre
- Primary Health Centre (PHC)
- Community Health Centre (CHC)
- District Health Office/CMO Office

At eachplace you should see:

- Organisational set up
- Population coverage
- Range of MCH services being provided
- Staffing pattern
- Drugs, logistics and equipment available for MCH care
- Schedule of activities
- Records and Returns
- Problems being faced in implementation of MCH schemes and programmes
- Referral system.

In the end you must be able to critically analyse the functioning at each level and suggest remedial measures.

You can achieve this by:

- Observation of various activities at each level
- Study of records maintained at each level
- Interaction/discussions with available personnel at various levels.

You must record the findings of the visits and get it signed by the concerned academic counsellor.

Format for Data Collection

Name of the Rural Health Unit Visited.....

Location of the Rural Health Unit Visited.....

Date of Visit to Rural Health Unit .....

Check List for Visit to Rural Health Units

Sl. No.	List of Items
1)	Organisation Set-up
2)	Population Coverage
3)	Physical facilities Accommodation Services available
4)	Staffing Pattern (Authorised/Posted)
5)	Logistics/Drugs/Equipment available
6)	Range of Services provided
	a) Medical Care
	b) MCH
	c) School I-Iealth
	d) Nutrition
	e) National Health Programmes
	f) Mobile health unit
	g) Water Supply and Sanitation
	h) Immunisation
	i) Control of Endemic Disease
	j) Suiveillance
	k) Vital Statistics
	l) Transportation
	m) Communication
	n) Training
	o) Supervisory Visits/Inspections
7)	Records/Returns Maintained
8)	Referral System
9)	Role of Voluntary Agencies
10)	Critical Analysis about Functioning
11)	Problems/Bottlenecks
12)	Remedial Measures

1.4 LET US SUM UP

After making visits to the various health units engaged in delivery of primary healtli care services you must have appreciated the capabilities and limitations in their organisational set-up, functioning and activities being carried out by them. You must have also gained an insight into some of the problem areas requiring immediate attention. This practical activity will help you in improving the co-ordination with these institutions in you set-up in furtherence of quality in delivery of health care services.

UNIT 2 INVESTIGATION OF AN OUTBREAK

Structure

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- identify the presence of an outbreak;
- apply the steps of investigation of an outbreak;
- find out the causes of the outbreak and prevent future epidemics; and
- send report of investigation of the outbreak.

2.1 INTRODUCTION

You have already learnt about general principles of epidemiology, applied aspects of health statistics, 'at risk' approach and screening and surveillance and monitoring in Unit 3 of Block 1 of this Course. In this unit you will learn about the identification of an epidemic as well as the usual steps followed in an investigation of an outbreak. Epidemics can occur in many communicable diseases like infective diarrhoeas, respiratory infections, exanthematous fevers (viz. measles, chickenpox) etc. Out of all diseases causing epidemic, some diseases can be prevented by the available vaccines. Other containment measures during epidemic like isolation, disinfection, chemoprophylaxis etc. have to be undertaken in addition to immunoprophylaxis for prevention of further spread of the disease. You will be able to investigate an outbreak if you follow the epidemiological principles for control and prevention of the 'diseases.

2.2 STEPS OF INVESTIGATION OF AN OUTBREAK

You will appreciate that whenever there is an epidemic, investigation of the epidemic or outbreak is very important from the point of view of containment measures, finding out

underlying causes of the epidemic and application of appropriate preventive measures for controlling the spread of the disease. There are well established, well accepted steps of investigation of an epidemic. In every situation, the sequence of these steps may not be taken as incorporated in this text, but may vary according to the given situation. Very often the investigator has to undertake many steps concurrently and not one after the other. While data related to causation and time, place, person is being collected, management of affected individuals should be simultaneously undertaken. If investigation is undertaken after the peak of the epidemic is over, the investigation is mainly retrospective.

It is desired to have a scientific procedure, to achieve the ultimate purpose of epidemiological investigation i.e., to control the health problem in the community.

An epidemiological investigation is usually undertaken by following steps.

2.2.1 Ensure the Existence of Outbreak

The first step in investigation of an epidemic outbreak is to ensure the existence of outbreak. For this purpose repeated cases with similar symptoms and signs start appearing in well defined geographical area must be identified. In the unusual occurrence of many cases of same/similar illness causes concern in the public. When you observe such an occurrence of unusually large number of cases in the community, you suspect an outbreak of epidemic and must bring it to the notice of health authorities.

Sometimes you may not be aware of any such phenomenon but routine records and returns show a sudden rise in the number of cases due to particular disease. This should draw your attention and also of all those who are dealing with these statistics right from the grass-root level worker to the health authorities.

Increase in number of cases beyond expected number in case of those diseases, which are endemic can be considered as an outbreak. For those diseases which do not occur in the concerned geographical area, like Yellow Fever in India, even one indigenous case of yellow fever can be considered as an epidemic. The diseases which were endemic earlier but are now controlled due to good vaccine coverage like Polio, are considered on similar lines. Where vaccine coverage is very high, even a single case of paralytic poliomyelitis should be considered as an epidemic. For ensuring the existence of an epidemic, baseline information about occurrence of various diseases in different geographical regions is essential. Comparison of current figures with the existing figures for corresponding months over a period of time will tell you whether epidemic situation is present or not.

2.2.2 Confirm Diagnosis

When there are large number of cases occurring simultaneously in the community, it may not be possible to take a detailed history and clinical examination for each and every case. Since signs and symptoms of the disease are similar 'a working case definition' can be made based on symptomatology and clinical signs of the disease.

Symptoms as you know are subjective criteria and are based on what the patient feels or experiences, e.g. pain in abdomen or vomiting. On the other hand, clinical signs and laboratory studies give objective criteria for diagnosis.

There can be other conditions producing symptoms and signs observed in an epidemic situation to some extent. Laboratory investigations will give you the exact estimation of the number of persons affected by the disease under consideration. Depending upon the underlying diseases under consideration, the relevant samples will have to be collected for sending to the appropriate public health laboratory. Samples are subjected to microbiological, pathological and chemical investigations as per suspected provisional diagnosis of the disease causing epidemic.

During an epidemic there could be many individuals affected or only a few individuals affected. If number of cases is small, each and every case can be examined thoroughly and laboratory investigations undertaken for all of them. But if the number of affected persons is few thousands, it is not possible, and also not essential to undertake laboratory investigations for each ahd every individual, Investigations on a representative and

sufficiently large sample of affected cases is enough to confirm the diagnosis and find out the important information related to agent, host and environment as well as the mode of transmission of the disease.

Once the organisms are isolated you can know about the agent factors like toxigenicity, different strains, their resistance to antimicrobials, etc.

2.2.3 Estimate the Number of Cases

Using the 'working case definition' estimate the number of persons affected. Collect relevant data such as age, sex, place of residence of the cases, history of travel, exposure to a suspected case and a detailed history about the symptoms. This information may be collected on 'epidemiological case sheet', from cases as well as from persons apparently exposed but unaffected.

To know the-total population exposed to the risk of infection, sometimes it is necessary to carry out a house-to-housesurvey. This will help in further analysis like calculating the 'attack rate'.

During an epidemic there can be some overt cases and some sub-clinical cases also. Identification of these subclinical cases or carriers is important from the point of view of the spread of the disease. Estimating clinical cases as well as sub-clinical cases is thus an important step in the investigation of an epidemic.

2.2.4 Orient the Data in Terns of Time, Place and Person

Prepare the 'epidemic curve', which is a clear, simple y a y to show the relationship between the occurrence of cases and their time of onset. The occurrence of cases in the area/region affected can be best shown on the "spot map". The spot map may help to show that the cases occurred close to a sewage treatment plant or its outflow or around a factory letting out toxic fumes/gases.

Calculate the attack rate of the infection. This can be done by considering the population at risk as the denominator and those individuals affected as the numerator. Also calculate the attack rates/case fatality rates for those exposed and those not exposed.

You have already learnt in Unit 1 of this block that the descriptive epidemiology giving information as to when did the epidemic start. You will also agree that knowing about the number of cases occurred in relation to time is important. Seasonal and cyclical trend of a disease can also be studied (Fig. 2.1). Where did the epidemic take place and the distribution

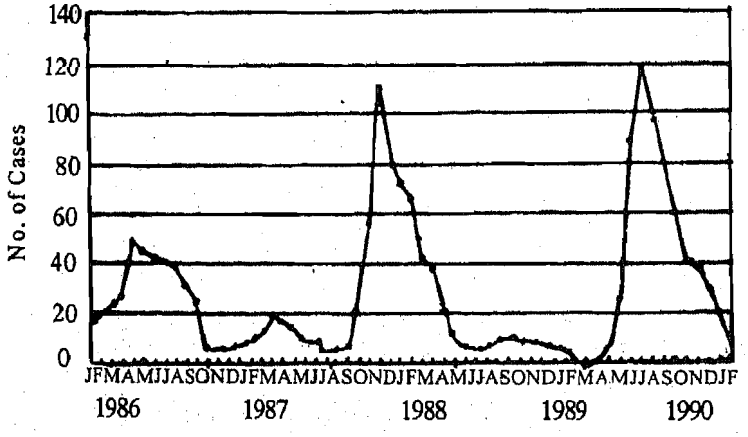
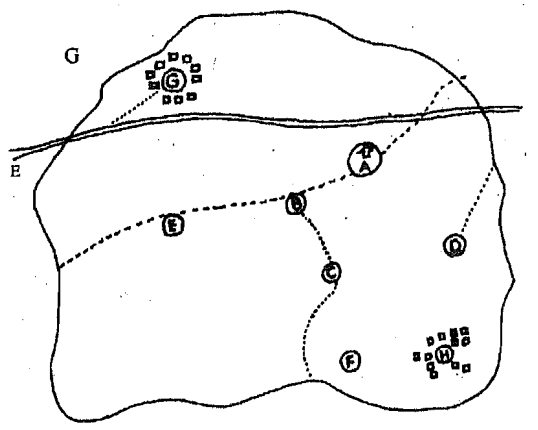


Fig. 2.1 : Epidemic pattern and seasonal variation of measles

of cases in well definedgeographicalarea will give us distributionin space (Fig. 2.2). Similar characteristics of the persons affected in relation to age, sex, occupation etc, will give us an idea about the susceptible population. Children below five years are at a higher risk of getting measles. Epidemic occur both in urban and rural area. Epidemics of measles are common in India during winter and early spring (January to April).



ONE CASE OF MEASLES	
MAJOR HIGHWAY	
ALL WEATHER ROAD	
FOOT PATH	
VILLAGE	
WEALTH CENTRE	

POPULATION DATA	
VILLAGE A	5,000
VILLAGE B	2,500
VILLAGE C	600
VILLAGE D	600
VILLAGE E	700
VILLAGE F	500
VILLAGE G	800
VILLAGE H	5,000

Fig. 2.2: Mapping of Cases of Measies in **a** Health Centre Area

2.2.5 Determine who is 'At Risk' of Contracting the Disease

It is very important to determine the population at risk because when the rates are calculated, those with the disease are taken as numerator and those exposed to the risk of disease are taken as denominator. If the disease is such which occurs in the entire population like in case of water borne diseases, when the water supply of the area is contaminated, all the population receiving water from the contaminated source is at risk. Out of this population group, those persons with the disease under consideration can be identified. These values of numerator (people with the disease) and denominator (total population at risk) are essential for calculating incidence rate prevalence rate and attack rate. When the outbreak is limited to certain population groups like food poisoning among those who attended a marriage party or feast or gastroenteritis in a particular residential institute, the investigations can be'focussed on these restricted population groups at risk.

2.2.6 Develop an Explanatory Hypothesis

Compare the attack rates among those at risk with these who or not. Compare the food-specific attack rates in case of suspected food borne outbreaks. With the help of all the data collected so far and after its analysis, now, formulate a hypothesis and explain the possible sources, causative agent, mode of its spread and the environmental factors favouring its spread.

It was John Snow who hypothesised in 1854 that cholera spread through the water supply. He observed that death rate from cholera was very high in a particular area of London i.e., in Broad Street Golden Square. This area was supplied by two water supply companies viz. Lambeth Company and Southwark and Vauxhall Company. Both these companies drew their water from the Thames River at a point which was highly polluted with sewage. Then between 1849 and 1854, the Lambeth Company changed its source to a point of the Thames River, which was quite free from sewage pollution. Thereafter, the rates of cholera declined drastically in those areas of the city supplied by the Lambeth Company, while there was no change in those areas receiving water from the Southwark and Vauxhall Company,

Table 2.1: Death Rates from Cholera in London, 1853-54 According to Water Company Supplying Actual House

Water company	Number of houses	Deaths from cholera	Deaths per 10,000 houses
Southwark and Vauxhall	40046	1263	315
Lambeth	26107	98	37
Rest of London	256423	1422	59

These data provided Snow with convincing evidence that water supplied by the Southwark and Vauxhall company was responsible for the out-break of cholera in London. With the help of the distribution of cholera cases, he formulated the hypothesis that the disease was spread through the water supply. This is a classical example of how an explanatory hypothesis can help in clinching the source of epidemic and arriving at some conclusions.

2.2.7 Compare the Hypothesis with the Established Facts

The hypothesis formulation should take into consideration all the facts known about the disease such as the causative agent, source of infection, mode of spread, clinical features, etc. If the hypothesis and the known facts are not coherent, then go through the medical records once again, and repeat different calculations. Repeat the interviews with case subjects, collect additional laboratory specimens for more detailed laboratory tests.

The epidemics of gastroenteritis have been occurring usually during summer and raining months in India. In your area, if you encounter a sudden increase of cases during this gastroenteritis period, suspect an epidemic of gastroenteritis. Thus compare your observe facts with the established ones to a logical conclusion.

If cases start occurring among previously immunised individuals then it calls for more detailed study, Theoretically immunised individuals are immune to attack. Hence, in such instances, vaccine potency tests, cold chain maintenance, take of the vaccine have to be studied.

2.2.8 Plan a More Systematic Study

After the initial study and formulation of a hypothesis, plan a more detailed systematic study such as a case control study. It requires more often additional information which dan be collected by surveying the population at risk. a serological survey or carrying out other biological and chemical tests.

For example, if a large number of paralytic poliomyelitis among vaccinated population is encountered, this has to be further investigated. Different aspects of the disease causation should be looked into. Future epidemics could be prevented by improvements in the immunisation services based on the results of the investigation.

The rate of occurrence of polio cases among immunised and unimmunised population can be studied and Vaccine Efficacy Rate can be calculated. So also the development of immunity after oral polio vaccine can be studied by estimation of serum antibodies.

2.2.9 Prepare a Written Report

This will form the basis of action by health officials. The report should be complete comprising of the background information, methodology of investigation, analysis and interpretation of data such as agent, host and environmental factors, mode of spread of the disease, etc. Many a times, such a report will bring out a new fact about the disease. It may also form a basis for reallocation of resources in future.

It was by such a study that John Snow in England, in his classical investigation of cholera epidemic in 1854, showed that cholera was a water-borne disease, long before the birth of bacteriology.

2.2.10 Proposed Measures for Control and Prevention

No investigation of an epidemic is complete without containment measures. While the data are being collected and the causes are being investigated, working definition of cases is made and provision of treatment of the cases is undertaken on war footing.

The aim of any epidemiological investigation should be the ultimate control of the disease problem in question. The study should propose the methods of control of the epidemic both in terms of short and long term measures.

2.3 CASE STUDY

In the preceding sections of this unit, you have learnt the theoretical aspects of investigation of an epidemic outbreak. In this section you are going to learn practical aspects of investigation of an outbreak.

You already know that investigation is an examination for the purpose of finding out something. You will also appreciate that the investigation of an epidemic is of limited duration for some already existing problem. This existing problem or an outbreak is an extraordinary situation due to shift of balance between agent, host and environment. You have also learnt the steps in the investigation of an outbreak. These steps can be recapitulated.

- Ensure the existence of an epidemic
- Confirm the diagnosis

  Estimate the number of cases
- Orient the data in terms of time, place and person
- Deteimine who is at risk of having the health probelm
- Develop an explanatory hypothesis
- Compare the hypothesis with the established facts
- Plan a more systematic study
- Prepare a written report and purpose measures for control and prevention

Now you will go through a case study of gastro-intestinal epidemic which will give you an insight of application of various steps in investigation of an epedemic

2.3.1 Case Study of an Epidemic Outbreak

On 3rd May 1995, it was observed that there were many cases of nausea, vomiting, diarrhoea and abdominal pain in one of the villages of PHC Shivapur area. Cases started occurring on the night of 2nd May till the early morning of 3rd May. All the cases gave history of having attended the marriage party on 2nd May evening. A total of 75 persons attended the marriage party, out of whom 48 persons suffered from gastro-intestinal illness.

Question may be arising in your mind that what makes this an outbreak? Yes you have rightly thought that there was a sudden increase in the number of cases with similar signs and symptoms in the said village, constituting an outbreak.

Next question coming to your mind may be that which diseases could possibly cause an outbreak of such illness?

Clinically, illness consisted of nausea, vomiting, diarrhoea and abdominal pain. None had fever. The illness was of acute onset. The conditions causing such gastro-intestinal illness are:

1) Food poisoning due to Staphylococci, Salmonella, Cl. perfringens or B. cereus
2) Chemical poisoning such as arsenic, heavy metals, etc.
3) Diarrhoea diseases like Cholera, Shigella, E. coli and Campylobacter

Pause for a moment and think what more information is required at this stage ? Yes you have rightly throught of:

- List of those who attended the part
- Items of foods served in the party

Chronological occurrence of cases

Table 2.1 gives information on the age and sex of the persons attended, time of food consumption, onset of symptoms and food items eaten in the party. From this table you will also notice that the earliest case occurred on 2nd May evening at 9.00 p.m. and the latest case occurred at 3.30 a.m. on 3rd May.

Now if you draw a graph of cases by onset of illness using appropriate time periods (epidemiccurve), you will observe from the graph that the epidemic was a single source explosive epidemic without any secondary cases (Fig. 2.3).

Now can you calculate the incubation period from available data and determine the median incubation period and the range?

You will see that in the present instance, the incubation period is the time interval between consumption of food and the onset of symptoms. The shortest incubation period was 3 hrs and longest was 7 hrs (range 3-7 hrs).

Now you arrange the incubation period of the cases in an ascending order starting from 3 hrs onwards, the incubation period of the middle case will be the median incubation period which is 4 hrs.

Table 2.2 and 2.3 are showing agewise and sexwise distribution of cases.

Now you can calculate the attack rate by age and sex'from available data?

For this first you need to classify the people according to their age group. In each age group make male and female columns. Then in each column make tally mark according to their age.

Table 2.1 : **People at Marriage Party**

Sl. No.	Age in years	Sex	Time of eating	Date and Time of onset		Food items eaten				
				Date	Time	Rice	Chapati	Dal	Bundi ladoo	Kheer
1.	11	M	Unk	WELL		Y	Y	Y	Y	N
2.	62	F	8.00 pm	3	00.30 am	N	Y	N	N	N
3.	65	M	6.30 pm	3	00.30 am	Y	N	Y	Y	Y
4.	59	F	6.30 pm	3	00.30 am	Y	N	Y	N	Y
5.	13	F	Unk	WELL		N	Y	Y	Y	N
6.	63	F	7.30 pm	2	10.30 pm	Y	N	N	N	Y
7.	70	M	7.30 pm	2	10.30 pm	N	Y	Y	N	Y
8.	40	F	7.30 pm	3	2.00 am	Y	N	N	N	Y
9.	15	F	10.00 pm	3	1.00 am	N	N	N	N	Y
10.	33	F	7.00 pm	2	11.00 pm	N	N	N	N	Y
11.	65	M	Unk	WELL		Y	N	N	Y	N
12.	38	F	Unk	WELL		N	Y	Y	N	N
13.	62	F	Unk	WELL		Y	Y	Y	N	N
14.	10	M	7.30 pm	3	2.00 am	N	N	N	N	Y
15	25	M	Unk	WELL		N	Y	Y	Y	N
16.	32		Unk	2	10.30 pm	N	N	Y	N	Y

Sl. No.	Age in years	Sex	Time of eating	Date and Time of onset		Food items eaten				
				Date	Time	Rice	Chapati	Dal	Bundi ladoo	Kheer
17.	62	F	Unk	3	00.30 am	N	N	Y	N	Y
18	36	M	Unk	2	10.15 pm	N	Y	N	N	Y
19.	11	M	Unk	WELL		Y	N	Y	Y	N
20.	33	F	Unk	2	10.00 pm	N	Y	N	N	Y
21.	13	F	10.00 pm	3	1.30 am	Y	N	N	N	Y
22.	77	M	Unk	2	11.00 pm	N	Y	N	Y	N
23.	64	M	Unk	WELL		N	N	Y	N	N
24.	3	M	Unk	2	9.45 pm	Y	Y	N	N	Y
25.	65	F	Unk	WELL		Y	N	N	Y	N
26.	59	F	Unk	2	9.45 pm	N	Y	N	N	Y
27.	15	F	10.00 pm	3	1.00 am	Y	N	N	N	N
28.	62	M	Unk	WELL		N	Y	Y	Y	N
29.	37	F	Unk	2	11.00 pm	Y	N	N	Y	Y
30.	17	M	10.00 pm	WELL		Y	Y	Y	N	Y
31.	35	M	Unk	2	9.00 pm	N	Y	Y	N	Y
32.	15	M	10.00 pm	3	1.00 am	Y	N	Y	N	Y
33.	50	F	Unk	WELL		N	Y	Y	Y	N
34.	40	M	Unk	WELL		Y	N	N	N	Y
35.	35	F	Unk	WELL		N	Y	N	Y	N
36.	35	F	Unk	2	9.15 pm	N	N	N	N	Y
37.	36	M	Unk	WELL		Y	N	Y	N	N
38.	57	F	Unk	2	11.30 pm	N	Y	N	Y	Y
39.	16	F	10.00 pm	3	1.00 am	N	N	N	N	Y
40.	68	M	Unk	2	9.30 pm	Y	Y	N	N	Y
41.	54	F	Unk	WELL		Y	Y	N	Y	N
42.	77	M	Unk	3	2.30 am	N	N	Y	N	Y
43.	72	F	Unk	3	2.00 am	Y	N	N	Y	Y
44.	58	M	Unk	2	9.30 pm	Y	N	Y	N	N
45.	20	M	10.00 pm	WELL	Y		Y	N	Y	N
46.	17	M	Unk	WELL		N	N	Y	N	N
47.	62	F	Unk	3	00.30 am	N	Y	N	N	Y
48.	20	F	7.00 pm	3	1.00 am	N	N	N	Y	Y
49.	52	F	Unk	2	10.30 pm	Y	Y	N	N	Y
50.	9	F	Unk	WELL		N	N	Y	Y	N
51.	50	M	Unk	WELL		Y	Y	N	Y	N
52.	8	M	11.00 am	3	3.30 am	Y	N	Y	N	Y
53.	35	F	Unk	WELL		Y	Y	Y	Y	Y
54.	48	F	Unk	2	12 MN	N	Y	N	N	Y

Sl. No.	Age in years	Sex	Time of eating	Date and Time of onset		Food items eaten				
				Date	Time	Rice	Chapati	Dal	Bundi ladoo	Kheer
55.	25	M	Unk	2	11.00 pm	Y	N	Y	N	Y
56.	11	F	Unk	WELL		Y	N	N	Y	N
57.	74	M	Unk	2	10.30 pm	N	N	Y	Y	Y
58.	12	F	10.00 pm	3	1.00 am	Y	Y	N	N	N
59.	44	F	7.30 pm	3	2.30 am	N	N	Y	N	Y
60.	53	F	7.30 pm	2	11.30 pm	Y	Y	N	Y	Y
61.	35	M	Unk	2	9.00 pm	N	Y	Y	N	Y
62.	35	F	Unk	2	9.15 pm	N	N	N	N	Y
63.	16	F	10.00 pm	3	10.00 am	N	N	Y	N	Y
64.	72	F	Unk	3	2.00 am	Y	N	N	Y	Y
65.	62	F	Unk	3	00.30 am	N	Y	N	N	Y
66.	50	M	Unk	WELL		Y	Y	Y	Y	N
67.	25	M	Unk	2	11.00 pm	Y	N	Y	N	Y
68.	44	F	7.30 pm	3	2.30 am	N	Y	Y	N	Y
69.	65	M	6.30 pm	3	00.30 am	Y	N	N	N	Y
70.	70	M	7.30 pm	2	10.30 pm	N	Y	Y	N	Y
71.	65	M	Unk	WELL		Y	Y	Y	Y	N
72.	25	M	Unk	WELL		Y	Y	Y	N	N
73.	11	M	Unk	WELL		N	Y	N	N	N
74.	64	M	Unk	WELL		Y	N	Y	Y	N
75.	15	F	10.00 pm	3	1.00 am	Y	N	N	Y	Y

Y = Yes (indicates consumption of food item.)

N = No (indicates non-consumption of food item.)

Unk = Unknown

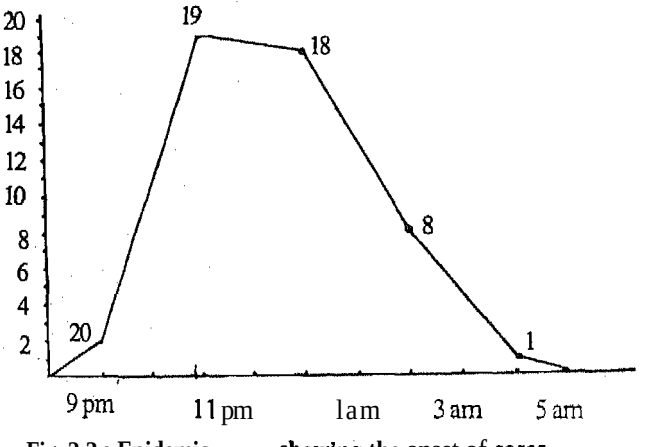


Fig. 2.3 : Epidemic curve showing the onset of cases

and condition after consuming food Go on making one vertical tally mark for each person in the respective category. Make a cross tally mark for every 5th person which will make it easier for counting (Table 2.3). Calculate the attack rate in each age group for male and female separately. Add up both row wise and column wise.

Table 2.2 : Sexwise Attack Rate of illness

Age in Years	Male Total	Male Ill	Male A.R.	Female Total	Female Ill	Female A.R.	Total Total	Total Ill	Total A.R.
0-9	II	II		I	0		III	II	
10-19	~~IIII~~ II	II		~~IIII~~ rm	~~IIII~~ II		~~IIII~~ ~~IIII~~ I	&a- m	
20-29	~~IIII~~	II		I	I		~~IIII~~ I	III	
30-39	IIII	III		~~IIII~~ IIII	~~IIII~~ I		~~IIII~~ ~~IIII~~ IIII	~~IIII~~ IIII	
40-49	I	0		IIII	IIII		~~IIII~~	IIII	
50-59	III	I		~~IIII~~ II	~~IIII~~		~~IIII~~ ~~IIII~~	~~IIII~~ I	
60+	~~IIII~~ ~~IIII~~ m	~~IIII~~ IIII		~~IIII~~ III	~~IIII~~ II		~~IIII~~ ~~IIII~~	~~IIII~~ ~~IIII~~ ~~IIII~~	

Table 2.3: Sexwlse Attack Rate of Illness

Age in Years	Male Total	Male Ill	Male A.R	Female Total	Female Ill	Female A.R	Total Total	Total Ill	Total A.R
0-9	2	2	100.00	1	0	0.00	3	2	66.67
10-19	7	2	28.57	9	7	77.78	16	9	56.25
20-29	5	2	40.00	1	1	100.00	6	3	50.00
30-39	4	3	75.00	9	6	66.67	13	9	69.23
40-49	1	0	0.00	4	4	100.00	5	4	80.00
50-59	3	1	33.33	7	5	71.43	10	6	60.00
60 +	13	9	61.54	8	7	77.78	22	15	68.18
All	35	18	51.43	40	30	75.00	75	48	64.00

You will notice that the total attack rate among those who attended the party was 64, i.e., out of 75 persons who consumed food, 64% became ill, The attack rates among males and females were 51.43% and 75.00% respectively.

Now does the information on incubation period, combined with clinical symptom help in the differential diagnosis ?

From your previous knowledge you can make the differential diagnosis of food poisoning which includes:

a) Salmonella food poisoning

Incubation period : *12* to 48 hours
Source : Contaminated meat, milk, milk products, custard, eggs and egg products
Symptoms : Sudden onset fever, chills, nausea, vomiting and profuse watery diarrhoea

b) Staphylococcal food poisoning

Incubntion period : 1 to 6 hours
Source : Salads, custards, milk, and milk products.
Symptoms : Sudden onset, vomiting, abdominal cramps and diarrhoea

c) Cl. perfringens food poisoning

Incubation period : *12* to 24 hours
Source : Cooked meat and poultry
Symptoms : Diarrhoea, abdominal cramps

d) B. cereus

Incubation period : Emetic form — 1 to 6 hours
Diarrhoea1form — 12 to 24 hours
Source : Cooked rice, dried potatoes
Symptoms : Diarrhoea, abdominal pain

e) Cholera

Incubation period : few hours to 5 days
Source : Contaminated food and water
Symptoms : Onset with purging, projectile vomiting, copious rice watery diarrhoea, and Dehydration.

In the above case the median incubation period is 4 hours and the symptoms were nausea, vomiting, diarrhoea, and abdominal pain. These are suggestive of staphylococcal food poisoning or B. cereus.

Now let us tabulate the specific items of food as consumed by ill and healthy persons and calculate the food specific attack rate.

Table 2.4 : Consumption of Different Food Items and Condition of Health Status

Food Items	Consumed			Not Consumed		
	Total	Ill	A.R.	Total	Ill	A.R.
Rice	38	21	55.26	37	27	72.97
Chapati	36	19	52.78	39	29	74.36
Dal	35	17	48.57	40	31	77.50
Bundi Ladu	28	10	35.71	47	38	80.85
Kheer	46	43	93.48	29	5	17.24
Bhaji	33	11	33.33	42	37	88.10
Chutney	27	12	44.44	48	36	78.00
Water	41	23	56.10	34	25	73.53

From Table 2.4 it can be observed that the highest food specific attack rate among consumed was observed for Kheer (93.48%); and the lowest attack rate among not consumed was observed for Kheer (17.24%).

Given below is a table containing the consumption of Kheer and condition of Health Status of 75 person who attended the marriage party :

Table 2.5 : Consumption of Kheer and Condition of Health Status

	Consumed	Did not Consumed	Total
Ill	43	5	48
Well	3	24	27
Total	46	29	75

From the above table, it is seen that for the item Kheer the attack rate is 93.48% among consumed and 17.24% among not consumed which is significant statistically also. Therefore, it is concluded from the table that Kheer was responsible for the outbreak of food poisoning.

Now can you outline the further investigations needed ?

Further you need to take the food samples from the left over food have to send for laboratory examination. The vomitus and stool samples of the symptomatic cases also have to be sent for laboratory examination. The food handlers, kitchen employees have to be examined thoroughly and nasal swab, throat swabs from the food handlers have to be collected for laboratory examination. The procedure of food preparation and storage has also to be studied.

Now based upon the information and knowledge can you identify a vehicle or common vehicle or common vehicle of infection ?

You will see that from the data given, it is clear that there is a common history of consumption of food in the marriage party. All the cases started experiencing symptoms after that food consumption, From the food specific attack rates it can be concluded that Kheer was the food item responsible for the outbreak of food poisoning.
Lastly what is your hypothesis and conclusion ?

In order to make any further conclusions, you are being provided with following additional information, half of the Kheer was prepared by Mr. A during the early hours of 2nd May and the remaining half was prepared by him on 2nd May mid-morning. Both the preparations were later mixed and kept in a big vessel, which was covered. During preparation and storage they were presumably not touched by anyone.

Bacteriological examination of left over Kheer indicated large number of staphylococcus aurcus.

All the food handlers were examined. Nose and throat cultures were taken from Mr. A who prepared the Kheer. The laboratory report showed staph aurcus in the isolate. He did not have skin lesions nor any symptom suggestive of acute respiratory infection. The Kheer was served with a clean spoon.

With this additional information, you may be able to draw following possible inference:

In this case it is possible that contamination of the kheer with staphylococci could have occurred while mixing the two parts of the kheer preparation. The temperature of this mixed Kheer could have been warm enough for survival rapid multiplication of the organism but not sufficient to kill the organism. Under favourable conditions when cooked food is allowed to cool slowly, sufficient enterotoxin can be produced within two to three hours. Between 30 to 37°C/staphy lococci multiply rapidly in milk and after 7 hours, there can be sufficient number of organisms producing enterotoxin food poisoning. In this case the Kheer was allowed to cool slowly and a lapse of more than seven hours was seen between possible contamination and consumption.

Considering all the information collected, it may appear to you that the outbreak could have been caused because of staphylococci food poisoning due to contamination of Kheer.

Conclusion

An outbreak of gastroenteritis associated with stapliylococcus aurcus occurred on 2nd May 1995 following a marriage party. A total of 48 persons were affected out of the total 75 people who consumed food. The main symptoms were nausea, vomiting, diarrhoea and abdominal pain. All these cases were admitted and given treatment. It was observed that, the Kheer had distinctly higher food specific attack rate, as compared to other food items suggesting that it was Kheer that was responsible for the outbreak. Positive nose and throat cultures in a food handler who prepared Kheer suggest that he might have been responsible for contaminating the food. On 3rd May, all the remaining food was discarded. No further cases occurred and the outbreak subsided on its own.

2.4 LET US SUM UP

In this unit of practical manual you have learnt about various steps in investigation of an epidemic outbreak. You have also gone through a case study which contains step by step analysis of this process of investigation of an outbreak of a gastroenteritis outbreak. After going through the case study you will also gain an insight as to how to apply the epidemiological principles and methods for investigation of an epidemic outbreak.

2.5 KEY WORDS

Attack Rate : An attack rate is an incidence rate, used when the population is exposed to risk for a limited period of time such as during an epidemic.

Endemic : It refers to the constant presence of a disease but at a low frequency within a given geographic area or population group, without importation from outside,

Epidemic : An epidemic is the occurrence in a community or region of a number of cases of a disease that is unusually large or unexpected for the given place and time.

Epidemic curve : It is a graph of the time distribution of epidemic cases,

Incidence : The number of new cases occurring in a defined population during a specified period of time,

Outbreak : The word outbreak is usually used for a smaller epidemic in the interest of minimising public alarm.

Prevalence : The term prevalence refers specifically to all current cases (old and new) existing at a given point in time in a given population.

Spot map : The spot map shows at a glance the areas of high or low frequency, the boundaries and patterns of disease distribution in a region.

PROJECT STUDY

PROJECT STUDY

Structure

1.0 OBJECTIVES

The purpose of this project work is to help you to apply the concepts and techniques learnt earlier to develop an action plan for improving the effectiveness of a selected area of an institution/hospital. The manual outlines a framework for integration of various concepts and provides guidelines for collection, analysis and interpretation of data of a particular health institution.

After going through the project guidelines, you should be able to:

- understand the meaning, characteristics and types of the project;
- apply the multidisciplinary concept, tools and techniques to solve hospital/health management practical problems.
- critically appraise the functioning of an institution providing medical care/health care services;
- identify the key problem areas; and
- suggest measures to improve the effectiveness of the selected institution.

1.1 INTRODUCTION

Throughout the various courses of this programme you have learnt that globalisation and liberalisation have made the organisations more competitive. You have also learnt that the focus has shifted from home turf to the international market, where the operating area for the organisations are not marked by boundaries of countries. For them it is open market or progressing towards open economy. Consequently the pressure on organisations is increasing to maintain a competitive edge in all areas of its operations. You will appreciate that competitive edge can be maintained only by the improvement of its processes and products and the onerous task of improving upon the processes and products requires a thorough study and careful examination of the issues involved. The multiple factors that influence these issues have to be viewed in correct perspective before assessing the influence by them as well as on them, A group of people from multiple disciplines are employed to study these multiple factors in a given time frame who examine and study the issues involved in detail to suggest a range of possible solutions. It is expected that after going through these guidelines you should be able to write a project report on a topic related to a hospital management on health service management.

1.2 WHAT IS A PROJECT?

Let us now try to understand, what is a project?

Various authors have defined project differently as per their own point of view depending

upon their particular field of activity. A very simple and explicit definition of project is as follows:

"A project is any task which has a definable beginning and definable end and requires the expenditure of one or more resources in each of the separate but interrelated and interdependent activities which must be completed in the given time frame to achieve the objectives for which the task (or project) was instituted."

From above definition you will see that a project has a definite aim to achieve in the given time frame and requires the firm commitment of resources to achieve the objective.

1.3 CHARACTERISTICS OF A PROJECT

A project has following characteristics:

- A project is an entity by itself.
- A project has a specific purpose that can be readily defined.
- It is made up of a collection of activities that are linked together because they all contribute to the desired result.
- It has identifiable end product.
- It is non-repetitive.
- It has clearly defined and agreed time constraints. It has to be completed in a given time frame.
- It involves high degree of uncertainty and risk at every step of the process and the management of the risks to sustain the focus on the desired results.
- It is complex because the work involves the commitment and coordination of resources in different departments and even on different sites.
- It has to be flexible to accommodate change as the work proceeds.
- It involves many unknowns both within the work itself and the external influences on the project.
- It has cost constraints, which must be clearly defined and understood to ensure the project remains viable at all times.
- It challenges the traditional lines of authority with perceived threats to tlie status quo.

1.4 WHAT IS PROJECT STUDY?

Having understood the definition and various characteristics of the project, it will be easier for you to understand what is meant by project study.

"Project Study is the method of study of all the variables involved in a given project by the application of various scientific principles, statistical and management techniques with the aim of arriving at a set of feasible and practical solutions, one of which provides the most optimum option to increase the effectiveness and efficiency of the ultimate aim involved for which the project study has been ordered."

In simple terms project study is the scientific examination of a problem and/or concerned issues, to assist the decision-makers arrive at conclusions with a sharper focus over a broad perspective. Project study involves the process of following a logical way to carry out the careful examination of multiple factors involved in a project, based on sound and time tested scientific principles and management techniques. The outcome of a project study must result into a "Project Report"

1.5 WHY PROJECT STUDY?

The advantages of doing a project study are:

a) It helps you to gain experience in the application of theoretical knowledge to real life management situations.

b) It helps you to increase your awareness of the need for synergy and teamwork in dealing with complex problems.

c) It helps you to examine real life problems critically, with a view to analyse them, formulate findings and recommendations and thereby improve system efficiency and cost effectiveness.

d) It helps you in exponential expansion of human knowledge, skill and aptitude.

1.6 TYPES OF PROJECT STUDIES

The project studies are initiated to help the decision-makers in choosing the most optimum solution depending upon his requirements after bringing forth all the relevant issues in sharper focus. The project studies are classified into different types depending upon their proposed utilisation. They are of following types:

a) Exploratory Studies

b) Problem Solving Studies

c) Designing, Refining or Modifying Systems

d) Designing Interventions

e) Evaluating Options

f) Validating Hypothesis

Exploratory Studies

This type of study is carried out to gather some specific information/facts about some management issue. The issue and its attributes are explored and analysed and a "cause-effect" relationship is established, based on which meaningful solutions are recommended for desirable changes.

Examples of such studies in Health and Hospital settings are:

- Project study on acceptance of family planning methods in some specific community
- Project study on motivation profile of health workers in public sector
- Project study on impact of National Health Programme on health status of population

Problem Solving Studies

This type of study is carried out to find solution for a specific problem confronting the organisation. Often the normal functioning in an organisation gets interrupted due to a problem, Problem solving technique involving broadly the following steps is used:

- Defining and diagnosing the problem
- Collection of information and its analysis
- Finding Alternatives
- Choice and evaluation of alternatives
- Selecting the most optimum alternative
- Recommending solution based on that alternative

Some of the examples of such study in health and hospital settings are:

- How to reduce the waiting time in OPD (Outdoor Patient Department) services.
- How to reduce the unnecessary laboratory investigations.

Designing, Refining **or Modifying** Systems

This type of study is carried out when new organisation components are evolved, or when new routines are introduced or when new norms are evolved. In such studies the existing issues are studied and based on the new requirements the appropriate solutions are designed or systems are recommended to be modified.

Few examples of such studies are:

- Study to evolve a uniform organisational structure in health departments for various states.
- Study on evolving staffing norms for a 400 bedded district hospital:

  Study on expansion of out door patient services of a hospital.
- Study on hospital information system.

Designing Interventions/Interventional Studies

This type of study is carried out when the decision maker is confronted with the situation where he seeks assistance to find ways and means for implementing a solution, i.e., how a particular intervention should be designed. So in this type of study the problem and its solution has already been identified, only the way the solution is to be implemented has to be designed.

Some of the examples of such type of studies are:

- Study to devise a method for administration of Oral Polio Vaccine to eliminate polio from India within a defined time frame (Pulse Polio Campaign).
- Study to design a method for distribution of nutritional supplements to school going children to reduce incidence of Kwashiorkor and Marasmus (Mid-day Meal Programme).

  Study to devise a methods for increasing the access of health services to rural population and people staying in remote areas (Mobile Clinics and Medical Camps) etc.

Evaluating Options

This type of study is required to be carried out when the decision-maker requires assistance in selecting the best option as per his requirement, out of a number of alternatives available to him. It may include even generating the alternatives and then selecting one out of them.

Examples of this kind of study are:

- Mechanical laundry versus conventional (manual) laundry services in a hospital.
- Developing hospital services in-house versus contracting out services.
- Evaluating drug distribution methods in pharmacy services.

Validating Hypothesis

Hypothesis as you know is an assumptive statement of facts made by an investigator health manager based on scientific facts after carrying out a study or research. At times the decision maker may be interested in knowing the degree of truthness or success of the hypothesis or idea, i.e., the validity of hypothesis. Under these circumstances such a study is required to validate hypothesis.

Examples of this type of study are:

- Study to test the hypothesis that improving OPD (Out Patient Department) services reduces the average length of stay of an indoor patient.
- Study to test the hypothesis that improving hygiene factors improve themotivation of workers.

1.7 PROCESS OF PROJECT STUDY

As already discussed, tlie type of project study depends upon its proposed utilisation. Therefore it is not correct to label a particular process, which can be followed for every type of project study. However general guidelines are described here which could be applied for conducting most of the project studies. The process of project study consists of essentially following steps:

- Selecting Aim, Objectives and Scope of study
- Methodology including tools of data collection
- Analysis of existing system

- Data collection

  Inference and Interpretation

- Discussion

  Conclusions and Recommendations

- Summary

1.7.1 Selecting Aim, Objectives and Scope of Study

Aim as you know is the ultimate end towards which all objectives are directed. In fact aim should define the solution to the problem or the issue or the "felt need". For example the felt need of the user for the construction of a multi-speciality hospital in terms of aim, can be defined as "To prepare a project report on planning of physical facilities, staffing, equipment and utilisation of a 300 bedded multi-speciality hospital in a metropolitan city"

Objectives are the important ends towards which all activities are directed. The list of objectives should cover the main issues. In selecting objectives, one should list out attributes, which when measured will provide the necessary analytical context of the subsequent work. Objectives should be verifiable and should state what is to be accomplished and when. Objectives should present a challenge and indicate priorities. A few important points to be kept in mind while formulating objectives are as follows:

- Do the objectives cover the main feature?
- Are the objectives expressed clearly?
- Are the objectives verifiable?
- Do the objectives indicate:
  - Quantity (how much)?
  - Quality (how well or specific characteristics)?
  - Time (when)?
  - Cost (at what cost)?
- Are the priorities assigned to the objectives?

  Are the assumptions underlying the objectives clearly identified?

- Are the objectives achievable within available resources.

After the objectives are formulated, it should also be decided how to quantify these objectives, meaning thereby that how the objectives contribute quantitatively towards achieving the aim of the study. A decision has to be made how to measure these objectives. The objectives 'cover lot of issues some small and others big, and dimensions and interrelationship of all these issues and attributes are required to be measured and identified. The physical attributes can be measured with the help of physical instruments but the measurement of psychological and social attributes does require a different set of instruments.

Scope or the limits of the study should also be clearly defined. It means what the study will include and what it will not. What considerations will be taken into account and what will be left out? The constraints of the study should be clearly spelt out in the scope.

1.7.2 Methodology

Methodology adopted to carry out these study varies with the type of study. It may involve retrospective study, present study or prospective study. Retrospective study is the one in which the past events are studied. The prospective is the forward-looking study for the future period. For example in case of a project like " Study of health practices of a given community and their impact on the existing health system with a view to plan for expansion of health care facilities in that community " may involve all the three types of studies mentioned above.

In certain projects, networking techniques like PERT (Programme Evaluation and Review Technique), CPM (Critical Path Method) may be required. For example projects concerning construction of a hospital, project like installing MRI (Magnetic Resonance Imaging)

facilities or expansion of a hospital, application of PERT/Cost techniques is very useful. You have already learnt in detail about these techniques in Block 1 of Course 1.

Certain projects may require the application of Operations Research techniques like Simulation, Linear programming, Work-study, Activity Sampling, Method Study, Distribution logistics etc. For example in a project study to work out the staffing norms for a hospital or its department will require the use of technique of "Work Measurement" or "Activity Sampling". You have been exposed to these operation research techniques in Course 1.

Besides the techniques mentioned above, there are other techniques like Quality Circles, Total Quality Management, Value Engineering, CAD/CAM (Computer Aided Designs/ Computer Aided Manufacturing) which can be applied in project studies.

The important aspects which has to be decided in methodology is, that What data is to be collected, how the data is to be measured and how it is to be collected ?

What is Data?

Data as you know is an organised collection of information, containing the values of the variables, obtained from a sample of the subjects, and which would be sequentially used to derive conclusions through the process of scientific analysis and reasoning. In all types of studies the process df making measurements obtains data.

Types of Data

In clinical and health research the data, which is generally collected, is of two types:

- Quantitative data
- Qualitative data

Quantitative data is when the information is collected in the form of mathematical figures and it is recorded in the form of numerals. For example, height, weight, length etc. It is also called 'Numerical data'. The statistical methods employed in analysis of such a data or mean, range, standard deviation, co-efficient of variation and co-relation co-efficient.

Qualitative data is when the information can not be recorded in the form of numbers, but according to some certain defined attributes. For example "Sex-Malememale", " Satisfaction level - Satisfactory/Unsatisfactory". The results of a qualitative data are always expressed as a ratio, proportion, percentage or a rate. The statistical methods commonly employed in analysis of such a data are standard error of proportion and Chi-square tests.
Data can also be classified according to the source:

- ***Primary Data*** which is collected for the first time and thus is original in character.
- ***Secondary Data*** is that which has already been collected by someone else and has already been statistically processed. It can be obtained from various sources such as hospital registers, reports and returns of health centres, published data of some research studies etc.

Measurement of Data

Measuring or quantifying of the data is very important step in any project study. The data or the attributes in a project study are measured with the help of indicators. Indicators as you know are the specific instruments in the form of questions, scales or devices by which respondent's knowledge, opinion, expectations or the other data being collected in the study is measured. There is seldom a perfect measure of an attribute. Therefore it is desirable to consider and use different measures to gauge the same dimension/attribute. At times it is necessary to develop an instrument for measuring a specific attribute or data under study. At times when we have several attributes of a concept resulting in multifarious measurements, it may become necessary to combine these measurements into a single index so that they can be related to the original concept in a comprehensive way. The method of 'scaling is used to quantify data.

Scaling

Scaling is the procedure for the assignment of numbers (or other symbols) to a property of

objects in order to impart some of the characteiistics of numbers to the properties in question. In physical sciences the numbers are assigned to the measurement of various parameters like length, time, mass and so on, but in social research the numbers assigned do not have the one and the same interpretation. The interpretation of the numbers assigned in scaling depends upon the levels of measurement. These four levels are:

a) Nominal Scale
b) Ordinal Scale
c) Interval Scale
d) Ratio Scale

Nominal Scale: The nominal scale is used to measure qualitative data. In nominal scale, an attribute is marked as being either present or absent. The number of objects are recorded either those which have the defined or the specific attribute or those which do not have the defined or the specific attribute. So nominal scales merely classify without indicating order, distance or unique origin. In nominal scaling the given sample/population is labeled into a predetermined class. Examples are:

a) Marital Status – Single, Married, Divorced.
b) Status – Member/Nonmember
c) Smoker – Yes/No

Ordinal Scale: The ordinal scale uses numerical symbols for recording the data, but these numbers do not have any meaningful mathematical relationship. Ordinal scales indicate magnitude relationships of "more than" or "less than". Ordinal numbers do not permit mathematical operations. Since the number of this scale have only a ranking meaning, the appropriate measure of central tendency is the median. Example of ordinal scale: the fever can be graded as Mild =1, Moderate =2, High Fever =3. So when ranking the degree of fever these numbers can be used for mild, moderate or high fever but these numbers 1, 2, and 3 do not have same mathematical relationship between them as in other mathematical operations.

Interval Scale: Interval Scale has the property of both the nominal as well as the ordinal scale. In addition the interval between numbers, on an interval scale represents equal distances in the variable being measured. The scale does not have a unique or absolute zero, but an arbitrary zero. For example Fahrenheit temperature scale.

Ratio Scale: This scale includes the features of nominal, ordinal and interval scales and in addition provides an absolute (non-arbitrary) zero point. Ratio scales represent actual amounts of variables. Measures of physical dimensions such as weight, height, distance. etc. are examples where ratio scales can be used. In project studies ratio scales are used to obtain stock levels, transit time etc. All the statistical techniques can be used with ratio scales and all the manipulations that one carries out with real numbers can also be carried out with ratio scale values.

Based on these rating scales and techniques a decision is made how to evolve criteria for analysis of existing system by applying these scales and techniques.

After a decision has been made which methodology is to be used for the project study, what data is to be collected, how it is to be collected, what measurement techniques are to be used, the next step in project study is to apply these decisions to the existing system.

Data Collection

Following methods are used to collect the primary data:

- Observation
- Interview
- Questionnaire
- Documents

Observations: In this method, the information is sought by way of investigator's own direct observation without asking anything from the respondent. While recording observations, the investigator should take care to rule out all kinds of bias. Care should also be taken that others do not become conscious of the fact that they are being observed, as this will not produce the correct data. Observations therefore should be recorded discretly. The

recording of observations should be carefully planned and proper checks and controls for validity and reliability of data should be made. Advantages of this method are that subjectivity is reduced and there is complete separation from past or future. Disadvantages of this method are that it is relatively costly, time consuming and provides limited information.

Interview: This method is used to collect data from the subjects who have the knowledge o: the subject under investigation. Interviews may be Personal Interviews or Telephonic Interviews. In personnel interviews, the information is collected by face to face physical presence of the interviewer and the respondent. But nowadays organisations are taking help of modern technological tools like video-conferencing, in which face to face interview is conducted but both interviewer and the respondent are located at a far of distance, but both can see each other as sitting face to face. In telephonic interviews, contacting respondents on telephone collects the information. Interviews can be Structured inteiviews, Semi-Sructured interviews and Unstructured Interviews.

In Structured *Interviews*, a set of questions related to the project under study are prepared and asked. The questions are so designed so as to provide specific information about the issues under study. The interviewer in structured interview follows a rigid procedure laid down, asking questions in form and order prescribed and recording of responses is also done in the form and order prescribed. Structured interviews require lesser skill on the part of interviewer. Structured interviews are usually used in descriptive studies.

In *Unstructured* Interview, the interviewer is allowed much greater freedom to ask supplementary questions or omit certain questions. He has greater freedom while recording responses to include some aspects and exclude others. Here the aim is to extract information about the issues, which are important from the point of view of person who is being interviewed. This gives an insight about the human behaviour of persons performing the job under study. Unstructured interviews demand greater skill and knowledge on the part of interviewer. Unstructured interviews are generally used in case of exploratory studies.

In *Semi-structured Interview*, the interviewer follows the interview guide or the set pattern, but in addition may asks other questions.

Interviews may be focussed interviews, clinical interviews and non-directive interviews. In focussed interview the aim is to focus attention on the given experience of the respondent and its effect. The main task of the interviewer is to confine the respondent to a discussion of issues with which he seeks conversance. Such interviews are used in the development of hypothesis.

The clinical interview is concerned with broad underlying feelings or motivations or with the course of individual's life experience. In case of non-directive interview, the interviewer's function is simply to encourage the respondent to talk about the given topic with bare minimum questioning.

Questionnaire: This method is used when large size inquiries are to be conducted. A number of questions, presented in a definite order on a specially designed form are administered to the subjects under study, either personally or through post or through telephone. It is important to structure the questionnaire and validate it through pilot survey. before presenting it to the subjects under study. Care should be taken that questions are short and simple. Questions may be of closed type (with 'yes' or 'no' type answer) or they may be of open type (inviting free response). They may be of the type where they provide fixed alternative responses.

Documents: In this method the data is collected from the records, documents, report and returns, research papers and recorded forms. Documents or records provide a reliable source of observation. They can also be used to verify the articulation of policies, rules and Standard Operating Procedures (SOPs).

1.7.3 Analysis of Existing System

The next step is to analyse the existing system. An analysis is made of the existing objectives, existing functions being performed, the different relationships including functional relationship, the existing expenditure or the costs involved, the effectiveness of the existing way of functioning, existing policies, rules bylaws and so on. This review of the

existing system may require visits, discussions, briefings and interactions with a wide variety of people both inside and outside the organisation. It may include the review of literature available on the subject. It includes, not only the study of the organisation for which the project study is being done, but also, the analysis of the external environment, that is, the similar projects/ industries outside, their profitability, su vival, success.

For example in case of a project of construction of a multidisciplinary hospital in a district, the review of existing systems will include:

- The present system of health care delivery in the district
- The present number of health care facilities, hospitals, hospital beds, general practitioners, Registered Medical Practitioners and alternative health care system facilities and their capabilities.

  Demographic profile of the dependent population of the district.

  The social, economic and educational status, the health practices and social customs and taboos.
- Common health problems and disease prevalence in the dependent population so that concerned departments in the hospital can be developed more.

The detailed examination of the system involves the following:

Enumeration and description of all the elements

- Appreciation of the policies governing the relationships amongst the elements
- Identification of the opportunity elements
- Task analysis of the opportunity elements

Opportunity Elements

When you enumerate and describe various elements of the system, look for the elements, which promise scope for improvement, These elements are called Opportunity elements. The focus should be kept on these elements, but the care should be taken that the focus does not become too narrowed. Therefore elements of associated system should also be included, but the study should remain manageable. The opportunity elements are perused for the task analysis

Task Analysis

It basically means getting details about the task elements of each opportunity element so that the focus can be emphasised on these elements, The aim is to control the specific parts of the operations.

Effectiveness **Criteria**

An effectiveness criteria is basically the degree to which the system achieves the designated task or function while operating in the specified environment. The cost of operation related to the effectiveness should also be measured.

The good review of the system helps in better appreciation of the task and enables the study team to arrive at a range of feasible options as well as the attendant consequences.

1.7.4 Data Collection

The data relevant to the project study should be collected applying the methodology and using the parameters and attributes, decided as per study plan. While recording the data due care need to be taken to rule out the observer and instrument error. The observations should be recorded carefully and all types of biases should be ruled out. Any deviation, if it is there, should be explained by logical, sound and scientific reasoning. The overall plan or design for the study and the time frame as decided earlier should be strictly followed and adhered to. How the data being collected will contribute to the aim and objective of the study should always be kept in mind to avoid wasting of time and money in collecting data irrelevant to the study. Facts, figures, observations and data so collected should be

arranged, tabulated and presented in a simple and easily understandable manner. All statements should be supported suitably by relevant facts and figure.

1.7.6 Inference and Interpretation

After the data has been collected, it is analysed to draw inferences. The purpose of collecting, collating and analysing information is to arrive at objective assessment of the selected attsibutes of the system under consideration. The information, available on the basis of the processed data, is to be utilised in drawing inferences about the status of the selected attributes on which data is collected. These inferences are to be interpreted in larger context to arrive at meaningful conclusion.

Inferences in simple terms mean estimation. Use of both qualitative and quantitative techniques is made. The qualitative technique used can be intuition based on the experience or past practices. The quantitative techniques used are:

- Hypothesis testing
- Chi-square test
- Analysis of Variance
- Regression Analysis
- Co-relation Analysis
- Trend Analysis

All these techniques come under Statistical Analysis and beyond the scope of this project works and, therefore, are not being described here. The inferences should be drawn objectively and should be restricted to the information procured from the available data. After drawing inferences correctly, the next step is to make correct interpretation. The 'Interpretation' is the process of establishing links within the inferences and possible cause-effect relationship within the sub-system as well as with the larger system. The inferences should also be linked with the other studies on the same or related subject.

1.7.7 Discussion

After the inferences have been drawn and an appraisal of the organisational system including its processes with specific reference to areas of interest has been made, brainstorming sessions are held with in the study team to threadbare various conclusions drawn. The nodal points of the system needing attention and further study are emphasised to find ways and means to provide effective solution to the problem. The possible approaches/techniques/concepts that can be employed are explored. The options are generated and shortlisted based on the criteria of feasibility from all aspects including their evaluation for cost and effectiveness. The discussions are also held with the important users and outside experts and different options are generated. The consequences of implementing various options are also discussed and recorded. Any specific preferences of the user/sponsorer for a particular set of options are noted and specific interventions if required are designed. This helps in finding solutions, appropriate to the organisation and also improves acceptability subsequently. If the circumstances permit, a limited trial on a small scale can also be conducted to give confidence to the sponsorer/user as regards to viability of the proposal. This will help the study team in collecting data on post implementation changes and modify the proposal, if necessary.

1.7.8 Recommendations

Recommendations form the most important part of the project study. While framing recommendations due care should be taken that they provide answer to the aim and all the objectives set forth in the study. The recommendations should cover all aspects of the problems/issues for which the sponsorer/user has requested the study.

1.8 PROJECT REPORT

After the study has been completed, it is necessary to reduce in writing the entire thought process as evolved during the study. All underlying assumptions and information on which

the recommendations were based and formed should be recorded in a logical sequence. The most well designed and conducted study and the most revealing findings are of little value unless they are communicated properly. The purpose of project study is served only when the findings and recommendations are made well known to all concerned. Writing of the report is basically an art and requires special skills. The important thing to be kept in mind while writing the project report is that the whole subject matter should be written logically and chronologically and all facts, figures and statements should be stated along with various options and the implications and consequences of implementing these options. The following format as a guideline is suggested for the project report:

Layout of a Project Study Report

1) Cover Page : It should contain the following:
   - Title of tlie project report
   - Organisation or project study team or individual's name who has conducted and prepared tlie project report

     The organisation for which the project report has been prepared
   - Date and year of project report
2) Table of Contents
3) List of Abbreviations
4) Project Report Summary
5) Details of project study as under:
   a) Introduction
   b) Aims, Objectives and Scope of project study
   c) Background material like review of literature
   d) Methodology
   e) Findings/observations including analysis
   f) Discussion giving details of inferences and interpretations
   g) Recommendations with detailed justifications.
6) Areas of further study
7) Acknowledgements
8) Appendices, Charts, Graphs, Sketches etc.

1.9 LET US SUM UP

In this project manual you have learnt that a project study is the scientific examination of a problem and/or concerned issues, to assist the decision-makers arrive at conclusions with a sharper focus over a broad perspective. Organisations, as you know, are increasingly requesting for project studies in order to maintain their competitive edge in this era of globalisation and liberalisation. You have also learnt that project studies help to examine real life problems critically, analyse them and provide solutions to improve system efficiency and cost effectiveness. You have also learnt about the classification of project studies which can be classified in to different types depending upon their proposed utilisation, These can be Exploratory, Problem solving, Designing or modifying systems, Interventional studies, Evaluating options and Validating hypothesis. You have learnt that the process of conducting project study which consists of various steps viz. selecting aim, objectives and scope, methodology, analysis of existing system, making observations and collecting data, making inference and interpretation, discussion, recommendations, and summary. You will appreciate that the purpose of project study is served only when the findings and recommendations are made well known to all concerned and this is best done with the help ofproject report,

ACTIVITY

You would be required to write dissertation/project on a topic related to hospital management or health services management or on health problems. A list of suggested topics for dissertation project is given here:

1) Study of OPD services of a district hospital.
2) Study of purchase system and management of medical and surgical stores in the hospital.
3) A study of Nursing service in a district hospital.
4) An evaluatory study of some of CGHS/ESI dispensaries in the station.
5) A study of hospital laboratory services of a district hospital.
6) A study of Blood Bank services in a district hospital.
7) A study of Radiological services in a district hospital.
8) A study of Dietary services in a district hospital.
9) A study of absentesm among class D employees.
10) A study of Disaster plan for a hospital.
11) Procurement, storage and consumption pattern of crystalloids at a district hospital.
12) A study of the problems in maintenance of hospital buildings and equipments.
13) Any other subject pertaining to General Administration, Personnel Management, Financial Management, Materials Management.

This list is suggestive in nature only but you may select any other suitable subject for study. The dissertation should be based on a practical field study carried out by the candidate.

You should identify and select an institution/hospital or an area which has about average performance. You may finalize the selection of institution/hospital in consultation with your academic counsellor at programme study centre.

After the selection of the institution; you must:

- introduce yourself to the head of institution
- explain him the purpose of your study
- seek his approval for carrying out the project work in the institution
- request him to provide you access to various records and reports available at his end
- develop rapport with head of institution and other staff members
- develop the tools for collection of data i.e., questionnaire, interview schedules and checklists for observational study.