Step by Step®

Quality Hospital Care

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Farooq A Jan MD

Associate Professor
Hospital Administration
Sher-i-Kashmir Institute of Medical Sciences
Srinagar, Jammu & Kashmir, India

Foreword

Syed Amin Tabish

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Email: jaypee@jaypeebrothers.com

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Dedicated to

My Parents
and
Teachers

Foreword

Health services exist to meet the health needs of the community, so the delivery of health services should be designed to meet those needs. Quality management (QM) refers to the evaluation of the conditions under which care is provided. It encompasses all activities that contribute to defining, designing, assessing, monitoring and improving the quality of health care. It involves the identification of a problem, the determination of the source and nature of the problem, an assessment on how to effect improvement in the situation, the design of policies for remedying the problem through appropriate methods and implementation of those policies and monitoring of the methods applied to see if they have been effective. Quality management in health care is developing fast in the developing nations and is primarily directed towards solving effectiveness problems. Quality management activities can be looked at as processes slowly taking shape and obtaining incremental recognition from practitioners, academia and government. Various factors that have prevented quality assurance from coming of age cannot be controlled and can be influenced only with great difficulty. The existence of a QM support organization can, however, speed up developments to a considerable degree. Training and education in quality assurance is now available for most health professions. Four core principles have emerged out of this experience to guide quality assurance in health care: *Focus on the client:* Services should be designed so as to meet the needs and expectations of clients and communities; *Focus on systems and processes:* Providers must understand the service delivery system and its key service processes in order to improve them; *Focus on measurement:* Data is needed to analyze processes, identify problems; and measure performance, and *Focus on teamwork:* Quality is best achieved through team approach to problem solving and quality improvement.

A focus on patient examines how and whether each step in a process is relevant to meeting patient needs and eliminates steps

that do not ultimately lead to patient satisfaction or desired client outcomes. A focus on patients not only involves people that come to the facility to receive services (patients) but also addresses the work-related needs of personnel (internal customers) involved in the delivery of care. External customers include the people receiving the end product or output of a system. Doctors, nurses and other staff are examples of internal customers and are important in achieving the overall goal of quality care. Internal customers benefit from system efficiency by being able to perform their jobs better, thereby meeting the needs of external customers.

Quality management views all work in the form of processes and systems. Systems are arrangements of organizations, people, materials, and procedures that together are associated with a particular function or outcome. There are different types of processes in health care. *Clinical algorithms*: The processes by which clinical decisions are made; *Information flow processes*: The processes by which information is shared across different persons involved in the care; *Material flow processes*: The processes by which materials (e.g. drugs, supplies, food) are passed through the system; *Patient flow processes*: The processes by which patients move through the medical facility as they seek and receive care; *Multiple flow processes*: Most processes are actually multiple flow processes, whereby patients, materials, information, and others are involved simultaneously in the same process of care.

Processes can cause inefficiencies due to problems that occur in the execution or the transition of one step to the next. Inefficiency in a process often results from unnecessary steps that add complexity, waste, and extra work to a system, ultimately reducing the overall quality of care. Tools such as a flow chart help people understand the steps in a process. Processes also may be unclear and/or missing steps, and therefore in need of clarification. By increasing understanding of the processes and systems of care, QM activities can identify weaknesses and change processes in ways that make them produce better results.

Data are important because they ensure objectivity. Measurement and data are used to identify opportunities for improvement to

initiate QA efforts, detect and assess problems, verify possible causes of problems, inform decision-making, show if a quality intervention yielded improvement and by how much, monitor processes overtime to see if the change or improvement is maintained.

Teams are important to QM for several reasons: The group working within a process will understand it better than any one person, including key people in the improvement of a process often involves clarifying and incorporating the insights and needs of clients into health care delivery. The participation of major stakeholders improves the ideas generated, builds consensus about changes, and reduces resistance to change.

Development of QM programs in hospitals is being achieved in various ways: Some countries have developed a management approach to quality assurance by developing explicit organizational standards and an accreditation-like process (King's Fund, United Kingdom); others have developed an approach focused on specific activities (accreditation for emergency care services in Italy). Hospitals maintain standards by maintaining ISO accreditation; performing clinical audits; quality improvement; mortality and morbidity reviews; conducting regular continuing medical education (CME) programs; observing infection protocols; following international external quality controls; ensuring ethical staff work practices; performing regular audits of clinical standards by external organizations; and maintaining International Hospital Accreditation Standards.

Despite the importance of quality, to date there have been few sustained QM efforts in developing countries. Many evaluations have focused on measuring changes in mortality and morbidity, or on measuring coverage rates. A few have emphasized on the quality of services or the process of service delivery. Further, systematic efforts to improve quality based on findings about the delivery process have been extremely rare. This book is a step in the right direction. It is an essential reading for Hospital Administrators, Clinicians, Nurses and Student Managers. The author defines the meaning of quality and related issues, explicates its components, and provides clear and systematic guides to its assessment and enhancement. His style is lucid, succinct and systematic.

Efforts by the author will evolve as an authentic resource if experts in the field provide their valuable inputs for its improvement in the next edition.

Syed Amin Tabish
FRCP FACP FRCPE FAMS MHA (AIIMS)
Postdoctoral Fellowship in Social Medicine, England
Head, Hospital Administration and Medical Superintendent
Sher-i-Kashmir Institute of Medical Sciences
Srinagar, Jammu & Kashmir, India

Preface

This book has been written for doctors in general and postgraduates of Hospital and Health Administration and Hospital Managers in particular. Emphasis has been particularly laid on latest developments and approaches in management of hospitals. Number of books on hospital management are available in the market which cover quality in hospitals. In this book not only new topics of current interest have been included but also the latest trends in much talked about topics have been discussed, somehow omitting a great deal of material that stands traditionally discussed.

Farooq A Jan

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I am greatly indebted to Dr Qazi Qayoom who reviewed most of the chapters and made useful suggestions. I am thankful to my parents and teachers who have given me education. I am thankful to my wife Dr Shadab and kids Sarlees and Nibras who were helpful in their peculiar ways.

Contents

chapter 1

Quality in health care

Health care services are very complex; on one side new technologies become available very rapidly which make practices obsolete before the process of delivering care can be fully evaluated and variation minimized. On the customer side accessibility, parameters and reim-bursement methods are rapidly changing. All these activities demand efficient operations, continuous improvement and update.

Quality management in health sector is important for improving health status of populations, enhancing quality and access, increasing macroeconomic and microeconomic efficiency, strengthening cost and clinical effectiveness and improving quality of care and consumer satisfaction.

Several definitions of quality have been used over the years. Following are some of the predominant ones.

- Freedom from defects.
- Fitness for use.
- The totality of features and characteristics of a product or service that bear on its ability to satisfy given needs.
- The features and characteristics that delight the customer.

Joseph M Juran has defined quality management as "meeting or exceeding customer expectations by doing the right things right and doing them the right the first time."

Joint commission on accreditation of health care organizations, United States, has defined quality of patient care as the "degree to which patient care services increase the probability of desired outcomes and reduce the probability of undesired outcomes, given the current state of knowledge."

This definition is broad enough to encompass wide variations in individual perceptions of quality and recognizes that outcome of care are not certain.

Avedis Donabedian suggested that assessing quality in health care should include an assessment of structure, process and outcome (Fig. 1.1).

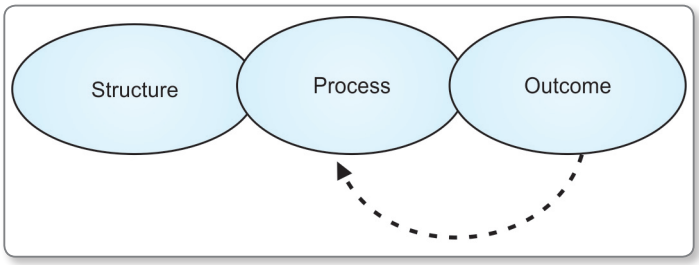

Figure 1.1 Integrated model of structure, process and outcome

Structure

Physical facility

Scientifically planned and designed for each function of the hospital.

- General structure, i.e. location, architectural pattern, internal and external traffic pattern and facilities.
- Location, layout and functional relationships.

Manpower

- Properly qualified and sufficient manpower for achieving mission of the institution.
- Committee composition consistent with institutional mission.
- Clearly drawn job descriptions.

Equipment

- Appropriate technology
- Maintenance
- Down time
- Utilization

Process

It is the application of knowledge, judgment and skill to improve health status. First standards are established and then degree of adherence to those standards is recorded.

The modern scientific procedures of patient care process in the hospital are:

- Medical audit
- Tissue review
- Mortality meets/death review
- X-ray review
- Utilization review
- Surgical audit
- Nursing audit, etc.

Outcome

Includes:

- Clinical outcomes
  - Survival
  - Recovery
- Affiliated outcomes
  - Attitude
  - Satisfaction
  - Disability
  - Rehabilitation

It should be clear that structure, process and outcome should not be viewed as strictly causative as they tend to merge in health care, i.e. number of intermediate outcomes affect the process itself.

Quality programs have three main foci: assessing or measuring performance, determining whether performance conforms to standards and improving performance when standards are not met. Following steps are important for quality improvement:

- Leaders must take lead in quality improvement.
- Additional investments in managerial time, capital and technical expertise.
- Health care workers must be assumed to be trying hard, acting in good faith and not willfully failing to do what they know to be correct.
- Communication between customers of health care must be open and carefully maintained.

- Modern tools and techniques of quality improvement must be put in use.

Health care organization must organize for quality, i.e. quality should get a central place in managerial agenda. Training in quality concepts must be introduced since all staff members must become partners in mission of quality improvement.

Once management is committed to the concept of quality and transformation of culture has begun quality planning follows. Planning emphasizes team formation and building, identification of customer requirement and professional standards, data-based identification of deviation from standards and requirements and identification of opportunities for improvement. After the completion of quality planning organizing quality becomes the second major task for quality management team. During this phase four key elements are emphasized: translating the requirements of customers or professional standards into operational specifications, selecting process performance measures or key indicators, measuring process performance measures or key indicators and planning and implementing the proposed solutions. Structure, process and outcome should be considered important key elements of evaluation. Evaluating quality includes evaluating results of the implemented solutions, holding gains and evaluating team effectiveness.

Challenges to quality improvement:

- Lack of political will.
- Lack of awareness and interest among hospital leadership.
- Fear among hospital staff.
- Inadequate trained staff in QM.
- Inadequate logistic support.
- Lack of quality management reference material.
- Lack of well organized information system.
- Lack of cooperation from all concerned departments.

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chapter 2

Total quality management

Nearly everyone in practice of medicine is highly trained, is usually very well educated and is by far committed to providing high quality of care. Because of all the changes in health care the ways in which quality is perceived, pursued and insured continues to develop. All health care systems are in a state of evolution. Limited resources, changes in insurance coverage, participation, decision-making by patient and patient demands and expectations are driving attention to quality today. It remains a challenge to find innovative approaches that improve the quality of health service delivery. Staff needs models of good practice to improve service delivery. Quality is achieved when accessible services are provided in an efficient, cost effective and acceptable manner that can be controlled by the ones providing them.

Evidence of quality problems

Several types of quality problems in health care have been documented through peer-reviewed research.

Variation in services

There continues to be a pattern of wide variation in health care practice including regional variations and small area variation.

Under use of services

Millions of people do not receive necessary care and suffer needless complications that add to costs and reduce productivity.

Over use of services

Each year a large number of people receive health care services that are unnecessary, increase costs and may even endanger their health. Research has shown that this occurs across all populations.

For example, a study examining the use of antibiotics for treating ear infections in children on Medicaid found that expensive antibiotics were used far more often than indicated.

Misuse of services

Too many patients develop complications during the course of their treatment and some die prematurely as a result. For example, a study of injuries to patients treated in hospitals in New York State found 3.7 percent experienced adverse events, 13.6 percent of these events led to death and 2.6 percent led to permanent disability. About one-fourth of these adverse events resulted from negligence.

Quality transformation

Traditional patient care has been a very individual and private affair for clinicians. For them quality means control by others. Clinicians feel powerless in this evolving system and because quality assessment feels invasive and intrusive it can produce resistance. While this seems understandable it is not in health care's best interest to stay stuck in resistance. The changes happening in health care mean that only 15 percent of health care quality is attributable to performance of individual and 85 percent is due to performance of systems. A clinician has power in the developing health care system to the extent to which he has knowledge. The knowledge is of his performance and of increases in his performance quality. This power of knowledge allows him within his arena to proactively increase quality of patient care and to share positive outcomes with the influential health care plans.

Management theories and practices to improve quality often have different names and to some extent even different definition but they share same roots. According to current thinking client satisfaction and efficiency happen automatically when organizations focus on improvement in processes and system to improve quality. During this transformation the approaches to quality improvement shift from being reactive to proactive. Rather than only inspecting and controlling, organizations build quality into the design of their services or products and into their work processes and systems.

Through strategic quality management there is mobilization of staff at all levels of the organization to be responsible for quality and its implementation instead of reliance on a quality department or program.

Quality is definitely in the eyes of the beholder. It needs to be considered which dimension of quality or perception of quality the other person may have. Administrator makes an effort to improve the level of performance across an entire organization to achieve higher levels of customer satisfaction (cultural quality). Clinical personnel focus on the delivery of medical care and the consistency of incorporating current professional knowledge (clinical quality). Employees, health care purchasers, patients and families assess the quality of their health care delivery based on personal treatment, access to care and medical outcomes (services quality). The commitment to quality improvement must come from the top of the organization, i.e. the Board of Director, CEO. The chair of the quality Improvement committee is best held by a physician. Without this leadership the program tends not to move forward and lacks commitment of a key group, the physicians. A physician must be the one carrying the message to his peers. The bottom line is that everyone in the organization can participate in improving some aspect of quality from organizational efficiencies in the clinic's operations to service and clinical quality.

Quality improvement teams should initially focus on:

- Highly prevalent conditions with significant effects on morbidity and mortality
- Conditions in which improving quality of service delivery will be efficacious (spend effort in the wisest manner)
- Conditions for which interventions are cost effective (spend money in the wisest manner)
- Conditions for which interventions are under control of health plan or provider or for which variation can be controlled, i.e. it is easier to control how my team performs a treatment than it is to control patient compliance.

There are different approaches to diagnose quality related problems and to improve quality.

Quality assurance approach

Quality improvement or quality assurance involves the development of criteria, standards and tracking methods to ensure that a facility is providing quality services to its customer on an ongoing basis. The process is supposed to detail in what areas a facility can be considered excellent, average or below acceptable standards and practices. Quality improvement programs may be stated clearly, but they cannot be organized and carried out as simply. There are many variables that have a direct impact on how a particular department operates on a daily basis. The status of one's budget, existing staffing levels, condition and age of the facility and its equipment, knowledge level of the staff and the expectations of the senior management staff are significant variables. These variables in turn directly affect how well quality improvement is made and how well existing quality is maintained. Tracking these variables that is comparing current operations against standards based on these variables is a fundamental part of any QA program. If the variables are ignored, a quality improvement program is not going to succeed.

Stages in implementing a QA program are:

Stage 1

Situation analysis

First step in implementation of QA program is situational analysis which is done to understand local staff and client perceptions towards quality of health services through a series of focus group discussions and exit interviews.

Stage 2

Developing a quality culture

Interdisciplinary quality action teams need to be formed which would undergo a program of intensive orientation and training in QA skills.

Stage 3

Setting quality indicators and standards

This involves identification of the event to be measured which is called Indicator. Indicator in Quality management is a measureable element in the structure, process or outcome of care whose value suggests one or more dimension of quality of care. Next step is to establish a benchmark which is optimal goal or best practice associated with that event. Once that goal has been determined the event is measured on a routine and periodic basis and the outcome of that measurement is compared to the established goal. Two types of benchmarking have been identified. Competitive benchmarking is the comparison of an organization to competitors that produce the same product or service. Comparing the performance of one hospitals surgical services to another hospitals surgical services is competitive benchmarking. Competitive benchmarking does not mean that the objects of comparison are in the same market. By definition one of the hospitals must provide the best surgical services. The best surgical services may not be provided by a local competitor. World-class benchmarking is the comparison of an organization to another organization outside the industry. For example, a hospital may compare its billing process to a billing process of a utility company, if the utility's billing process is recognized as the best billing process. Although the clients of the two organizations are very different there still may be procedural lessons to be learned from the utility that are transferable to the hospital. Similarly health care organizations have been much slow to embrace information technology as a path to more efficient delivery of results and data. Bar coding used throughout many industries for materials management is not as prevalent in health care organizations, despite the large number of supplies that move through a hospital or other health care organizations at any given time. In health care, benchmarking typically has been applied to clinical practices rather than to business activities.

Stage 4

Institutionalizing the quality assurance system

Quality Assurance (QA) system has to be formalized by signing service level agreements containing explicit quality specifications.

Organizations have to prioritize and classify indicators, prepare data collection instructions, prepare a deviation from standards form and use it to plot progress when a particular benchmark/standard is not met.

Underlying this approach is the " Bad Apples" view: find the bad apple and get rid of it. Such an approach to measuring and insuring quality has, understandably led to much resentment and focuses on meeting minimal standards (then stopping the assessment) rather than on improvement of quality on a continuous basis. A more mature and developed approach than quality assurance alone is "Total Quality Management." It uses QA as its first step and seeks to implement the result of QA into a more comprehensive and continuous effort to improve quality.

Total quality management

Quality improvement is the effort to improve the level of performance of a key process within an organization. Opportunities to improve care and service are found primarily by examining the systems and processes by which care and services are provided. The goal is to not merely meet standards of care but to exceed them. Performance assessment or measurement (QA) is a necessary step but is not the end—it is the first step in a continuous cycle of improving quality (Continuous Quality Improvement).

Continuous Quality Improvement (CQI) is defined as the use of incremental and breakthrough quality management techniques to constantly improve processes, products or services provided to internal and external customers and thus achieve higher levels of customer satisfaction. Total Quality Management (TQM) is defined as a structured systematic process for creating organization wide participation in planning and implementing continuous improvement in quality. Total organizational commitment is woven throughout the fabric of the organization, appearing in strategic planning, allocation of resources, role expectations, reward structures, performance evaluations and the role of the organization in the community. An ongoing comprehensive self-assessment system supports and promotes continuous improvement in the quality of patient care.

Traditionally quality in health care has been defined by physicians and hospitals in professional and technical terms. However with the reemergence of quality as a major issue in health care, payers and patients are demanding participation in new definitions of quality that will include customer perception and satisfaction with the quality of care received. Definitions and measures contribute in the setting of expectations of the system and provide a method of monitoring the results; however organizations must seek to make quality an integral part of the delivery process. A variety of phrases have been used to define philosophy of total quality management. The principles of the philosophy are described in what are known as Deming's Fourteen points. The burden of effective implementation of TQM falls squarely on top management. Demings fourteen points constitute a road map for management to follow in order to enhance competitive position over the long run. These points have also been called "The Fourteen obligations of top management" and are summarized as follows:

Create constancy of purpose

Management must believe that the organization will be in business for a long time and therefore develop a strategy that is based on long-term thinking. Board plays an important role in creating constancy of purpose by establishing the time frame and criteria by which the chief executive officer will be evaluated. There are additional ways to establish constancy of purpose in an organization: (1) Innovation; (2) Research and education; (3) Continuous improvement of products and services; (4) Maintenance of plant and equipment.

Adopt the new philosophy

Adopting a new philosophy means transformation of management and obtaining appropriate technology.

Cease dependence on mass inspection

Competitive position can only be enhanced when the root causes of problems are identified and appropriate remedial actions taken upstream in the process. Continuous improvement occurs through

the design and redesign of patient care systems and not by blaming individual workers within the health care organization. The problem in many hospitals is that all or most deviations are considered special, which ignores a common observation that 85 percent or more of variation in systems is from random causes. Employees who are held accountable for common — cause variation can easily become demoralized, angry and disconnected from their work. It is the job of management to redesign the system to reduce variation. One-way of accomplishing this is through the development and use of protocols for activities, procedures, intermediate products and patient groups that will allow medical and clinical staff to concentrate on improvement rather than correction.

End the practice of awarding business on price tag alone

Hospital administrators should consider the implications on quality and productivity before substituting cheaper material and less skilled labor for more costly one on the basis of price tag alone.

Improve constantly and forever the system of service

Improvement is not a one time effort. Management is obligated to improve continually. Quality as per Deming "must be built in at the design stage" and teamwork is essential to the process. The staff members must as a team always consider what kind of service they can perform for their customers and how they can improve their present service.

Institute training and retraining

Training and education are essential to continuous improvement and establishing constancy of purpose. Management must encourage and provide for continuing education to assure that employees can perform their jobs correctly and to enhance professional development and employee satisfaction.

Institute leadership

Leadership is the job of management. It is management's responsibility to discover the barriers that prevent workers from

taking pride in what they do and to continually seek ways to provide employees with the tools to do an effective job.

Drive out fear

Fear of failure, fear of embarrassment and fear of blame or retaliation inhibit to capitalize on opportunity and prevent people from asking questions or suggesting new ideas. This can result in loss of quality. People must feel secure and not be afraid to report problems, to ask for additional instructions or to call attention to conditions that interfere with quality.

Breakdown barriers between departments

Continuous improvement on an organization wide basis requires a system that fastens teamwork and a common departmental/ organizational vision. This vision is built on the mission of the organization that has quality as a primary goal. Top management's role in fostering teamwork means dismantling systems that destroy teamwork.

Eliminate slogans, exhortations and targets for the work force

Management can generate frustration and resentment in employees by proclaiming slogans like "zero defects", etc. Slogans contain an implicit supposition that employees could if they tried do better. People especially professionals may be offended by this suggestion.

Eliminate numerical quotas

Work standards such as "measured day work" or rates have been a part of American work ethic for decades. Deming stated that work standards impede quality more than any other single working condition. Work standards place a cap on productivity improvement and are totally contrary to the concept of continuous improvement.

Remove barriers to pride of workmanship

Top and middle managers must delegate as much authority as possible to their subordinates to foster their autonomy. The systems

that evaluate the performance of people on a regular basis must be changed. Health care institutions should make use of "employee involvement programs and quality circles."

Institute a vigorous program of education and retraining

Closely related to point 6. It essentially means people are assets not commodities.

Take action to accomplish the transformation

Top management must agree on the direction to take action. They must feel pain and dissatisfaction with past performance. Management at all levels must constantly study the process it controls, ask how it might be improved, organize an appropriate team to address the issues, determine what data are necessary, collect the data, implement change and evaluate what occurred. This is known as the Shewhart cycle or the Deming cycle.

Pyramid of continuous quality improvement involves cultural, technical, strategic and structural dimensions (Fig. 2.1).

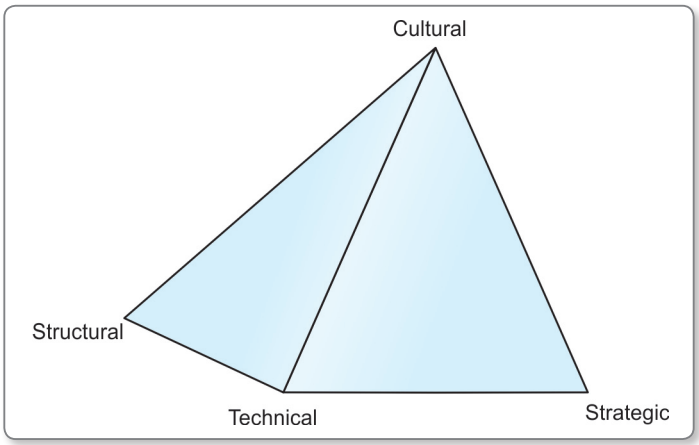

Figure 2.1 Pyramid of continuous improvement

Cultural dimension refers to the underlying beliefs, values, norms and behaviors of the organization that support or serve as a barrier to organization wide improvement. The technical dimension refers to the extent to which employees have received training in CQI tools and group decision-making processes to support quality improvement efforts. The strategic dimension refers to the extent to which the organization's quality improvement efforts are focused on key strategic priorities and on the organization's overall strategic plan. The structural dimension refers to the specific organizational entities such as coordinating committees, councils, task force, work groups and reporting/accountability mechanisms used in the organizational quality improvement efforts.

Integration of quality assurance and total quality

While Quality Assurance (QA) is seen as an activity to fix blame, Total Quality (TQ) searches for root causes of the problems in processes within the health care system rather than among the ranks of its employees. QA on one hand does not extend beyond meeting standards thereby making the system static and reactive while on the other hand TQ process continuously seeks opportunities for improvement and is proactive. In QA the coordinator or the department is the main driver while focused and combined efforts of all departments and employees drive TQ. Health care organizations can integrate TQ with QA by using the positive aspects of QA as a foundation for developing a comprehensive systems approach to health care quality issues. Successful implementation of TQ system offers resolution to many current barriers obstructing effective quality management for the health care organization. Quality in health care has multiple dimensions that dictate the need for an Integrated Quality Management Systems (IQMS). These dimensions include clinical quality, patient and customer service, appropriateness of care, cost effectiveness and efficiency, reduction of clinical risk and patient and employee safety.

The UK NHS quality proposals require all NHS organizations to develop an integrated approach to quality. In other countries,

health care organizations are also working to ensure that the many different quality methods and systems used in health organizations do not duplicate or conflict with each other.

Seven components of integrated quality development approach which characterizes the hospitals program and which can guide others in their quality journey are:

1. Four coordinated organization wide programs to develop professional competencies, organization and processes and a new role for patients.
2. Three dimensional definition of quality (patient, professional and management quality)
3. Patient pathway and process development
4. Quality data gathering
5. Team quality projects.
6. Patient focused system development and
7. Creating soulful spirals.

The aim of "Integrated Quality Development (IQD) is to develop the capability of a service better to meet the wants and needs of patients and to use fewer resources in doing so. It is an approach which provides a common language, simple methods and frame work for professionals and managers to work together to improve their services. It integrates the professional, management and patient quality perspectives and views the organization of services to a patient as a system made up of processes. The IQD approach recognizes that people have a right and a wish to grow as people from giving service to develop their technical and their human potential. The program requires to recognize that the individual professionals competence is no longer the only source of quality. In modern health care, quality also depends on the contributions of other employees and on how these contributions are coordinated. Another challenge that the program brought was to understand and bring about a change in role for managers from one of controlling to one of empowering. The managers role becomes one of motivating professionals to improve quality and ensuring that they know how to use organizational quality methods to understand and gain control over systems of care which they work in and contribute to.

Component 1—four coordinated sub-programs

The integrated quality development approach is to establish four sub-programs and to coordinate these. These sub programs are to develop professionals, managers and the organizations but also to develop the patient's role.
Separate but coordinated programs for each are:

Professional development

- Education and practice development
- Updating
- Peer review
- Evidence based guidelines
- IT supported practice
- Inter professional working skills and culture.

Management development

- Managing change to professional practice
- Education in quality management
- Quality measurement
- Managing empowerment
- Matrix management of projects
- Systems thinking and acting.

Organization development

- Responsibility and recognition of structure
- Matrix structure for process and professions
- Application of improvement science process/systems
- Variation
- People and teams.

Patient development

- information about condition and options.
- Expectations
- Develop interdependence and self-care as appropriate
- Ability to help improve service.

Component 2—integrated quality definition

The integrated definition combines three elements:

1. Patient quality, i.e. what patients want.
2. Professional quality, i.e. what professionals want.
3. Management quality using fewest resources without waste, errors or delay within policy and legal regulations (Fig. 2.2).

Component 3—patient pathway and process development

Research has found that one of the most effective methods to improve quality is to form teams to describe and improve processes. In professional services there are many processes, but the most important are different patient pathways-all processes should contribute to these primary processes in some way. The idea is to describe patient's journey throughout the service system, i.e. entry, first contact, assessment, intervention, follow-up, etc. This is the easiest way to reveal the service system acting on the patient, to see where things go wrong and to decide where to concentrate

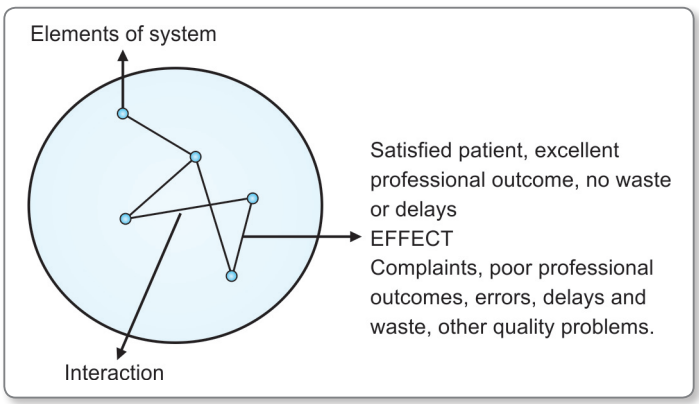

Figure 2.2 Interaction between elements of system with spectrum of outcome

improvement efforts. A true map of the pathway flow process is the basis for changing the process.

Component 4—quality data gathering

Gathering and using data are essential for monitoring and improving quality in modern professional services. It has been seen that hospital personnel usually do not have the skills to gather and use quality data or do not see the need to do so. Information management systems for automatic data capture and analysis usually are not available. Quality data is essential to quantify problems, gather data to be more certain about possible causes of complex problems and to evaluate quality interventions.

Component 5—team quality projects

Multidisciplinary quality project teams are one of the most effective ways to improve quality in health services as long as they are well managed and well led. The nine phase Team Quality Improvement Sequence (TQIS) is:

1. Choosing the problem
2. Formulating the problem
3. Guessing the cause of the problem
4. Gathering data
5. Analysis of data
6. Planning the solution
7. Implementing change
8. Evaluating results
9. Closing or continuing

Component 6—patient focused service systems

In addition to concentrating on improving professional competence a service system approach recognizes that the patients experience is the result of many direct and indirect influences.

Component 7—developing the soul and spirit of quality

This approach recognizes the importance of motivation, values and morale to professional service quality. There was a need to develop

technical excellence but also to develop the humanity of service and the spirit of quality. Professionals expect fulfillment from their work and opportunities to grow.

The soulless spiral results in complaints leading to personnel withdrawing from and losing satisfaction from their work. People leave and put more stress on those remaining, leading to drop in quality sending the spiral of morale downwards. The upward spiral is where personnel grow through achieving recognized improvements.

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chapter 3

Tools of quality management

A particular method being used by quality specialists for a particular purpose is referred to as a quality tool. A quality strategy differs from a quality tool in being an overall approach an organization takes over a period of time. Thus, a program for inspection of hospitals is a strategy and a particular method for carrying out inspection is referred to as a tool.

Technical tools

Quality function deployment

If quality is defined by the customer, Quality Function Deployment (QFD) is the tool to assure that the customer's vision of quality is captured, defined, deployed through the enterprise and linked to the activities of the enterprise. QFD possesses a fairly extensive research and literature base. A few of the benefits stemming from the use of QFD are:

- More satisfied customers.
- More efficient use of resources since the team works on important things first.
- The ability to present and evaluate data on requirements, alternatives, competitive position, targets, possible sources of interrelations and priorities.

A comprehensive QFD analysis ensures that we have addressed all customer needs, that everyone who works in the process understands what is important to the customer, and that everyone understands why each performance measure is tracked.

Seven management and planning tools

The Seven Management and Planning (7 MP) tools are:

1. Affinity diagram
2. Tree diagram

3. Prioritization matrix
4. Inter relation ship digraph
5. Matrix diagram
6. Activity network diagram
7. Process decision program chart.

Affinity diagram

Affinity diagram (affinity chart) also known as the K-J Method in honor of its developer Kawakito Jivo is useful for generating and grouping ideas and concepts. This tool uses Paper or cards to generate and collect team ideas. These are then arranged into groupings and assigned a descriptive header. The number of cards under each header indicates the breadth of team consensus on the issue.

Tree diagram (Fig. 3.1)

Tree diagram (also known as the schematic diagram) By tree diagram a complex project is broken into manageable tasks. Each element is divided into a list of self contained tasks that may be assigned to one or more sub teams or individuals. The tree diagram is used to identify the best solution. After the team has identified the best solution for addressing the problem statement, a recommendation is made to the quality council. The purpose of communication is to gain the sanction of executive level management so that they

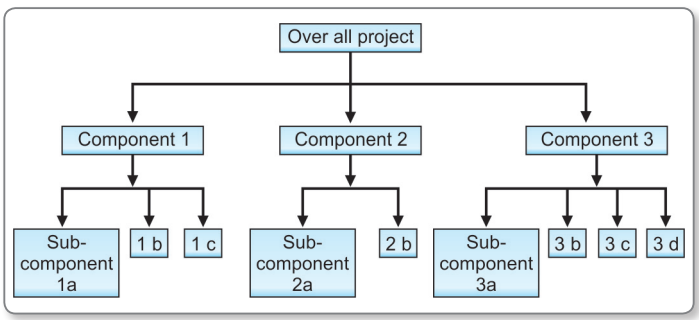


Figure 3.1 Tree diagram

may demonstrate their commitment to the overall TQ process. The dissecting process continues until the team reaches the point where tasks are defined well enough that they can be assigned to someone.

Prioritization matrix

This tool makes it easy for the team to focus on important items. Pair wise comparisons are made to determine the over all relationship of a large number of elements.

Inter-relationship digraph

Inter-relationship digraph (ID) or relations diagram. It helps to discover relationships and dependencies between different activities. Using graphical techniques relationships are identified one by one and driver tasks as well as outcome tasks are identified.

Matrix diagram

Matrix diagrams allow to display relationship and responsibilities in concise and efficient manner. They may appear similar to interrelationship digraph but are used for assignments not assessments.

Activity network diagram

Is a way to schedule project tasks. The tasks are arranged in anticipated flow order (sequential, parallel or a combination). Times are assigned to each task and the result is an ordered diagram that shows predecessor/successor relationships, total task times and the critical path.

Process decision program chart

In process decision program chart (PDPC) after exploring likely problems for each step, contingency countermeasures are planned for each potential problem and the best choice from the options is selected. The team begins as with tree diagram but instead of breaking each of the second level items down into more tasks the team leader takes each second level item and asks, what could go wrong with this? The various failure scenarios based on data,

past experience are written on individual cards to form the third level of tree. Next the fourth level of diagram is used to describe various contingencies that the team could utilize to minimize the impact of each failure scenario. The symbol X is typically used to mark those that are impractical, while the symbol O is used to mark those that should be implemented.

Failure mode and effects analysis

Failure Mode and Effects Analysis (FMEA) is a slightly more sophisticated version of contingency planning. In FMEA steps, failure scenarios and contingency plans are typically described in more detail and the resulting information is displayed in tabular form. The key refinement is that each failure mode is then rated based on likelihood of occurrence and severity. These rating scores follow a pareto distribution and direct the planning groups attention toward the most likely and most severe potential failures.

Statistical process control, statistical quality control and seven quality control

Statistical Process Control (SPC) is the application of statistical methods to identify when a process may have been influenced by a special cause of variation. While SPC deals with in process measures often our only significant way to measure the process result is by measuring the performance of the finished product. As within process measures final performance variation is a function of the variation resulting from normal and special causes. Often this approach is called Statistical Quality Control (SQC). The same charts and approaches are often used. SQC should not be used as a substitute for SPC. Since SPC is directed at process, it offers faster detection and correction of Problems. Many of the tools for this job are grouped with SPC/SQC in what are called the seven quality control tools (7QC).

1. SPC/SQC
2. Histograms
3. Scatter diagram
4. Pareto charts

5. Fish bone diagram
6. Check sheets
7. Defect Maps.

Histogram (Fig. 3.2)

Histogram is a modified bar graph where the data on the X-axis are continuous and thus, the bars are adjacent to one another. It is a graphic summary of variation in a set of data. It enables us to see patterns that are difficult to see in a simple table of numbers.

Scatter diagram (Figs 3.3A to C)

The technique is useful in displaying data from two variables that may relate to each other. The data collected is plotted on a graph with one variable on X-axis and the other on Y-axis.

Pareto chart (Fig. 3.4)

The Pareto principle is defined as the separation of the vital few issues that contributed to a problem from the less important issues. The Pareto concept is also known as the 80-20 rule, i.e. most of the problems are linked to only a few causes. One can analyze data utilizing this principle with the aid of bar and line graphs.

- Identify the quality problem to be studied.
- Select data collection method.

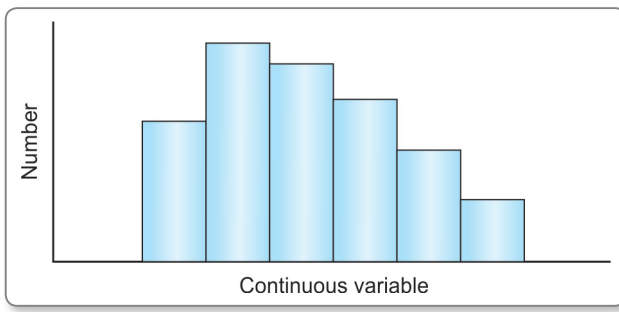
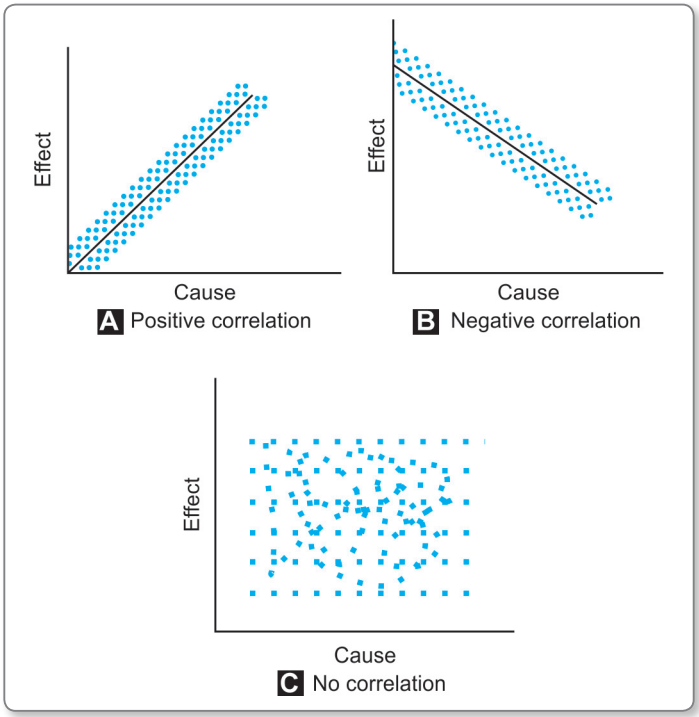


Figure 3.2 Histogram



Figures 3.3A to C Scatter diagram

- Categorize your data according to the type.
- Plot the frequency of each category of problem on a bar graph and arrange the categories in order of descending frequency from left to right on horizontal axis. Two vertical axis are designated. The left axis is divided into equal intervals based on the highest frequency while the right vertical axis is divided into percentages from 0 to 100 percent.
- Add the percentage values of the bars and calculate the cumulative total for each bar. Plot these totals on the same graph but as a line graph.

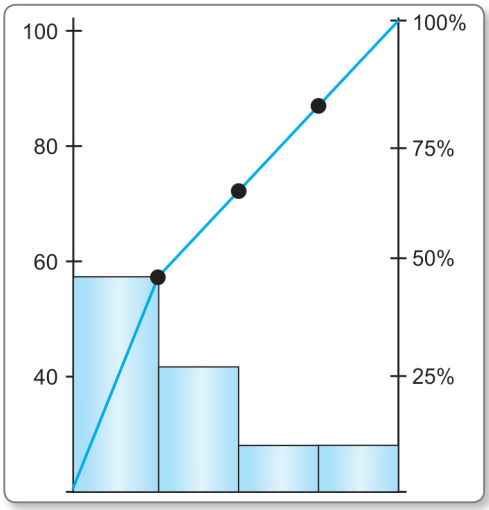


Figure 3.4 Pareto chart

Fish bone diagram or cause and effect diagram (Fig. 3.5)

Fish bone diagram or cause and effect diagram are tools to help organizations analyze problematic situations. Problematic situations are set equal to effects. Then by working backward from the effect and asking why? a diagram of interrelated causes is constructed. Cause and effect diagrams are constructed by the quality improvement team in few steps. Once the problem is selected for study its causes are listed. The list of the causes is then classified into categories and subcategories which are displayed on a diagram with arrows directed towards the main problem. The final diagram represents a fish skeleton and is therefore referred as fish bone diagram. It is also called Ishikawa diagram.

Check sheets

Check sheet is a data recording form that has been designed to readily interpret results from the form itself. It needs to be designed for the specific data it is to gather. It is used for the collection of quantitative

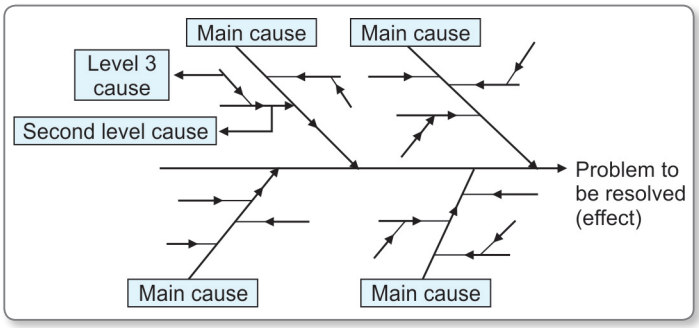


Figure 3.5 Fish bone diagram

or qualitative data and is adaptable to different data gathering situations.

Defect maps

In defect maps locations of the defective devices are stored. Defect maps are fundamental for defect tolerant computing and are fundamental to bridge the manufacturing and system design stages.

Other TQM technical tools

Brain storming

In this technique a group of individuals meet to generate a list of ideas regarding a topic. Discussion is then encouraged to clarify each idea and its objective. Duplication is eliminated and ideas are sorted into related subtopics. The final list is then used for the purpose intended.

Brain writing

Brain writing differs from brain storming in that after writing the ideas on a piece of paper each member modifies his own list after reading the ideas of other members. It provides all members an equal opportunity to participate and eliminate ideas that are not well thought out.

Event log

Logs are used to keep track of a sequence of events and/or periods of time during which such events occur in order to chart trends. Logs are drawn as tables with columns and rows.

Pie chart (Fig. 3.6)

Pie chart is a graphic representation of data elements that are part of a whole. The segments of the pie chart must add up to 100 percent of whole and should not exceed six so as to avoid a cluttered appearance. If one or more categories have a value of zero then pie charts should not be used.

Checklists

A checklist contains items that are important or relevant to a specific issue or situation. Checklists are used under operational conditions to ensure that all important steps or actions have been taken. Their primary purpose is for guiding operations, not for collecting data. Generally used to check that all aspects of a situation have been taken into account before action or decision-making.

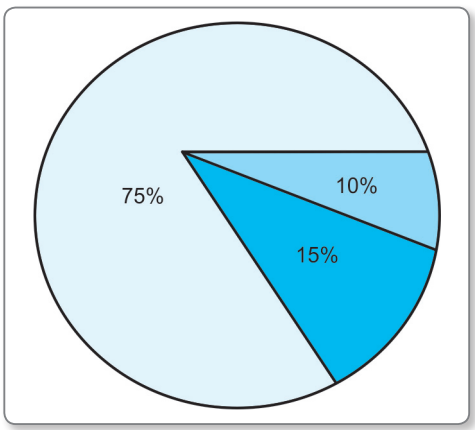


Figure 3.6 Pie chart

Control chart (Fig. 3.7)

Control charts are a method of statistical process control. They enable the control of distribution of variation rather than attempting to control each individual variation. Upper and lower control and tolerance limits are calculated for a process and sampled measures regularly plotted about a control line between the two sets of limits. The plotted line corresponds to the stability/trend of the process. Action can be taken based on trend rather than on individual variation. A process is said to be in control if trend falls within the upper and lower control limit. The process is out of control if trend falls outside UCL or LCL or if at least three consecutive points on the process trend line fall below or at least three consecutive points falls above the average even though the process trend line is between the UCL and LCL.

Flow chart (Fig. 3.8)

Pictures, symbols or text coupled with lines, arrows onlines show direction of flow. It enables modeling of processes; problems/ opportunities and decision points, etc. Develops a common understanding of a process by those involved. No particular

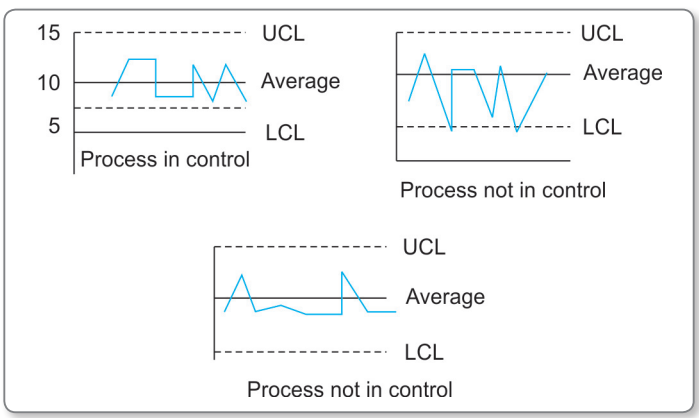


Figure 3.7 Control chart

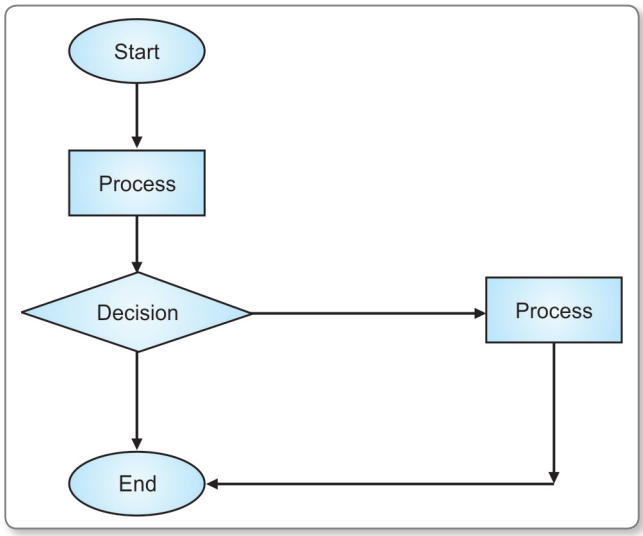


Figure 3.8 Flow chart

standardization of symbology is required as communication to a different audience may require considerable time and explanation. Oval represent beginnings, diamonds represent decision points circle connector, rectangle process, etc.

Quality circles

Quality circles are group of employees who meet voluntarily to solve their own work related problems in an organized way. Successful utilization of quality circles requires a long-term commitment. Members of quality circles need to have adequate knowledge of the subject and need to know how to evaluate and improve process and product quality.

Bar chart

Which are found in pareto charts and histograms help give a visual sense of weight to the problem at hand. It differs from histogram

in that bars are not adjacent to each other, i.e. data on X-axis is not continuous.

Line graph (Fig. 3.9)

Shows how a process performs overtime. Add a arrow pointing up or down to orient people's attention and you have got an immediate grasp of any process issue.

Nominal group technique

Once the list of ideas is generated then prioritizing or ranking is done by nominal group technique. The ideas are then used to improve the process. The ranking can be done by multiple voting, weighted voting or rank ordering. In multiple voting, group arbitrarily chooses the number of votes each member may have while in weighted voting technique each group member is allowed a set number of votes which is usually 1.5 times the number of ideas to be voted on.

Decision matrices

Decision matrices are helpful where the criteria are multidimensional. In a two dimensional matrix, options are listed as rows while as

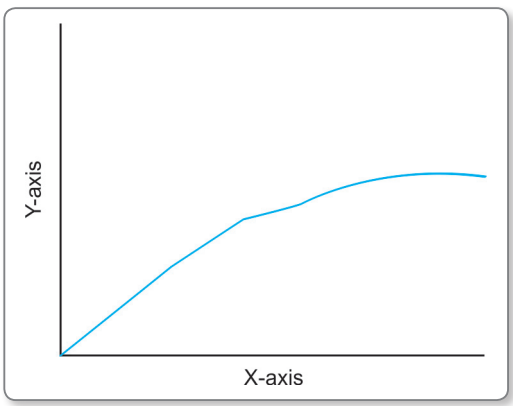


Figure 3.9 Line graph

specific criteria are listed as columns. The intersection of rows and columns are used to capture the group's opinion about how each option rates on the specific criteria.

Six sigma

Sigma is a measure of statistical variation. Six sigma indicates near perfection and is a rigorous operating methodology aimed to ensure complete customer satisfaction by ingraining a culture of excellence, responsiveness and accountability within an organization. Such programs also incorporate a strong system for gathering customer feedback. Six sigma entails five key steps.

- Identify the customer requirements, clarify the problem and set goals.
- Select what needs to be measured, identify information source and gather data.
- Develop hypotheses, identify the variables and causes.
- Generate solutions and put them into action, either modifying existing processes or developing new ones.
- Develop monitoring processes for continued high quality performance.

Six sigma can:

- Make processes more rigorous by using hard, timely data, not opinions or gut feel to make operating decisions.
- Cultivate customer loyalty by delivering superior value.
- Achieve quantum leaps in product performance.
- Reduce variation in service processes such as offering a consistent high quality service experience.
- Improve financial performance, through cost savings from projects, increased revenue from improved products and expanded operating margins.

The five objectives of six sigma are:

1. To satisfy the customer.
2. To lift internal performance.
3. To enable better performance by better design.
4. To improve the quality of purchased supplies.
5. To reduce costs.

Six main benefits of the sigma break through strategy are remarkable improvements in.

1. Processes.
2. Products and services.
3. Investor relations.
4. Design methodology.
5. Supplier relationships.
6. Training and recruitment.

While TQM focuses on improvement in individual operations with unrelated processes six sigma focuses on making improvement in all operations within a process producing results more rapidly and effectively.

The main objective of six sigma methodology is the implementation of measurement band strategy that focuses on process improvement and variation reduction through the application of six sigma improvement projects. This is accomplished through the use of two six sigma sub methodology: DMAIC and DMADV. The six sigma DMAIC process (define, measure, analyze, improve, control) is an improvement system for existing processes falling below specification and looking for incremental improvement. The six sigma DMADV process (define, measure, analyze, design, verify) is an improvement system used to develop new processes or products at six sigma quality levels.

Specific process planning methods in health care

The importance of quality in health care led to the development of specific adoptions for health care.

Critical paths

Critical paths or care paths are multidisciplinary high level process design efforts that specify key milestones in the care process for patients in given diagnostic category. It not only reduces average length of stay but improves quality of care, patient and attendant satisfaction and coordination between team members.

Clinical guidelines

Clinical guidelines outline the process of clinical decision-making and thereby focus discussion on potentially unnecessary variation in clinical practice.

In order to make quality in health care a success each health care organization should have a annual quality plan same as they have annual budget. A health care organization might ask each department or service to set specific improvement goals which would then be categorized and summarized to form organization wide goals. Japanese developed Hoshin planning which places quality firmly at the center of all organizations plans. Hoshin planning rests on two critical assertions: one that central goal of any organization must be to meet the needs of its customers, and second that to be successful the organization must achieve alignment between organizational and personal goals. Implementation of Hoshin planning in health care is hindered by confusion over multiple customers, lack of information about the true needs and expectation of these customers, and the tradition of not involving staff in strategic planning.

A review of the clinical application of CQI in United States found 41 single and 13 multi-site studies mostly using practitioner before and after measures. Accepting the scientific weaknesses of the studies the review concluded that there was some evidence that improved quality and economic efficiencies were achieved. One policy evaluation of a 24-pilot United Kingdom National CQI based improvement program explained the wide range of short-term and long-term results as due to "the power of physicians, the inertia built into established ways of working and the effort needed to implement new work processes." Recommendations included stimulating change at individual, team, organization and systems levels simultaneously and need for personnel to feel that they too as well as patients benefit from improvement. Some studies have shown application of TQM difficult in health sector because of three different management hierarchies as opposed to one in industries. Professionals show resistance to management because it narrows their autonomy.

Approaches to improve quality in hospitals

The various quality strategies are increasing resources, large scale reorganization, strengthening management, formulating standards, patient empowerment, quality management system, accreditation, etc. There is no scientific evidence that one type of strategy is better than another. There is little research assessing the effectiveness of one or more hospital or national quality strategies. The lack of evidence is largely a result of the difficulties of evaluating this type of intervention and of proving that the results are due to the strategy and not to other changes. In sum no one quality strategy can be recommended over another.

The main recommendations by WHO Regional office for Europe's Health Evidence Network (HEN) are:

- Hospitals should decide which approach to adopt after making an assessment of their quality and safety status and listing the different strategies which might be appropriate to their situation.
- When reviewing types of strategies, hospitals and governments should question the claims of proponents of any one approach because there is no strong evidence of effectiveness of any strategy. They should recognize the value of extensive experience as a form of evidence but also the commercial nature of the growing quality industry in health care.
- Decision makers should be aware that the same strategy applied in a different place may well yield different results, even if fully implemented. Attention needs to be paid to financial, cultural and other conditions surrounding implementation.
- Having chosen one type of quality strategy one should review it regularly and adapt it to changing situations and the responses of the interested personnel. Efforts should be made to assess whether any lack of results is due to the wrong strategy, poor implementation or the time required for results to become measurable. Close monitoring using a range of types of information can assist this assessment.
- It is possible that applying a consistent quality strategy over time is more likely to be effective than changing to another

approach. Flexibility without sudden radical change appears to be important.

- Quality experts with wide experiences can be useful, but need to be chosen with care. One or more independent experts should be used to give independent feedback for regular reviews of a strategy.
- Researchers need to pay more attention to describing the strategy actually carried out, assessing the depth of implementation and considering alternative explanations for the apparent results of a strategy.

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chapter 4

Indicator in quality improvement

Indicators are defined as specific criteria used to measure the quality of care. Indicator is a measurable element in the structure, process or outcome of care whose value suggests one or more dimensions of quality of care. Indicators of care can be divided into three categories: structure, process and outcome. Structure indicators are those that focus on the physical facilities and resources of an institution. Process indicators look at departmental functions that in themselves do not ensure a good outcome but that, when done well increase the likelihood of a positive outcome. Outcome indicators include patient complaints, deaths, discharges, etc.

The quality of health care is on the agenda in most countries, however there is no mandatory national system to track the quality of care delivered to the citizens. Health care in the aggregate is the largest enterprise in the United States, employing more people than any other industry, consuming nearly 15 percent of the gross domestic product and having expenditures of more than $1.2 trillion a year. Given this, it is remarkable how little is known about the quality of US health care. Whatever little is known it shows serious lapses and systematic quality problems. Hospitals need to have quality improvement as their primary business strategy. Providers increasingly wish to know how well they are performing and to have effective means of assessing and improving the quality of care they provide. For this they require measures that are meaningful, interpretable and of demonstrable value in helping to improve quality. Indicators for performance and outcome measurement allow the quality of care and services to be measured.

In 1984 leaders of seven Maryland Hospital Association met and agreed to share data. Using grant from the Robert Wood Johnson Foundation, Maryland Hospital Association (MHA) began in 1987 to test its model of indicators and assessment tools for use of hospitals outside the state. Today Maryland Quality Indicator Project is a

registered trademark with more than 225 hospitals in States and more than 1000 US health care organizations using its data mining services. In addition more than 300 health care institutions in nine countries abroad are associated with it. The International Quality Indicator Project (IQIP) comprises sets of performance indicators for four different pattern care settings—acute care, psychiatric care, long-term care and home care. Each indicator set has numerous measures for which a facility can submit data and receive comparative feedback. It is common for new participants to select a handful of measures for the first few reporting periods, then add more measures as the facility gains experience in the IQIP and the data collection process.

The Agency for Health care Research and Quality (AHRQ) makes use of administrative patient data and has four models measuring various aspects of quality. Preventive quality indicators identify, e.g. hospital admissions that evidence suggests could have been avoided at least in part through high quality out-patient. In-patient quality indicators reflect quality of care inside hospitals including inpatient mortality for medical conditions and surgical procedures, patient safety indicators reflect quality of care inside hospitals but focus on potentially avoidable complications and iatrogenic effects and pediatric quality indicators reflect quality of care inside hospitals and identify potentially avoidable hospitalizations among children. In 2000, the National Indicator Project was established in the Danish health care system. From 2000 to 2002 disease specific quality standards, indicators and prognostic factors have been developed for six diseases: stroke, hip fracture, schizophrenia, acute gastrointestinal surgery, heart failure and lung cancer. Indicators and standards have been based on scientific literature to assure the highest strength of evidence. If there is no scientific evidence available and the clinical problem in relation to disease is very important indicators and standards are determined by consensus among experienced and competent clinical experts. For each disease six to ten indicators were determined relating to structure, process and outcome of care. To secure the comparability of the collected data at the hospital and national levels, prognostic factors were identified in relation to the defined indicators and standards.

These prognostic factors are used as explanation variables and to adjust for case mix. This is important as it then becomes possible to evaluate whether a favorable or unfavorable outcome is due to the health care system or due to conditions over which the health care system has no influence, e.g. conditions related to the patient or the disease. Indicators, Standards and prognostic factors are implemented in all hospital units in Denmark. There is mandatory participation for all hospitals and relevant clinical departments and units treating patients with the six diseases. This requires development of an organization at the clinical units; hospital and country levels to ensure that the data collected are reproducible and correspond with the definitions determined by the indicator groups. Care is taken to ensure that the implementation of the project is incorporated into the daily work of the units and that structure of the project follows the daily structure in management and consultancy. Clinical indicators for stroke are illustrated in Table 4.1.

The project aims to document and develop the quality of health care. It aims to assess the health care system as an organization and does not focus on individuals. It is not the aim of the project to find scapegoats but to bring forth the best possible basis for improvement of quality and development of quality in the health care system. At the same time a qualified basis has been created for a dialogue between the health care providers, managers, the political system and patients founded on evidence based documentation.

Patient satisfaction has also been used as an indicator of quality care in independent health facilities. Although patient ratings cannot substitute for expert on spot assessments, they are important part of a quality management program and provide additional complementary information about components of quality care. In US National Quality Forum (NQF) has been established as a private, not-for-profit, open membership, public benefit cooperation for the purposes of developing consensus about standardized health care performance measures, reporting mechanisms and a national strategy for health care quality improvement. The new assertiveness of consumers as well as that of providers has challenged the traditional roles of physicians

Table 4.1: Clinical indicators for stroke

Indicator concept	Indicator
Organization of treatment	Proportion of patents treated/rehabilitated in stroke units
Secondary prophylactic treatment	Proportion of patients treated with platelet inhibitors
	Proportion of patient treated with anticoagulants
Diagnostics	Proportion of patients who undergo a CT/MRI scan
Assessment by a physiotherapist	Proportion of patients assessed by a physiotherapist
Assessment by an occupational therapist	Proportion of patient assessed by an occupational therapist
Assessment of nutritional status	Proportion of patients who have their nutritional status evaluated
Mortality	30 days and 3, 6 and 12 months mortality

Adopted from International Journal for Quality in health care 2004. Vol 16 supp 1

and health care provider organizations in establishing quality improvement and in determining quality improvement priorities. At this time the myraid health care stake holders have divergent views about who should determine quality standards, how performance measures or standards should be set and who should be allowed access to data about compliance with standards. Standards are more likely to be accepted and implemented if representatives of those who will have to implement and use the standards are involved throughout their development. The idea of establishing a unique public private organization to promote a national agenda for health care quality improvement was advanced by the President's Advisory Commission on Consumer Protection and Quality in the health care Industry in US. In pursuing this strategy, the NQF does not anticipate that it will develop new quality performance measures. Many research, accreditation and oversight organizations as well as commercial interests have developed measures or are developing new performance indicators.

The NQF sees a greater need at this time for weighing the evidence behind existing measures and endorsing those that are both evidence based and linked to national priorities for health care quality. NQF is unique in blending consumer, purchaser and provider perspectives on an equitable basis and then using the combined market power of both the public and private sectors to leverage quality improvement. Care is taken that standards have five attributes, i.e. openness, balance of interest, due process, an appeals process and consensus. Priorities of health care consumers are better addressed. It includes those parts of health care system that consumer directly interface with, i.e. hospitals, out patient clinics and individual care givers.

Benchmarking is not solely a measurement technique but goes deeper to understand why there are performance differences between seemingly similar processes. Knowing why something is better is the key to improving processes. Internal benchmarking compares similar processes and services within the organization. While this is a good way to reduce unnecessary variation we may not uncover substantially better practices simply by looking within our own organization. Competitive benchmarking is the comparison of an organization to competitors that produce the same product or service. For example, comparing the performance of one hospital surgical services to another hospital's surgical services is competitive benchmarking. It does not mean that the objects of comparison are in the same market. But that one of the hospitals must provide the best surgical services. World class benchmarking (generic benchmarking) is the comparison of an organization to another organization outside the industry. Functional benchmarking compares performance against those who are the best in the industry, but not direct competitors. It is also called group benchmarking. The absence of direct competition opens up a better channel for detailed sharing across organization.

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chapter 5

Hospital accreditation

Quality issues began to be addressed in hospitals during early 1900s. In 1913 American College of Surgeons (ACS) was founded and in 1918 Hospital standardization program was established by ACS for hospital where surgery was performed. Eventually it evolved into Joint Commission on Accreditation of Health care Organizations (JCAHO) which is still key accrediting agency for hospitals.

Accreditation is defined as the process by which an agency or organization evaluates the degree to which an institution meets certain predetermined standards.

CE Lewis defines accreditation as a professional recognition of facilities that provide high quality care.

Accreditation is a voluntary process for introduction of formal quality assurance system into hospital program in which hospitals invite survey by the commission.

Four basic elements of accreditation are:

1. It is voluntary.
2. Standards are laid.
3. Compliance is measured by external review.
4. Rating.

Models of accreditation

There are three models of accreditation.

1. Standard-based

This model emphasizes on the availability of basic health facilities, i.e. space and equipment requirements and human resources.

2. Quality assurance-based

Ranking is based on satisfying some basic indicators of quality in those institutions that are striving to improve quality.

3. Citizens charter- based

In this model criteria of assessment is geared towards people centric indicators. It emphasizes on evaluating health systems from indicators such as user friendliness, providing information to users about services available, setting-up procedures for redressal of grievances.

Standards

Standards represent a degree of excellence, serve as a basis for comparison and are a minimum with which a community may be content. Fifty percent of the standards are designated as core standards or minimum standards and are necessarily to be met for an organization to be accredited. Criteria for identification of care standard include; the standard reduces the risk that the rights of the patient will not be respected, standard reduces risk point in the clinical care process or the standard reduces risk in the patient care environment. Beyond the minimum there are desirable or optimum or reach standards. A hospital while meeting a minimum standard should seek to achieve a desirable or optimum standard. Standards can be explicit or implicit. Explicit criteria are written down and the work under study is checked against them. Implicit criteria on the other hand exist only in the mind of the evaluator and nothing is written down. Assumption is made that evaluators can distinguish between good and bad based on their experience and knowledge. Ideally standards should be explicit as these allow assessment of care to be based on clearly delineated agreed upon benchmarks.

Accreditation body

For proper development and implementation of quality, authority and responsibility should be vested in an autonomous body or commission which should be nonpolitical.

The composition of this body should be

- Representation of public sector especially the ministries of health and social security and the private sector.
- Experts from the field of hospital administration, finance, law, hospital engineering and medicine.

- Representation of the most distinguished medical councils and academies.
- Representation from the voluntary organizations.

Accreditation body should be supported by a proper secretariat and as an alternative to use of subjective criteria by physicians in assessing the quality of medical care, accreditation body relies on precise criteria that makes assessment easier and simple.

Functions of the accreditation body include:

- Granting accreditation to the hospitals meeting specified requirements.
- Periodic inspection for evaluating hospital performance.
- Inspection of hospitals from time of construction to the time of commissioning as per approved plan.
- Temporary/permanent cancellation of accreditation if the hospital fails to meet the prescribed standards.

The various standards laid down by Joint Commission for international accreditation are based on following:

Patient-centered standards

Access

- Patients have access to the health care organization's services based on their identified health care needs and the organization's mission and resources.
- The organization has a process for admitting patients to the organization.
- Patients with emergency or immediate needs are given priority for assessment and treatment.

Continuity

- The organization designs and carries out processes to provide continuity of patient care services within the organization and coordination among health professionals.
- During all phases of care there is a qualified individual identified as responsible for the patients care.

- Information about the patient's care and response to care is shared among medical, nursing and other care providers during each staffing shift, between shifts and during transfers between units.
- Patient record is available to the care providers to facilitate the exchange of information.

Discharge, referral and follow-up

- A process is in place to appropriately refer or discharge patients.
- The organization cooperates with health care practitioners and outside agencies to ensure timely and appropriate referrals.
- Patients and their attendants are given understandable follow-up instructions at referral or discharge.

Transfer of patients

- There is a process to appropriately transfer patients to another organization to meet their continuing care needs.
- The receiving organization is given a written summary of the patient's clinical condition and the interventions provided by the referring organization.
- The transfer process is documented in the patient record.

Patient and family rights

- The organization is responsible for providing processes that support patient's and his attendant's rights during care.
- The organization informs patients and families about its care and services and how to access those services.
- Care is considerate and respectful of the patient's personal values and beliefs.
- Care is respectful of the patient's need for privacy.
- The organization takes measures to protect patient's possessions from theft or loss.
- Patients are protected from physical assault.
- Venerable children, disabled individuals and the elderly receive appropriate protection.
- Patient's information is confidential and protected from loss or misuse.

- The organization supports patients and families rights to participate in the care process.
- The organization informs patients and families about how they will be told of medical conditions and treatments and how they can participate in care decision to the extent they wish to participate.
- The organization informs patients and families about their rights and responsibilities relating to referring or discontinuing treatment.
- Staff are educated about their role in identifying patient's values and beliefs and protecting patient's rights.
- All patients are given information about their rights in a manner they can understand.
- Patient informed consent is obtained through a process defined by the organization and carried out by trained staff.
- Patients and families receive adequate information about the illness, proposed treatment and care providers so that they can make care decisions.
- When someone other than the patient gives the informed consent, that individual is noted in the patient's record.
- The organization has a committee to oversee all research in the organization involving human subjects.
- The organization provides patient care within business, financial, ethical and legal norms that protect patients and their rights.

Assessment of patient

- All patients cared for by the organization have their health care needs identified through an established assessment process.
- Assessments are completed in the time frame prescribed by the organization.
- The initial medical assessment is documented in the patient's record within the first 24 hours after the patient's entry.
- The initial medical assessment is documented before anesthesia or surgical treatment.
- All patients are reassessed at appropriate intervals.
- Qualified individuals conduct the assessment and reassessments.

Laboratory services

Laboratory services are available to meet patient needs, and all such services meet applicable local and national standards, laws and regulations.

Radiology services

- Radiology services are available to meet patient needs and all such services meet applicable local and national standards, laws and regulations.
- Medical, nursing and other individuals and services responsible for patient care collaborate to analyze and integrate patient assessments.

Care of patients

- Policies and procedures, and applicable laws and regulations guide the uniform care of all patient's.
- The care provided to each patient is planned and written in the patient's records.
- Polices and procedures guide the care of high-risk patients and the provision of high-risk services.
- Policies and procedures guide the care of emergency patients.
- Policies and procedures guide the use of resuscitation services throughout the organization.
- Policies and procedures guide the handling, use and administration of blood and blood products.
- Policies and procedures guide the care of patients on life support who are comatosed, who are on dialysis, vulnerable elderly patients and children, patients with a communicable disease and immunosuppressed patients.

Anesthesia care

- A qualified individual conducts a preanesthesia assessment.
- Each patient's anesthesia care is planned and documented.
- The risks, potential complications and options are discussed with the patient, his or her attendants.

- The anesthesia used and patient's physiological status during anesthesia administration is documented in the patient's record.
- Each patient's post anesthesia status is monitored and documented.

Surgical care

- Each patient's surgical care is planned and documented based on the results of the assessment.
- The risks, benefits, potential complications and options are discussed with the patient and family.
- Each patient's physiological status is continuously monitored during and immediately after surgery and written in the patient's record.

Medication use

- The pharmacy service and medication use in the organization comply with applicable laws and regulations.
- An appropriate selection of medications for prescribing or ordering is stocked or readily available.
- Medications are stored properly.
- Prescribing, ordering and administration of medications are guided by policies and procedures.
- The organization identifies those qualified individuals permitted to prescribe or order medications and those permitted to administer medications.
- An appropriately licensed pharmacist, supervises the storage, preparation and dispensing of medications.
- Medication prescription or order are verified.
- System is used to dispense medication in the right dose to the right patient at the right time.
- Patients are identified before medications are administered.
- Medication effects on patients are monitored.
- Medication prescribed, administered and its adverse effects are recorded.
- Medication errors are reported through a process and within time frame defined by the organization.

Food and nutrition therapy

- All patients receive an order for food or other nutrients based on their nutritional status.
- Food preparation, handling, storage and distribution are safe and comply with laws, regulations and current acceptable practices.

Patients and family education

Each patient and his family must receive education to help them give informed consent, participate in care processes and understand any financial implication of care choices.

Health care organization management standards

Quality leadership

Those responsible for governing and leading the organization participate in planning and monitoring a quality management and improvement program.

Quality design

The organization designs new and modified systems and processes according to quality improvement principles.

Data collection for quality monitoring

The organization's leaders identify key measures to monitor the organization's clinical and managerial structures, processes and outcomes.

Analysis of data

Individuals with appropriate experience, knowledge and skills systematically aggregate and analyze data in the organization.

Quality improvement

- Improvement activities are undertaken for the priority areas identified by the organization's leaders.
- Assignments are made and support provided.

- Staff are trained, appropriate policy changes made and necessary resources allocated.

Prevention and control of infections

- The organization establishes the focus of the nosocomial infection prevention and reduction program.
- The organization identifies the procedures and processes associated with the risk of infection and implements strategies to reduce infection risk.
- Gloves, masks, soap and disinfectants are available and used correctly when required.
- The infection control process is integrated with the organization's over all program for quality management and improvement.

Governance of the organization

Governance responsibilities and accountabilities are described in by laws, policies and procedures, or similar documents that guide how they are to be carried out.

Leadership of the organization

- A senior manager or director is responsible for operating the organization and for complying with applicable laws and regulations.
- The organization's clinical and managerial leaders are identified and are collectively responsible for defining the organization's mission and creating the plans and policies needed to fulfill the mission.

Direction of departments and services

- One or more qualified individuals provide direction for each department or service in the organization.
- Directors identify in writing the services to be provided by the department.
- Directors provide orientation and training for all staff of the department or service appropriate to their responsibilities.

Facility management and safety

- The organization complies with relevant laws, regulations and facility inspection requirements.
- The organization inspects patient care buildings for fire safety and has a plan to reduce evident risks and provide a safe physical facility for patients, families, staff and visitors.
- The plan includes prevention, early detection, suppression, abatement and safe exit from the facility in response to fire and non-fire emergencies.
- The organization develops a plan to respond to likely community emergencies, epidemics and natural or other disasters.
- The organization has plan for the inventory handling, storage and use of hazardous materials and the control and disposal of hazardous materials and waste.

Medical equipment and utility system

- The organization plans and implements a program for inspecting, testing and maintaining medical equipment and documenting the results.
- Portable water and electrical power are available 24 hours a day, seven days a week, through regular or alternate sources to meet essential care needs.
- Designated individuals or authorities monitor water quality regularly.

Staff education

The organization educates and trains all staff members about their roles in providing a safe and effective patient care facility.

Staff qualifications and education

- Each organization defines the desired education, skills, knowledge and other requirements of all staff members.
- Each staff member's responsibilities are defined in a current job description.

- The organization maintains a record of the current professional license, certificate or registration when required by law, regulation or by the organization of every medical staff member.

Patient clinical record

- The organization initiates and maintains a clinical record for every patient assessed or treated.
- Aggregate data and information support patient care, organization management and the quality management program.

Accreditation of health services in India

Accreditation of health services has never been taken seriously in India though some efforts were made in late eighties and early nineties. The Bureau of Indian Standards (BIS) and National Institute of Health and Family Welfare had laid down standards for hospitals of different bed strengths but these standards were urban oriented. Different states have tried to lay down standards but there is no uniformity. Any effort toward accreditation in India should consider uniformity of standards.

The relationship of accreditation bodies with the to be accredited institutions should be evaluative, educational, consultative, inspectorial and judgmental with punitive powers. Medical tourism in India is at present worth $333 million and is expected to grow to $2.2 billion by 2010. Considering this and the increased pressure from insurance sector seeking grading of hospitals, there would be an exceeding emphasis on quality of hospitals making role of accreditation bodies more stringent. Through these standards on price, service and quality India can be promoted as a health value destination. More important than ranking of hospitals would be survey of facilities, i.e. facility survey model which would be pertinent in putting in place the basic facilities required for providing care. The most relevant model for Indian health system would be people-centric model, which would ensure acceptability, accessibility, accountability and allocative efficiency. This would monitor utility of the health available services and orient the health system towards performance management.

The accreditation process should begin with minimum or moderate level standards and over a period of time expand to higher ideal level standards addressing all the dimensions of health care.

There has been mushrooming of private hospitals and nursing homes in India but they do not maintain any standards of services and charge exorbitant fee. There is a need to regulate the growing number of private hospitals and to keep a track of their operations. A central body under the ministry of science and technology namely National Accreditation Board for Testing and Calibration of Laboratories (NABTCL) laid down norms for pathological laboratories. Many laboratories have applied for accreditation in India.

National Accreditation Board for Hospitals and Health Care providers

National Accreditation Board for Hospitals and health care providers (NABH) is a constituent board of Quality Council of India set-up to establish and operate accreditation program for health care organizations. The board is structured to cater to much desired needs of the consumers and to set benchmarks for progress of health industry.

Accreditation is a public recognition of the achievement of accreditation standards by a health care organization, demonstrated through an independent external peer assessment of that organizations, level of performance in relation to the standards. Accreditation benefits all stake holders. Patients are the biggest beneficiaries. Accreditation results in high quality of care and patient safety. The patients get services by credential medical staff. Rights of patients are respected and protected. Patient satisfaction is regularly evaluated. The staff in an accredited hospital is satisfied lot as it provides for continuous learning, good working environment, leadership and above all ownership of clinical process. Accreditation to a hospital stimulates continuous Improvement. It also provides opportunity to health care unit to benchmark with the best.

National Accreditation Board for Hospitals (NABH) is a constituent board of Quality Council of India (QCI). NABH has been set-up with the cooperation of Ministry of Health and

Family Welfare (Government of India) and Indian Health Industry to establish and operate accreditation for hospitals and health care providers. The NABH standards for hospitals were released in December 2005.

Accreditation is an external review of quality with four principal components.

1. It is based on written and published standards.
2. Reviews are carried by professional peers.
3. The accreditation process is administered by independent body.
4. The aim of accreditation is to encourage organizational development.

The standards focus on:

- Patient safety
- Staff and employee safety
- Environment and community safety
- Information, education and communication.

The NABH standards have 10 chapters, 100 standards and 503 objective elements. The standards are suitable for the country and are in accordance with relevant international standards.

Section I

Patient-centered standards

- Access, assessment and continuity of care
- Patient's rights and education
- Care of patients
- Management of Medications
- Hospital Infection control.

Section II

Health care organization management standards

- Continuous quality improvement
- Responsibilities of Management
- Facility management and Safety
- Human resource management

- Information management systems
- The accreditation process involves comprehensive review of hospital compliance with NABH's standards. Cardinal principles of assessment are:
- Hospital operations are based on sound principles of system-based organization
- NABH standards are implemented and institutionalized into hospital functioning
- Patient safety and quality of care, as core value are established and owned by management and staff in all functions and at all levels
- There is a structured quality improvement program based on continuous monitoring of patient care services.

Accreditation process

- Applications are received
- Screening of applications is done
- Pre-assessment survey
- Assessment survey
- Review of the recommendations of the assessing body by the accreditation committee
- Recommendations to the Board
- Accreditation decision.

Who can apply?

- Currently in operation as a health care organization.
- Preferably registered.
- Willing to assume responsibility for improving quality of care.
- Should be able to meet the prescribed standards of the accrediting organization.

Steps to accreditation

- Obtain copy of NABH standards.
- Carry out self-assessment on status of compliance with the NABH standards.

- Identify gap areas and prepare action plan to bridge the gaps.
- Ensure that NABH standards are implemented and integrated with hospital functioning.
- Obtain copy and submit application form for assessment.
- Pay the accreditation fee.
- Receive the assessment program
- Facilitate the assessment.
- Receive recommendation on accreditation
- Maintain quality improvement program based on continuous monitoring of patient care services.

Initial presentation by the hospital

- Organogram
- Quality management team
- Methodology followed for quality improvement
- Facilities provided
- Inputs on resources provided for quality improvement
- Identified high-risk area for patient care and safety
- Sentinel events being monitored
- Key monitoring indicators
- Resource
- Volume
- Utilization
- Performance
- Control charts
- Problems faced and remedial measures undertaken.

Document review

- Quality manual
- Various policies and procedures
- Minutes of meetings of various committees
- Medical records
- Medical/Nursing audit
- Adverse events
- Action taken reports
- Personal records of staff.

Observations

- Facility safety
- Level of compliance with laid down procedures and policies
- Bio Medical Waste (BMW) management
- Standard precautions
- Patient care
- Fire safety
- Equipment management.

Patient and staff interviews

Scoring pattern

NABH has laid down the following Pattern.

- Non-compliance – 0
- Partial compliance – 5
- Full compliance – 10

Duration of accreditation awards

Generally three years with one reassessment survey to ensure continued compliance and to assess the CQI program. If during accreditation the Accreditation Organization receives inputs that the organization is substantially out of compliance with the current standard then resurvey or withdrawal of accreditation decision may be resorted to.

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chapter
6

Rights of the patients

Health is a wide ranging concept and it is duty of State to protect and promote health of its citizens. When a patient is being treated by a medical team both the partners have rights and responsibilities towards each other. Patient means a person who is admitted to an acute care inpatient facility for a continuous period longer than 24 hours, for the purpose of diagnosis or treatment bearing on the physical and mental health of that person. Patient also means any person who is receiving treatment on an out patient basis or in a community support program or other community based program. Patient has also been defined as any person suffering from illness or using health services.

Patients shall at admission be told that there are legal rights for their protection during their stay at the facility or throughout their course of treatment and maintenance in the community. Explanation of the written statement of rights shall be available to patients, their guardians or their chosen representatives upon reasonable request to the administrator. Sufficient information about medical services and the best way to use them shall be made available to the public. Patients shall be given by their physicians complete and current information concerning their diagnosis, treatment, alternatives, risks and prognosis as required by the physician's legal duty to disclose. This information shall be in terms and languages the patients can reasonably be expected to understand. This information shall include the likely medical or major psychological results of the treatment and its alternatives. In case where it is medically inadvisable, doctor can use therapeutic privileges and not disclose information because it would be harmful to the patient. This privilege is less used these days because of the decreasing paternalistic attitudes of doctors. One should also consider the moral and legal implications of not disclosing information. A high degree of respect for the patient is needed to make this Judgment. This is where virtues in the doctor's

personality are important. The patient shall have the right not to be informed if he so requests. The patient shall have the right to choose if and who will be informed on his behalf. The patient has the right to know about the identity and status of all those who provide health care as well as regulations concerning the terms and the procedures of stay and the medical care offered by the establishment. Patient has right to refuse treatment. Patients who receive services from an outside provider are entitled upon request to be told the identity of the provider. Information shall include the name of the outside provider, the address and description of the service which may be rendered. A patient who no longer has a medical reason to stay in a medical institution shall have the right to full explanation before he is transferred to another institute or be discharged. The transfer can take place only if another institution has agreed to accept the patient. When a patient is discharged he should be offered out-patient services. For every procedure which is to be performed on a patient, consent has to be taken. All the relevant information has to be given to the patient regarding the procedure, its risks and the alternatives available. The patient should have thorough understanding of the procedure and should volunteer for it. He should know the competence of the person who is performing the procedure. Five conditions for informed consent are: disclosure of information, understanding, voluntariness, competence and consent. Should the patient not be in a position to express his wishes and should emergency treatment or other procedure be necessary his consent shall be considered as given unless it is obvious that under the circumstances he would have reasonably objected. In case when due to the condition of the patient a person is appointed or should have been appointed to give consent and treatment is urgent, then this can take place if the consent cannot be obtained in time, unless it is obvious that under the circumstances he would have reasonably objected. When consent is to be taken from person appointed by law for a particular patient he should be thoroughly informed about the procedure to be performed. If a person who is appointed by law to give consent for a patient refuses to give consent and doctor thinks that treatment is necessary to save life

of the patient, the case then is to be labeled as medico-legal and referred to law enforcing agency for decision.

Confidentiality is the corner stone of the doctor patient relationship. Patients have to be assured confidential treatment of their personal and medical records. The patient can review his medical record without charge. Patient can obtain a copy of medical record for which hospital can charge a reasonable fee, however copy cannot be denied if patient cannot afford to pay. The patient has to be provided a written discharge plan and written description of how he can approach the hospital when needed. Information which is put on the person's file is not merely something which needs to be explained in terms the patient can understand and act upon, but is in fact owned by the patient. Although the medical record is owned by the hospital but the information contained is owned by the patient and is to be respected as such and may refuse its release to any individual outside the facility. Confidential information shall be disclosed when consent has been obtained from patient or if the law permits it in exceptional cases. The consent is considered to have been given when information is given to a person who is involved in treatment of the patient. Doctors have dual role when working as occupational physicians for companies. Doctor in such case must explain his duty to the third party and patient as well. First duty of the doctor in such a case is toward the patient and any information cannot be revealed without consent of the patient. Doctor may however feel obliged to warn a person who is going to be affected by disease of the patient. This is what is called "Double effects" but are difficult to answer. Data protection Acts oblige doctor to protect information and are responsible for it not being divulged or used for means other than patient has consented for. Patients shall have the right to respectfulness and privacy as it relates to their medical and personal care program. Patient has the right to correction of his medical record which is inaccurate, incomplete or unclear.

Whenever circumstances call for a selection among patients for specific medial care, this shall be made without discrimination, in a fair manner and shall be based on medical criteria. Upon admission to a facility a patient or his legal guardian shall be given opportunity to

authorize disclosure of the patient's presence in the facility to callers or visitors who may seek to communicate with the patient. Patient has the right to complain about the care and services he is receiving and to have hospital to respond to it. Patient has a right to an itemized bill and explanation of all charges. Patient has the right to make known his wishes in regard to anatomical gifts to appropriate authority.

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chapter 7

Quality in laboratories

The aim of quality control in laboratories is to produce accurate results every time. Two yard sticks used are accuracy and precision. Accuracy is concerned with the relationship of a set of results to the true value. This can be done by relating the mean of the replicate analysis to the true value. Precision measurements are concerned with agreement between replicate analyses. Rarely are the results same when a certain test is performed on a same sample repeatedly under ordinary working conditions, instead a scatter of results is obtained. The distribution of the results of such measurements is a measure of the precision of a method.

The functioning of a laboratory can be divided into three components.

1. Pre-analytical activities
2. Analytical activities
3. Post-analytical activities.

Each laboratory quality program defines requirements for a lab in terms of physical facilities, policy, procedures, etc.

- Ventilation in the facility should be adequate
- Temperature and humidity must be regularly monitored
- Proper layout
- Equipment manufacturers quality control recommendations should be strictly followed
- Daily equipment function checks be performed before sample testing
- Quality control procedures for equipment to be performed at least each day of the use
- Quality manual, SOPs manual (Standard operating procedures manual) should be available in the laboratory and all staff members should have access to the same
- All health and safety measures should be followed

- Proper qualified personnel should be available
- Job description of all categories of workers should be available.
- Organogram of the laboratory as part of the health organization and also internal laboratory organization should be available
- Staff appraisals should be done
- CMEs should be regularly done
- Internal and external audits should be regularly carried out.

Quality assurance activities

Preanalytical activities

Quality control starts right from the ordering of investigation.

Test ordering process

Test requisition should be complete and should include name of patient, hospital number, sex, age and clinical information. Date and time of ordering should be mentioned. The person requesting for investigation should identify himself.

Specimen collection procedures

Samples should be taken by trained staff. Standard precautions should be observed while drawing samples. Labeling instructions of samples should be laid down and communicated to personnel concerned.

Transportation to the laboratory

After collecting the samples in well defined condition they should be transported to lab in such a way and within such time that no changes occur. The specimens taken should be placed in adequate containers for transport to the laboratory. Request forms should be placed in separate water proof bags or envelops.

Automated computer systems in the form of LAN (Local Area Network) are used for ordering tests which reduce the chances of error. If the patient is not prepared properly for investigation or any clinical information not provided, the whole process of quality control is undermined.

Analytical activities

Well established and scientifically recognized methods should be used and method used should be documented. There should be calibration of equipment and devices and maintenance schemes as advised by manufacturer should be strictly followed. Control samples should be tested in same manner as patient samples. Once the specimen reaches the laboratory worker should have control over the specimen handling techniques. There should be early separations of blood serum. The time required to mix a specimen where deposits occur is frequently under-estimated. The temperature change that occurs in a biologic fluid during centrifugation should be known and monitored. Procedures which can be automated, should be automated to reduce human error. Many test methods use automated analyzers. Most instruments have internal control systems to detect error. External control systems also bring abnormal results to the operator's attention. Internal quality control measures by using control replications and random sample check determine the drifts occurring in the daily tests. Appropriate remedies to correct any deviations should be implemented immediately. External quality control by periodic analysis of samples from reputed quality control programmers can be done. The variance index scores are measures of performance. Performance comparisons with other laboratories are provided. These measures help to assess the quality of work in comparison with international laboratories and also to implement corrective procedures if the performance is not up to standard. Good quality reagents should be used.

Postanalytical activities

As test results are made available to the heath care provider, quality continues to be monitored. The test results have to be sent to appropriate party and should be reported timely. Reference ranges should be included. There should be immediate notification of results exceeding critical limits. Results can be reported electronically through LAN. There has to be proper handling of hazardous waste both chemical and biological, as per BioMedical Waste Management and handling rules.

Quality control officer

In large laboratories there should be a Quality Control Officer who should have complete knowledge of laboratory procedures but should not be part of those who actually perform the tests nor should he be identified with Head of the laboratory. He should be indirect contact and access to the Head of the laboratory. He should ideally be appointed from the hospital staff itself and not from outside. He should be responsible for monitoring the quality control activities by using quality control techniques. He should identify the problems and find solutions thereof.

Safety in laboratories

The good laboratory safety practices is a step toward the achievement of a safe and healthful work environment. One cannot remove all the dangers and hazards from a laboratory but can make a laboratory reasonably safe. A Laboratory Safety Coordinator is appointed by Laboratory Head and is responsible for overall safety in laboratories including chemical safety, explosion hazards, electrical hazards, emergency contingency plans and hazardous waste disposal.

General principles of safety in laboratories

- Wear lab coat, gloves and safety glasses with side shields to protect from unintended splashes and explosions
- Use safety shields to protect against explosion hazards
- Never pipette by mouth. Use pipette pump or bulb
- Wash your hands properly before leaving the laboratory
- If there has been a spill take care of people first and then clear the spill.
- In case of chemical spills Material safety data sheet (MSDS) is a valuable document that should be consulted before medical attention is sought.
- MSDS provides information on physical and chemical properties, toxicity, health hazards, fire and explosion limits, reactivity, spill and clean up, handling and storage. MSDS should be used wisely.

- It is the responsibility of the Laboratory Director to ensure the development and adoption of a biosafety management plan and a safety or operations manual, SOPs (Standard operating procedures) manual.
- Laboratory Safety Officer should ensure that regular training in laboratory safety is provided.
- Personnel should be advised of special hazards and required to read the safety or operations manual and follow standard practices and procedures. The laboratory safety officer should ensure that all personnel understand these. A copy of the safety manual should be available in the laboratory.
- Understand the chemistry and predict potential hazards.
- Proper chemical storage.
- Never work in the lab alone.
- Keep emergency number handy.
- Make chemical hygiene plan specific to each laboratory.
- Know your hazards and steps to be taken to ensure your own safety.
- Use common sense in emergency situations.
- When working with unknown assume the worst and take extreme precautions to protect yourself and the environment.
- Know position of first aid kits.
- Familiarize yourself with escape route.
- Everybody should know about Safety Officer and his number.
- Take special precautions when working with radioactive materials, lasers, ultraviolet radiations, recombinant DNA molecules, chemical carcinogens, biohazardous agents, compressed gas cylinders and cryogenic liquids.
- Avoid underestimating the risk.

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chapter 8

Marketing and quality

Marketing

Marketing is a core business strategy fundamental to success of any organization. Good marketing means creating, pricing, providing access to and promoting needed products/services to a target group such that goals of all parties are met. There are no specific strategies for marketing of hospitals. Systematic approach has evolved over years and sound client-provider relationship forms the basis for this. Events both indoor and outdoor play a significant role in marketing of health care institutions. Marketing has since long been considered a taboo for doctors and the only acceptable marketing allowed was "word of mouth" but doctors now use additional avenues to promote themselves. The purpose is to let people know who you are and what you do and where you do it.

Branding

The branding strategies have since long been used by large industries and now are being increasingly used by hospitals. Branding of hospitals is all about creating a recall in the minds of service consumers and influences through credible reinforcements of key brand elements specific to that particular service provider. Branding of any hospital includes information about the services of the hospital and the word of mouth. Good client provider relationship is to be observed by all the staff members be it doctors, nurses, technicians or front office staff. To brand you need to position yourself differently from others. Branding is an emotional response to an organization or its services and to achieve this you need strength in five dimensions, i.e. name, personality, profile/recognition, positioning and reputation/track record.

For positioning a hospital or a doctor one may use traditional communication tools such as public relations, media, website/ internet, brochures/posters, magazines, etc.

Quality matters

Quality and accreditation standards are becoming mandatory for health care institutions; these will enhance the brand image of institutions. It is therefore important that all health care institutions start identifying their quality needs and implement processes which create transparency in consumer experience. Quality is the way to build an enduring brand name and image. The service the hospital provides must not only satisfy the patient but delight him and this is achieved when the service he receives far exceeds his expectations.

Successful brand is achieved by:

- *Compassionate care*: When a service is being delivered to patient by a hospital not only has that care to be as per the standards set for the ailments but how the service is delivered is also important. The hospital staff have to be caring and courteous towards patients.
- *Positioning*: If a hospital wants to have a brand name it has to position itself differently from others and this difference has to be maintained. It needs to be proved while treating every new patient.
- *Quality facilities*: To provide quality service the hospital needs to have the latest state-of-art facilities in the from of hi-tech equipment and best qualified and competent specialists. There will be no takers of obsolete technology.
- *Marketing*: Marketing is all about creating a good image to outsiders and insiders. You need to have a strong human resource department to build image among staff and various programs like CMEs for referral doctors, awareness sessions for general public, health camps in community, organizing events on health days and interviews with specialists on media, etc.
- *Internet*: Hospital needs to have a website of its own where it displays its presence and facilities it provides. Internet is the

first place where patient would like to know about institutions providing care to specific diseases.

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chapter 9

Evaluation

Evaluation in health program is an integral part of a professional role. The idea is to compare the performance with the standard. The standards are benchmarks which are laid down by experts in the field. Ultimate aim is to provide a basis for development. It is important to add that health professionals, even policy makers and advisers in government service are usually not trained or otherwise equipped to perform formal evaluations. The demands of public are increasing, resources shrinking and under constant pressure of containment. The systems have to be responsive to the needs of the population (Table 9.1).

Most programs when properly evaluated turn to be ineffective or at best marginally accomplishing their set aims. There are several possible explanations for this. First, the objectives of the organizations evaluated may have been multiple and difficult to summarize in simple performance criteria. Second, the nature of the

Table 9.1: Changes in evaluation perspectives

Evaluation before	Evaluation now
Imposed from above	Regarded as an aid
Is a duty or task	Functions as a tool
Takes time away from "real work"	Perceived as important, worth time
Not integrated in the organization	The organization learns
Highlights only negative results	Shows how we get better
Is complex and requires experts	Is everyone's concern.
Is expensive	Should be part of regular work
Quantity over quality	Quantity and quality both important

Source: Adapted from Menckel, 1993

service technology preludes accurate measurement. Third, isolating effects of services from extraneous factors is exceedingly difficult. Fourth, effects of services on clients are not readily quantifiable.

In recent years there has been a movement in evaluation practice away from the employment of just a single technique to the utilization of a wide range of methods. Choice of method will depend on the purpose of the evaluation in question.

Evaluation design

There is no single best design. The design which is the best and most suited to the purposes of evaluation is to be used.

Type 1 design—descriptive (Fig. 9.1)

It is used where managers do not have time and money for an outcome evaluation and only want a description of what is really happening. It may also help other people to set-up a similar program.

Strengths

- Much resources not needed
- Can be done in collaboration with service providers and people receiving treatment.

Weaknesses

- Can be ignored as unscientific, biased or trivial and does not give data on effects
- Usefulness of such evaluations depends on the skill, knowledge and credibility of the evaluator.

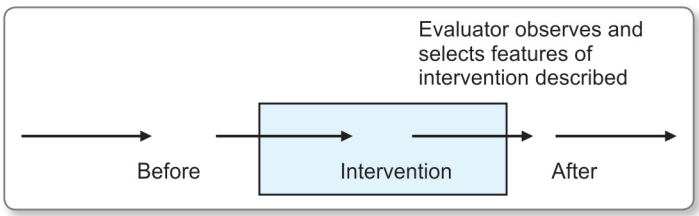

Figure 9.1 Type 1 design—descriptive

Type 2 design—audit (Fig. 9.2)

The purpose of the design is to compare what people are doing with what they are supposed to do. The audit may be carried out by external evaluators or by the organization itself using established standards.

Strengths

- Few resources needed.
- Can be done quickly. Goal for self-evaluation.
- It can promote understanding of why an intervention fails or succeeds.
- Can sometimes give generalized knowledge.

Weaknesses

- Depends on having clearly specified set of standards, procedures or objectives.
- The design does not help to judge the value of the intervention, but just whether people follow orders.

Type 3 design—before and after (Fig. 9.3)

The purpose of the design is to help to judge the value of an intervention by comparing the state of people "before" with their state "after" intervention.

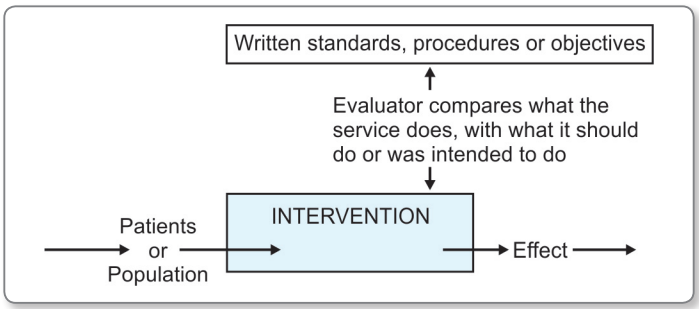

Figure 9.2 Type 2 design—audit

Strengths

- Evaluations can be small scale and relatively quick.
- The design can be arranged to use few resources if the evaluator selects a small number of subjects.

Weaknesses

- Cannot give conclusive objective evidence of effects (confounding variables are not controlled for)
- The subjects selected may have shown these effects overtime in any case.

Type 4 design—comparative (Fig. 9.4)

The design is like type 3 design but compares the outcomes of two groups undergoing evaluation.

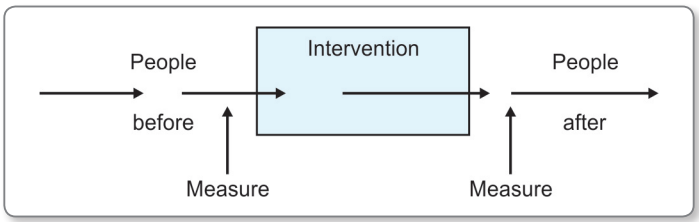

Figure 9.3 Type 3 design—before and after

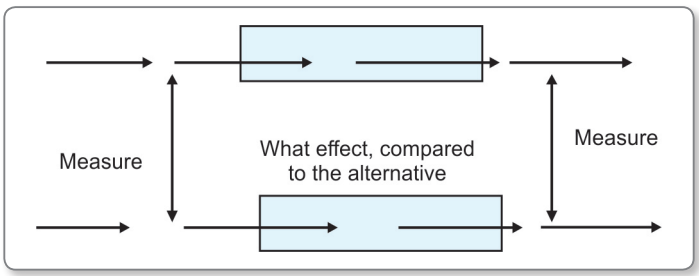

Figure 9.4 Type 4 design—comparative

Strengths

- Can suggest which of the two interventions is more effective.
- The design is suitable where it is unethical or impractical to trial or intervene in only one group.

Weaknesses

- Is expensive
- It is difficult to prove that effects are due to interventions alone rather than other factors.

Type 5 design—randomized control (Fig. 9.5)

This is the classic evaluation design for evaluation of a treatment or service. In this we create two groups which are similar except that only one group (experimental group) receives the intervention and the other group (control group) receives placebo. The people are randomly assigned to a control and an intervention group. The design gives conclusive evidence of the effect of treatment.

Strengths

- Gives more reliable and valid information about the effect of an intervention than other designs

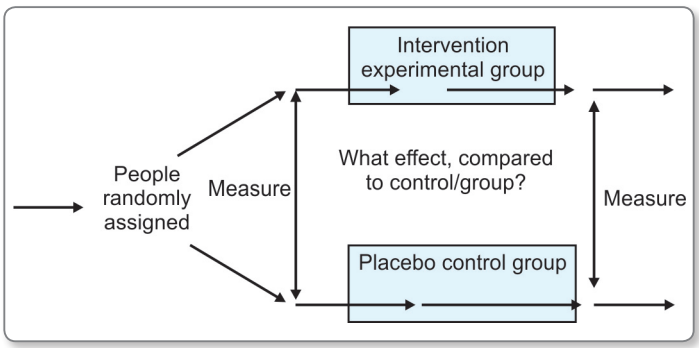

Figure 9.5 Type 5 design—randomized control

- Results of a well-conducted evaluation of this design usually have high credibility among clinicians.

Weaknesses

- Is expensive, takes time and needs evaluators with experience, skill and statistical expertise to produce credible results.
- Evaluations of this design do not take account of patient's subjective experiences and the group average may mask extreme effects on some individuals.

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chapter
10

Developing practices for safety

Hospitals confront a multitude of risk events in their daily working ranging from untoward incidents occurring to patients, employees and visitors to use of inadequate equipment or procedure to perform a task. It includes (1) property risks such as structural damage, vehicular accidents, technological obsolescence, etc. (2) liability risks such as professional negligence, workers compensation, etc. and (3) employee benefit risks such as disability claims.

Risk management is a program designed to reduce the incidence of preventable accidents and injuries to minimize the financial loss to the institution should an injury or accident occur.

In short risk management is the protection of assets. Risk management personnel usually accomplish this goal by following four steps, i.e. risk identification, risk analysis, risk control and risk financing.

Clinical risk management is an approach to improving the quality and safety of health care by identifying circumstances that put the patient at risk and acting to prevent or control those risks. In November 1999, the Institute of Medicine (IOM) released a report " To Err is Human: Building a safer Health System" The report estimated that 98,000 Americans die each year as a result of preventable errors. Deaths due to medical errors is higher than motor vehicle accidents (43,458), breast cancer (42,297) or AIDS (16,516). Approximately 7000 patients are estimated to die from medication errors alone which is 16 percent higher than deaths attributed to work related injuries. It was stated that medical errors are one of the leading cause of death.

Medical error is defined as "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim, including problems in practice, products, procedures and systems." Medical errors can be active or latent. Active error occurs at the level of the frontline operator and whose effects are felt almost immediately. Latent errors are errors that lie in the organization and its system.

These errors lie dormant in the system for lengthy periods of time. They can be improper training of staff, organizational problem, etc.

Risk management

Mission of risk management is to select, coordinate, and efficiently apply interdisciplinary skills to harmful uncertainties which may diminish the future value of public, private or personal resources.

American Society of Health care Risk Management (ASHRM) identified eight minimal components of a risk management program:

1. There must be a designated, trained and experienced risk manager who must obtain at least eight hours of continuing risk management education annually.
2. Risk managers must have access to all necessary credentialing, management and medical data
3. Institutions must commit the necessary resources to risk management through a written policy statement that is adopted by the governing body, medical staff and administration.
4. Facilities must have a system in place for the identification, review and analysis of unanticipated adverse outcomes.
5. Organizations must have the means to centralize risk management data and to share and integrate data collection and analysis with other clinical and administrative departments.
6. Periodically, at least annually, risk managers must provide the organization's governing body a report that reviews and evaluates risk management program activity.
7. Risk managers must ensure that medical staff and new employee educational programs minimize patient's risks and address high-risk clinical areas.
8. Risk managers must forward information on individual practitioners such as malpractice claim history, knowledge of adverse outcomes and incident reporting data to the committees that evaluate the competency of medical staff.

Effective risk management strategy should be judged not just in terms of whether it saves the provider money, although that

certainly is a legitimate and important goal, but also should be judged against the fundamental objective of contributing to the quality of services. While as risk management is concerned with acceptable levels of care from legal stand point and is focused on legal, insurance and risk financing activities quality assurance is focused on improving care.

Medical errors and patient safety

The components of the clinical risk management are:

Patient complaints

Number of areas which need improvement can be identified through patient complaints. These may be about poor or disrespectful communication or about administration of a wrong drug. A copy of the patients rights should be given to the patient at the time of admission and the same need to be displayed at prominent places throughout the hospital. Medicolegal action taken against the hospital should be analyzed to identify preventable factors and find ways to improve systems and processes.

Incident reporting

Reports are collected from staff across the hospital that identify incidents; these include incidents involving harm or potential harm to patients. Patient safety incidents are common in hospitals and many of them lead to patient harm or extra cost. All National Health Services (NHS) hospitals in UK now have routine incident reporting systems as part of their risk management program. However hospital reporting system may significantly under report-patient safety incidents. To test the performance of these systems researchers compared data from the routine reporting systems with a review of case notes for the same clients in a large NHS hospital in England. From a random sample of 1006 admissions, 324 patient safety incidents were identified. Case note review identified 303 (93%) incidents while the reporting system identified 54 (17%) of these 324 incidents out of which 136 (42%) resulted in patient harm. All of these were detected by the case note review but only 6 (5%) were detected by reporting systems. The

21 incidents missed by case note review were minor whereas the 130 incidents missed by the reporting system led to patient harm. The routine reporting system in this hospital missed most patient safety incidents that were identified by case note review and detected only 5 percent of those incidents that resulted in patient harm. This suggests that the routine reporting systems considerably under reports the scale and severity of patient safety incidents.

Root cause analysis

Root Cause Analysis (RCA) is a method of identification of organizational deficiencies that may not be immediately apparent and which may have contributed to the cause of the event. The idea is not to find the bad apple but to understand what is lacking in the system that allows such events to occur.

General characters of RCA include:

- Focus on system and process and not on individuals
- Review of relevant literature
- Examine extensively for underlying contributing cause
- Identify procedure and system modifications.

Sentinel events

These are incidents that were preventable and had a very harmful patient outcome. A root cause analysis technique is to analyse the event to identify processes and systems that can be improved to make sure it does not happen again and something is learned from the event. Sentinel events to be reported are:

- Procedures involving the wrong patient or body part
- Suicide in an inpatient unit
- Retained instruments or other material after surgery requiring re-operation or further surgical procedure
- Intravascular gas embolism
- Hemolytic blood transfusion reaction resulting from ABO incompatibility
- Medication error leading to the death of patient reasonably believed to be due to incorrect administration of drugs
- Maternal death or serious morbidity associated with labor or delivery

- Infant discharged to wrong family
- Other catastrophic events.

Mortality review

Weekly reviews of deaths would also ensure that safest and best care is provided to patients.

Limited adverse occurrence screening

Medical record is systematically screened using predetermined criteria to identify adverse patient occurrences such as nosocomial infection, transfer to a high dependency unit from a general care ward, etc. Ways to improve care are identified.

Patient safety can flourish only when hospital leaders actively listen and when health care practitioners and staff discuss patient safety issues. To build such a safety culture following steps need to be adhered to:

- Create a vigorous method of detecting flaws, analyzing problems and achieving meaningful results.
- Encourage everyone in the hospital to report safety information in a thorough timely fashion.
- Make sure there is no possibility of reprisals against those who make reports.
- When a safety report is submitted make meaningful changes in procedures. Let staff members know the hospitals response to the report. Feedback will encourage others to contribute to the process.
- Provide learning aids for hospital workers, keeping them informed of safety issues and institution's progress.
- Conduct regular walks through your institution including all patient care areas, pharmacies and laboratories. Speak to your front line staff about safety issues. Learn their concerns and their suggestions first hand. Make them part of safety team. Ask about adverse events or near-misses and the issues that may have led to these events and ways to mitigate them.
- Explore if a rapid response team can prevent avoidable deaths.

Patient safety plan

The patient safety plan is designed to continuously improve patient, visitor and employee safety. The plan has to be implemented through the integration and coordination of patient safety activities of medical staff, clinical departments and support service departments. Each employee plays a crucial role in ensuring patient, visitor and employee safety.

Patient safety committee

Every hospital should have a patient safety committee to primarily look into those aspects of risk which have an impact upon patient care issues. The committee provides a multidisciplinary forum for analysis of risk to patient and the dissemination of information on identified risk for the purposes of improving patient care and reducing morbidity and mortality within hospital. It shall review reports on occurrences typically ranging from "no harm" frequently occurring "near misses" to "sentinel events" with serious adverse outcomes, claims and identified risks which are gathered in accordance with this plan. It shall provide recommendations concerning identified risks and where appropriate shall request and approve plans for corrective action and evaluate the implementation that of. The patient safety committee should have Medical Superintendent as chairman and can be designated as Patient Safety Officer. He shall be responsible for managing all aspects of safety plan. On behalf of the committee he shall provide reports at least annually to the Hospital Council or Hospital Executive Board on the occurrences of medical errors and action taken to improve patient safety both in response to actual occurrences and pro-actively. The patient safety officer shall advise the hospital council regarding clinical issues that may necessitate changes to policies and procedures, orientation, ongoing education or resource allocation. He shall have the responsibility for gathering information on risks to patients. The committee will be comprised of Medical Superintendent as chairman and following would be the members: Heads of Surgical, Medical, Anesthesiology division; Chairperson of Quality Control Committee; Infection Control Officer; Deputy Medical Superintendent; Assistant

Medical Superintendent; Chief of Nursing; Chief of Pharmacy; Chairperson of Risk Management Committee; Public Relations Officer; and Chief of Hospital Security.

Each member of the medical staff should participate in the incident reporting system and in the implementation of corrective action activities in the event of identified risk. There has to be coordination between patient safety committee and quality improvement committee and should share the data regarding potential sources of patient injury. The quality improvement committee also needs to monitor incidents of identified risk on behalf of the committee. Patient, family and staff opinions need to be considered by the committee to ensure performance improvement.

Patient safety scenario

Patient safety in American hospitals in a study released by Health Grades in 2004 had not improved significantly since 1999 when it was given top priority in US hospitals. Agency for Health care Research and Quality (AHRQ) has developed a set of Patient Safety Indicators (PSI) specifically designed for screening hospital data for incidents of concern related to quality. A study in US showed that the 18 patient safety indicators evaluated contributed to $9.3 billion excess charges and 32,591 deaths in the United States annually. In 2002, AHRQ in collaboration with the University of California Stanford Evidence based practice center identified 20 indicators that could be readily identified in hospital discharge data and were deemed potentially preventable patient safety indicators. This tool set of 20 evidence - based PSI's was created and released to the Public in 2003 to be used by various health care stake holders to assess and improve patient safety in US hospital.

List of patient safety indicators used in the health grades study.

- Accidental puncture or laceration
- Complications of anesthesia
- Deaths in low mortality diagnostic related groupings (DRGS)
- Decubitus ulcer
- Failure to rescue

- Foreign body left during procedure
- Iatrogenic pneumothorax
- Selected infections due to medical care
- Postoperative hemorrhage or hematoma
- Postoperative hip fracture
- Postoperative physiologic and metabolic derangement
- Postoperative pulmonary embolism or deep vein thrombosis
- Postoperative respiratory failure
- Postoperative wound dehiscence
- Transfusion reaction.

List of AHRQ patient safety indicators not used in the health grades study

- Birth trauma – injury to neonate
- Obstetric trauma – cesarean? delivery
- Obstetric trauma – vaginal delivery with instrument
- Obstetric trauma – vaginal delivery without instrument.

In order to evaluate overall hospital performance and to identify the best performing hospitals across the US AHRQ'S Patient safety indicator version 2.1, Revision 3a February 2005 software application was used to evaluate hospitals on 16 PSI'S. It was observed that patient safety incidents were increasing; 82 percent of the mortalities were potentially preventable. The most commonly occurring Patient safety incidents were failure to rescue, decubitus ulcer and postoperative sepsis.

Lancaster general hospital uses bar codes and motion tablet PCs to improve patient safety. Doctors, nurses, patients and drugs are assigned unique bar codes. During medication administration a nurse scans his bar coded identification badge to log onto the system and then scans the patient's bar code and medication package to verify through the motion tablet PCs that the right patient is receiving the right dose of the right medication at the right time. The medpoint software is interfaced with the hospital's pharmacy information system. Each doctor's written prescription stays with the patient chart and a copy is scanned via a pyxis connect scanner to the pharmacy and entered into information

system. The motion tablet PCs running the medpoint software prompts nurses electronically at the point of care to compare and verify the pharmacy transcription with the written physician order. The joint commission on accreditation of health care organizations has (JCAHO) identified the following seven national patient safety goals as being mandatory requirement for participation in the joint commission's accreditation program.

1. Improve the accuracy of patient identification
2. Improve the effectiveness of communication among caregivers
3. Improve the safety of using high-alert medications
4. Eliminate wrong site, wrong patient, wrong procedure
5. Improve the safety of using infusion pumps
6. Improve the effectiveness of clinical alarm system
7. Reduce the risk of healthcare- acquired infections.

During the clinton presidency in US, the secretary of the department of health and human services was directed to establish a "Quality inter-agency coordination task force" with responsibility where ever feasible to collaborate on goals, models and time tables consistent with the commission's six "National Aims for Improvement". These are:

1. Reduce the underlying causes of illness, injury and disability
2. Reducing health care errors
3. Ensuring the appropriate use of health care services
4. Expanding research on the effectiveness of treatments
5. Addressing over/under supply of health care resources
6. Increasing patient participation in their own care.

National Quality Forum (NQF) has identified 26 safe practices that are utilized universally in applicable health care settings to reduce the risk of harm to patients. NQF is a private, non-profit public-benefit corporation created in 1999 in response to a need to develop and implement a national strategy for health care quality measurement and reporting. NQF is a voluntary consensus standard setting organization. Established as a unique public-private partnership, the NQF has participation from nearly 170 organizations. NQF report identifies 26 safe practices in five specific categories.

1. Promoting a culture of safety.
2. Matching health care needs with service delivery capabilities.
3. Facilitating information transfer and clear communication.
4. Adopting safe practices in specific clinical settings or for specific processes of care.
5. Increasing safe medication use.

Measures which can improve patient safety

- Improve accuracy of patient identification. At least two patient identifications such as name and medical record number should be used when providing care, treatment or service to a patient. The idea is first to identify the right patient and then to give right service to that patient.
- Improve the effectiveness of communication among caregivers.
- Ensure that message is conveyed and understood in its original form whenever communicating any patient related information. In-effective communication is the most frequently cited reason of sentinel events. Effective communication which is timely, accurate, complete, unambiguous and understood by the recipient reduces errors and results in improved patient safety. The receiver of information must be made to read back or test back.
- Take action to improve the timeliness of reporting critical test results and values. The organization should define the acceptable length of time between the ordering of critical tests and reporting the test results and values.
- Trailing zero, e.g. (X o mg) should not be used in medication orders or mediation related documentation.
- In hospitals there are number of instances of patient hand offs such as nursing and physician shift changes, anesthesiologist report to recovery room nurse, patient shift from emergency to in patient units. There should be uptodate information exchange regarding the patient care, treatment and services, condition and any recent or anticipated changes. There has to be interactive communication between the giver and receiver of patient information.

- Prevent interchange of look-alike and sound-alike drugs. Properly label medications and medication containers.
- Take all measures to reduce the incidence of nosocomial infections.
- Treat all unexpected deaths as sentinel events.
- A complete list of medications should be provided to patients at the time of discharge and also transferred to another facility in case of referral.
- Organization should ensure to reduce the risk of patient harm resulting from falls. Staff should receive education and training to reduce patient falls.
- Encourage patient's active involvement in their own care as a patient safety strategy. Communication with patients and their attendants (family) about all aspects of care, treatment and services is an important characteristic of a culture of safety. When patients know what to expect they are more aware of possible errors and can be an important source of information about potential adverse events and hazardous conditions.
- In psychiatric patients and those with behavioral abnormalities the risk of patient going for suicide needs to be addressed.
- Wrong site, wrong procedure and wrong person surgery must be prevented. It can be achieved by active involvement and effective communication between members of the patient care team. All relevant documents should be available at the time of the procedure and should be consistent with the patient details as well as procedure to be done. Missing information should be deliberated upon thoroughly before starting the procedure. Verification of correct patient, correct procedure and correct site should be done at the time of admission into hospital, anytime responsibility of care is transferred to another unit, in the anesthesia room and at the time of surgery. The intended site must be marked such that the mark is visible at the time of assessment.
- Verification, site marking and thorough assessment must be done even in procedures which are done outside the operating room, i.e. bed side procedures.

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chapter 11

Health care financing

Health care

Health care expenditures have risen from 3 percent of world GDP in 1948 to 7.9 percent in 1997. Providing access to all citizens has long been a cornerstone of modern health financing systems in many countries. To ensure that individuals have access to health services, three interrelated functions of health system financing are crucial: revenue collection, pooling of resources and purchasing of interventions.

Revenue collection

The process by which the health system receives money from house holds and organizations or companies, as well as from donors. Health systems have various ways of collecting revenue such as general taxation, mandated social health insurance contributions (usually salary related and almost never risk related), voluntary private health insurance contributions (usually risk related), out of pocket payments and donations. Most high income countries rely on either general taxation or mandated social health insurance. In contrast low income countries depend far more on out of pocket financing.

Pooling

Pooling is the accumulation and management of revenues in such a way as to ensure that the risk of having to pay for health care is borne by all members of the pool and not by each contributor individually. Pooling is traditionally known as insurance function. Its main purpose is to share the financial risk associated with health interventions for which the need is uncertain. In this way it differs from collecting, which may allow individuals to continue bearing their own risks from their own pockets or savings. When people pay entirely out-of-pocket, no pooling occurs. Pooling reduces uncertainty both for citizens and providers. By increasing and

stabilizing demand and the flow of funds, pooling can increase the likelihood that patient will be able to afford services and that a higher volume of services will justify new provider investments.

Purchasing

Purchasing is the process by which pooled funds are paid to providers in order to deliver a specified or unspecified set of health interventions. Purchasing can be performed passively or strategically. Passive purchasing implies following a predetermined budget or simply paying bills when presented. Strategic purchasing involves a continuous search for the best ways to maximize health system performance by deciding which intervention should be purchased, now and from whom. This means actively choosing interventions in order to achieve the best performance both for individuals and the population as a whole by means of selective contracting and incentive schemes.

Private financing particularly in developing countries is largely synonymous with out-of-pocket spending or with contributions to small, voluntary and often highly fragmented pools. In contrast public or mandatory private financing (from general taxation or from contribution to social security) is always associated with prepayment and large pools. The level of prepayment is mainly determined by the predominant revenue collection mechanism in the systems. General taxation allows for maximum separation between contributions and utilization, while out-of-pocket payment represents no separation. The reason why later is used so generally in developing countries is that separation of contributions from utilization requires the agencies responsible for collection to have very strong institutional and organizational capacity, the attributes which are lacking in many developing countries. Thus although the highest possible level of prepayment is desirable, it is usually very difficult to attain in low income settings where institutions are weak. General taxation as the main source of health financing demands an excellent tax or contribution collecting capacity. This is usually associated with a largely formal economy whereas in developing countries the informal sector is often predominant. While it is true that benefits may come as a result of the use of funds, under taxation these benefits are not directly linked

to the taxes. Only full scale economic analysis using heroic assumptions can link the benefits resulting from the spending of taxes to the costs of taxes themselves. Taxation can be direct or indirect. Direct taxes are those that are directly levied on income. They cannot therefore, be shifted, i.e. the burden cannot be made to fall on some one other than the taxpayer. Indirect taxes on goods and services can be shifted to some degree. Two types of taxes are commonly used to finance health care: payroll tax and sales tax. A pay roll tax is a tax that is levied on wages. Sales tax is a tax on a product or service. Most states use sales tax as a major source of revenue.

All other prepayment mechanisms including social security contributions and voluntary insurance premiums are easier to collect, as the benefit of participating is linked to actual contributions. In most cases, participation in social insurance schemes is restricted to formal sector workers who contribute through salary deductions at the work place. This makes it easier for social security organizations to identify them, collect contributions and possibly exclude them from benefits if no contribution is made. Similarly identification and collection is easier for voluntary health insurance and community pooling arrangements. Nevertheless such prepayment still requires large organizational and institutional capacity compared to out-of-pocket financing. Health insurance can be incrementally adopted in the social and economic environment of low and middle income countries. First small voluntary health insurance schemes can serve as learning models. Then principle of compulsion is followed to incrementally expand coverage to other groups and regions till universal coverage is achieved. Mandated benefit package should be adopted incrementally in accordance with changing needs, values and economic circumstances in order to ensure sustainability of social health insurance. Insurance can be obtained through the workplace either by being paid directly by the employees (through pay roll deductions) or by the employers. There is no controversy over incidence of premiums paid by employees or by individuals, the purchasers bear the cost of their insurance purchases. The cost of insurance benefit packages are viewed by employers as an expense much like the wages. If benefits are increased then the

employer will reduce wages. Thus, the economic burden of all health insurance benefits will fall on the employee either directly (out-of-pocket) or indirectly (through lower wage). Because of desirability of separating contribution from utilization out-of-pocket payment should not be used unless no other alternative is available. Although prepayment and pooling are a significant improvement over purely out-of-pocket financing they do not take questions of income into account. As a result of large pools society takes advantage of economics of scale, the law of large numbers and cross-subsidies from low-risk to high-risk individuals. Pooling by itself allows for equalization of contributions among members of the pool regardless of their financial risk associated with service utilization. Societies interested in equity are not indifferent to who is subsidized by whom. In addition to ensuring cross subsidies from low to high-risk, health financing should also ensure subsidy for greater equity. Existence of multiple pools allows members of pools to have different risk and income profiles. Without some compensatory mechanisms such arrangements would offer incentives for pooling organizations to select low-risks and to exclude the poor and the sick. Brazil has introduced compensatory mechanisms in the allocation of revenues from the central to state governments to reduce such differences.

Reimbursement

There are various types of reimbursements: fee-for-service, per case, per capita, and salary reimbursement.

Fee-for-service reimbursement

In this a physician is paid a specific sum for each individual service he provides to the patient. The services are broken down into units such as a complete physical exam, a follow-up visit, a tonsillectomy and so on. Each category of service is assigned a relative value in accordance with some criterion. Another method of fee setting is referred to as the UCR (usual, customary and reasonable). Usual refers to the usual or typical fee charged by the billing physician, customary refers to fees charged by all physicians in the community and reasonable refers to allowances

for particular circumstances. The customary fee is derived from the frequency distribution of the fees charged by all physicians in the community for the procedure. The insurer then decides which percentile to use to set an allowable maximum fee. Indeed fee-for-service reimbursement is believed to encourage physicians to provide medical care. The degree of encouragement will depend on the relation between the fee and the service's marginal cost. Some analysts believe that fee-for-service reimbursement encourages many unnecessary practices. The fee schedule is a potentially powerful tool that third parties can use to influence both the type of practices performed and where they are performed. If a third party wanted to discourage certain procedure which is thought to be unnecessary, e.g. tonsillectomy it could lower the amount of reimbursement. If a third party wanted to encourage certain procedures to be performed on an outpatient rather than on inpatient basis, it could reimburse physicians differently for the same procedure.

In recent years there has been a swing toward prospective reimbursement, i.e. predetermined rates and away from retrospective payment. Until the early 1980s hospitals were reimbursed on a retrospective basis, that is a third party insurer would reimburse a hospital for the expenses it had already incurred or the charges it had already billed. Whatever the arrangement retrospective reimbursement has one over-riding effect on supply and on costs: it encourages an organization to expand. Increase in both the scope and quality of services tend to occur. It can lead to higher costs, more services and higher quality services. Prospective reimbursement involves setting the basis of reimbursement before the reimbursement period. As a result this payment scheme puts the provider at risk for any excess of cost over revenue. In retrospective payment provider has an incentive to increase the quality and volume of service as it will be reimbursed for these, it bears no financial risk. In order to protect itself financially, the payer must incur expenses to set standards and monitor and enforce them. These contracting costs can be quite high because of the technical nature of medical care. In prospective fee-for-service system almost all of the financial risk is imposed on the payer. This is because all services provided by

the hospital will be paid for. As long as the per service rate exceeds the hospital's marginal cost, the provider will have an incentive to add additional services. The payer would have to set standards and monitor and enforce them, thus incurring costs.

Per case reimbursement

In this a physician is paid a fixed amount for each type of case treated. The physician bears the cost of any services he or she provides and is paid a sum for the entire case. If the physician reduces the number of services, more money will be left over as profit. Per case reimbursement for physicians is not being considered at this time because studies have shown wide variations in services for a single case type which would result in difficulties in establishing rates. While reimbursing a hospital all per case payment systems make use of case mix groups. Each group contains cases that use roughly the same amount of resources and payers reimburse the hospitals the same sum for all cases within the group. Under such a system, the risk to the payer is considerably reduced. However there is still a wide range of costs within each diagnostic group, sometimes the within group variation in resource use is due to severity. Hospitals that attract higher severity cases either because they are referral centers or inner city hospitals may lose money due to higher costs. They may therefore refuse to accept such cases without some kind of severity adjustment. In order to reduce costs imposed on providers who accept more severe cases payers have developed a two part system. Cases within each diagnostic group are divided into two groups, i.e. typical cases and outliers. Using the distribution of stays within each diagnostic group, a trim point is established that separates long stay outliers from typical cases. The actual setting of the trim point is arbitrary and depends on how much pressure the payer wants to impose on the provider to reduce its stays. Outliers are reimbursed in two parts: a per case portion to cover those days inside the trim and an additional per diem payment to cover the additional days. Thus, the risk of very high cost cases due to very long stays will be borne in a large part by the payer.

Per capita and salary reimbursement

The incentives for physicians who are paid on a per capita or a salary basis do exist if they provide no more than the basic minimum level of services. However a physician who intends to remain in practice for a long-time could not afford to allow the quality of services to fall to a low level.

Per diem fees

Under this arrangement there will be a sharing of financial risks between the payer and the hospital. The longer the hospital keeps the patient, the more it will be reimbursed since the later part of most hospital stays are less costly than the earlier portion, the per diem rates are likely to exceed the marginal costs of the later part of a stay.

Per admission method

Hospital gets payment for adding more patients. Payers usually adjust the payment by a case mix or severity index because cases differ considerably by diagnosis and severity.

Slowing growth of health care costs

Health care costs continue to be an important concern throughout the world. They remained a central issue of 2008 presidential campaign in US. There are three basic assumptions. First, health care spending has high intrinsic social value and the primary driver of cost increases is technical progress. The aging of the population and increasing number of patients with chronic illnesses contribute to the problem. Second the unconstrained growth in medical spending is threatening the income of individual patients, the cost structures of employer and the fiscal balance of government. Third the high social value of health care limits policy options for containing health care spending. In short, we want cost control but we also want broad access to health care and continued innovation in medical sciences. Trade offs among these goals are inevitable and they can be minimized only through thoughtful policies. Nevertheless,

the pressures to address increasing costs are so intense that policy decisions cannot be delayed until long-term studies are completed. Several types of payment reforms have been suggested and are being tried throughout the country. All of them are potentially disruptive to providers whose business is based on fee-for-service payments. Payment reform is likely to be most effective when providers are organized into delivery systems that can accept responsibility for cost mitigation goals. Health information system that include electronic records have significant potential for cost savings and enjoy strong political support. Policy makers often focus on the personal health record but the greatest cost reducing effect of electronic record will result from improved coordination among health care providers and from decision support that improves clinician's use of tests and treatments. Such decision support has the potential to decrease variation among physicians in the use of health care services, thereby reducing both baseline costs and cost trends. The potential is largely unrealized to date, however. Critical barriers include the requirements for capital investment and standardization of administrative and clinical data. Even more daunting is the need for cultural change among physicians, who must be willing to use decision-support system if electronic records are to improve their care. The improved care of patients with chronic conditions such as diabetes mellitus and coronary artery disease is a promising focus for cost reduction because about 70 percent of health care costs are generated by 10 percent of patients, most of whom have one or more chronic disease. Improved reliability and coordination of care of these patients could reduce their need for hospitalization. The observation that health care costs are concentrated in the period just before the patient's death raises concern that our health system uses excessive resources to extend the life of dying patients. Medicare data from Oregon indicate that the use of hospitalization and intensive care units in the last months of life can be decreased without compromising the care of dying patients and their families. However any serious attempt to change end-of-life care requires deep cultural change that extends well beyond the provider community.

Two familiar targets for cost-reduction are malpractice and drug pricing reform, but the potential savings from these approaches are probably small. Although the current malpractice system is an inefficient way to protect patients from negligent care, the direct cost of malpractice and estimated costs of defensive medicine are not major factors in overall health care spending. In any case political support for malpractice reform is weak because of resistance to major changes. Costs can be reduced through more restrictive drug formularies and tougher price negotiations, but the savings are modest because pharmaceuticals account for just 10 to 15 percent of health care spending. Enhanced primary prevention efforts have strong support and could lead to important general health benefits. James J Mongan et al recommend modification in reimbursement with explicit goal of rewarding the practice of evidence based medicine, reductions in variance among physicians in the use of services and improvement in the care of patients with chronic conditions. They recommend consideration of blended arrangements including pay-for-performance programs, case rates and even adequately funded and appropriately risk-adjusted capitation. They recommend enhancing standardization of health care transactions to drive down administrative costs.

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chapter 12

Private–public partnerships in health care

With shrinking budgetary allocations and fiscal problems most of the governmental organizations are finding it difficult to cater to the growing health care needs of the populations. Many governments are exploring options to improve equity, efficiency, accountability, quality and accessibility of the entire health system and one of the options available is promoting private-public partnerships. Private sector in India is most unregulated, but is easily accessible.

A good working definition of partnerships would include three points: First, these partnerships involve at least one private-for-profit organization and at least one not-for-profit or public organization. Second, the partners have some shared objectives for the creation of social values often for disadvantaged populations. Finally, the core partners agree to share both efforts and benefits. However the governmental organization can interface with the non-profit private sector for technical expertise or outreach. A chief factor encouraging these partnerships is that neither side alone can achieve its specific goals. Partnerships need to be differentiated from privatization which involves permanent transfer of control through transfer of ownership right or an arrangement in which the private sector share holder has waived its right to subscribe. Public–private partnership also needs to be differentiated from outsourcing. PPP usually entails a combination of services, for example, design, construction and maintenance whereas outsourcing is usually for one or relatively simple services.

Partnerships between public/governmental entities, private/commercial entities and civil society have a contribution to make in improving the health of the poor by combining the different skills and resources of various organizations in innovative ways. Public agencies clearly benefit from working in collaboration with the private sector in areas where the public sector lacks expertise and experience.

Partnerships are more justified in areas of disease control product development, disease control product distribution, strengthening health services, commercializing traditional medicine, health program co-ordination, health service delivery, etc. Partnership with for-profit sector is not appropriate in areas of policy making and development of regulations. Private-public partnerships should not be expected to substitute for action on responsibilities that properly rest elsewhere. In particular public sector agencies should continue to fund fundamental research, set standards for product safety, efficacy and quality, establish systems whereby citizens have adequate access to health products and services, use public resources in an efficient manner and create environments in which commercial enterprise is appropriately motivated to meet the needs of whole populations.

There are different models of public-private partnership in hospital provision:

a. Franchising: Public authority contacts a private company to manage existing hospital. Private company takes over management of an existing public hospital.
b. DBFO (Design, Build, Finance, Operate): Private partner designs facilities based on public authority's specific requirements, builds the facility, finances the capital cost and operates their facilities. In DBFO model private sector finances any funding short falls for the project; designs, constructs and operates specified services within the facility for a specified time. The government establishes service performance objectives and private sector partner is paid based on its performance as measured against the objectives. The capital and operational costs in DBFO are blended together in a service payment to the private sector over a period of up to 30 years. Adding responsibility for capital maintenance to the private sector is central theme in most DBFO projects causing private owner/operator to make the operating versus capital lifecycle cost trade offs while consistently delivering a project that meets user needs. The majority of the payments the government makes to the private sector are set in advance for the whole contract period with adjustments based on inflation,

performance by the private sector and hospital consumption. If the private sector does not perform to the standards agreed to in the contract, deductions are taken off. The deductions are related to the seriousness of the breach and are based upon a pre-established performance regime. Often publicity owned facilities age too fast due to lack of proper capital for maintenance but DBFO prevents this as the maintenance of asset is included in the contract. At the end of the contract the facilities are returned to the public sector in a good state as specified in the contract.

c. BOO (Build, Own Operate): Public authority purchases services for fixed period (say 30 years) after which ownership remains with private provider.
d. BOOT (Build, Own, Operate, Transfer): Public authority purchases services for fixed period after which ownership reverts to public authority.
e. BOLB (Buy, Own, Lease, Back): Private contractor builds hospital; facility is leased back and managed by public authority.
f. Alzira model: Private contractor builds and operates hospital with contract to provide care for a defined population in return for an annual per capita payment.

Private partner selection and obligations of the partners

Competitive process of selecting a private sector partner is less effective than an invited or negotiated partnership. While competing to win a contract, the private partner proposes low cost in order to clinch the bid. The public sector managers on the other hand are more concerned about satisfying procedural requirements than meeting the needs. The tendering process in government invariably chooses the lowest bid who later on fail to provide same level of quality as mentioned in the contract. Some of the successful partnership projects documented point to the importance of prior negotiations with the potential partners.

Both the partners in private–public partnership have to be committed to mutual responsibilities. Another corner stone of

partnership is the relative autonomy enjoyed by both the partners on day-to-day operations as well as in the over all management of the partnership. Autonomy is seen as non-intrusiveness by the public sector and the freedom of the private agency to take operational decisions without having to resort to cumbersome bureaucratic approvals or being constantly told about do's and dont's.

Quality of services

One of the major grey areas in any public–private partnership has been specific conditions related to quality. Although quality of service is talked about at the time of drafting an agreement, specific terms as to how quality of care is to be achieved and monitored need to be properly included in the contract document.

For the under-developed and developing countries public–private partnership is being considered a feasible solution to the current ills of the health care delivery system. Utilizing private capital to relieve some of the burden on the public health care system would make a significant contribution in resolving some of the current challenges being faced by health and medical care system. Currently lack of stable, long-term funding is jeopardizing long-term planning in the traditional system of health care delivery. Thus, the need of the hour is that policy makers, planners and administrators of the health and medical care systems explore the possibilities of suitable public-private partnerships to make medical care systems efficient, effective and suited to the needs of its rightful beneficiaries.

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chapter 13

Indian public health standards for district hospitals

District hospital is an essential component of the district health system and functions as a secondary level of health care which provides curative, preventive and promotive healthcare services to the people in the district. The Government of India is strongly committed to strengthen the referral services and provision of specialty services at district and sub-district hospitals. District hospital system is required to work not only as a curative center but at the same time should be able to build interface with the institutions external to it including those controlled by non-government and private voluntary health organization. The current functioning of most of the district hospitals in the public sector are not up to the expectation especially in relation to availability, accessibility and quality. The staff strength, equipment supply and service availability and population coverage are not uniform among all the district hospitals.

Most of the district hospitals suffer from large number of constraints such as:

- Buildings are either very old and in dilapidated conditions or are not maintained properly.
- The facilities at district hospitals are not keeping pace with the scientific development.
- A typical district hospital lacks modern diagnostic and therapeutic equipment, proper emergency services, intensive care units, essential pharmaceuticals and supplies, referral support and resources.
- There is lack of trained and qualified staff for hospital.
- There is lack of community participation and ownership.

The performance of district hospitals can be assessed against a set of standards to bring the District Hospitals to a minimum acceptable functional grade with scope for further improvement in it.

Objectives of Indian Public Health Standards (IPHS) for District Hospitals:

i. To provide comprehensive secondary health care (specialist and referral services) to the community through the District Hospital.
ii. To achieve and maintain an acceptable standard of quality of care.
iii. To make the services more responsive and sensitive to the needs of the people of the district and the hospitals/centers from which the cases are referred to the district hospitals.

Grading of district hospitals

The size of a district hospital is a function of the hospital bed requirement, which in turn is a function of the size of the population it serves. In India the population size of a district varies from 35,000 to 30,00,000 (Census 2001). Based on the assumptions of the annual rate of admission as 1 per 50 populations and average length of stay in a hospital as 5 days, the number of beds required for a district having a population of 10 lakhs will be around 300. However, as the population of the district varies a lot, it would be prudent to prescribe norms by grading the size of the hospitals as per the number of beds.

Grade I: District hospitals norms for 500 beds
Grade II: District hospitals norms for 300 beds
Grade III: District hospitals norms for 200 beds
Grade IV: District hospitals norms for 100 beds

Some patients with serious diseases can be transferred to tertiary and other specialized hospitals. A district hospital should however be able to serve 85 to 95 percent of the medical needs in the districts. It is expected that the hospital bed occupancy rate should be at least 80 percent. These standards are flexible as per the requirements and resources available to the concerned State/ Government. The timeframe for implementation and achievement of these Standards could be extended to five years and be done in phases.

Essential services

OPD, indoor, emergency services

- General Medicine including Nephrology, Cardiology, and Pulmonary Medicine
- General Surgery including Urology and Plastic Surgery
- Obstetric and Gynecologist
- Pediatrics including Neonatology
- Emergency (Accident and emergency)
- Critical care (ICCU)
- Anesthesia
- Operation theater
- Ophthalmology
- ENT
- Dermatology and Venerology including RTI (Reproductive Tract Infection)/STI (Sexually transmitted Infections)
- Orthopedics
- Radio diagnosis and Imaging
- Dental care
- Public Health Management

Paraclinical services

- Laboratory
- X-ray facility
- CT scan services
- Sonography
- EEG
- Echocardiography
- Pathology
- Blood bank
- Physiotherapy
- Dental technology
- Drug and pharmacy

Support services

- Medicolegal/post-mortem/mortuary services
- Ambulance services

- Dietary services
- Laundry services
- Security services
- Counseling services
- Waste management
- Ware-housing/central store
- Maintenance and repair
- Electric supply (power generation and stabilization)
- Water supply
- Heating, ventilation and air-conditioning (HVAC)
- Transport
- Communication
- Medical social work
- Nursing services
- Sterilization and disinfection
- Landscaping
- Lift and vertical transport
- Refrigeration

Administrative services

- Finance
- Medical records
- Procurement
- Personnel
- Housekeeping and sanitation
- Education and training
- Inventory management

Medical superintendent to be authorized to incur an expenditure up to ₹20.00 lakhs for repair/upgrading of impaired equipments/instruments with the approval of executive committee of Rogi Kalyan Samities. No equipment/instruments should remain non-functional for more than 30 days. It will amount to suspension of status of IPHS of the concerned institutions for absence period. Manpower and outsourcing work could be done through local tender mechanism.

Physical infrastructure

The size of a district hospital is a function of the hospital bed requirement which in turn is a function of the size of the population served. An area of 65 to 85 m^2 per bed has been considered to be reasonable. The area will include the service areas such as waiting space, entrance hall, registration counter, etc.

Factors to be considered in a district hospital

- The location may be near the residential area.
- Hospital Management policy should emphasize on quake proof, fire proof and flood-proof buildings.
- It should be in an area free of pollution of any kind, including air, noise, water and land pollution.
- It must be serviced by public utilities.
- Necessary environmental clearance will be taken.
- Local agency Guidelines and by-laws should strictly be followed.

Administrative block

Administrative block attached to main hospital along with provision of MS Office and other staff to be provided.

Circulation areas

Circulation areas like corridors, toilets, lifts, ramps, staircase and other common spaces, etc. in the hospital should not be more than 55 percent of the total floor area of the building.

Ambulatory care area

Ambulatory care area (OPD) waiting spaces, registration, assistance and enquiry counter facility should be made available in all the clinics. Main entrance, general waiting and subsidiary waiting spaces are required adjacent to each consultation and treatment room in all the clinics. The clinics for infectious and communicable diseases should be located in isolation, preferably, in remote corner, provided with independent access.

Nursing station

On an average, one nursing station per ward will be provided. However, it should be ensured that nursing station caters to about 40 to 45 beds.

Diagnostic services

Imaging

The department should be located at a place which is accessible to both OPD and wards and also to operation theater department. The size of the room should depend on the type of instrument installed. The room should have a sub-waiting area with toilet facility and a change room facility, if required. Film developing and processing (dark room) shall be provided in the department for loading, unloading, developing and processing of X-ray films. Separate reporting room for doctors should be there.

Clinical laboratory

For quick diagnosis of blood, urine, etc. a small sample collection room facility shall be provided.

Blood bank

Blood bank shall be in close proximity to pathology department and at an accessible distance to operation theatre department, intensive care units and accident and emergency department. Blood Bank should follow all existing guidelines and fulfill all requirements as per the various Acts pertaining to setting up of the Blood Bank.

Ward unit

Location of the ward should be such as to ensure quietness and to control over number of visitors. The basic aim in planning a ward unit should be to minimize the work of the nursing staff and provide basic amenities to the patients within the unit. The distances to be travelled by a nurse should be kept to the minimum. Ward unit will include nursing station, doctor's duty room, pantry, isolation

room, treatment room, nursing store along with wards and toilets as per the norms. On an average one nursing station per ward will be provided. It should be ensured that nursing station caters to above 40 to 45 bed. Depending upon the requirement of the hospital and catchment area appropriate beds may be allocated for private facilities. However, 10 percent of the total bed strength is recommended as private ward beds.

Pharmacy

Pharmacy should have component of medical store facility for indoor patients and separate pharmacy with accessibility for outdoor patients.

Intensive care unit

It should have highly specialized staff and equipment. The unit should not have less than 4 beds nor more than 12 beds. Number of beds should be restricted to 5 percent of the total bed strength. This unit should be located close to operation theater department and other essential departments, such as, X-ray and pathology so that the staff and ancillaries could be shared. Easy and convenient access from Accident and emergency department is also essential. This unit will also need all the specialized services, such as, piped suction and medical gases, uninterrupted electric supply, heating, ventilation, central air conditioning and efficient life services.

Emergency services

It should preferably have a distinct entry independent of OPD main entry so that a very minimum time is lost in giving immediate treatment to casualties arriving in the hospital. There should be an easy ambulance approach with adequate space for free passage of vehicles and covered area for alighting patients.

Operation theater

Zoning should be done to keep the theaters free from micro organisms. There may be four well defined zones of varying degree of cleanliness namely: Protective Zone, Clean Zone, Aseptic or

Sterile Zone and Disposal or Dirty Zone. Patient, staff and supplies traffic should be properly channelized. Laminar flow of air should be maintained in operation theater.

Labor room

The delivery suit unit should be located near to operation theater.

Hospital kitchen

It should easily be accessible from outside along with vehicular accessibility. It should be located such that the noise and cooking odors emanating from the department do not cause any inconvenience to the other departments. At the same time location should involve the shortest possible time in delivering food to the wards.

Central sterile supply department (CSSD)

It should be located at a position of easy access to operation theater department.

Hospital laundry

It should be provided with necessary facilities for drying, pressing and storage of soiled and cleaned linen.

Medical and general stores

It should have vehicular accessibility and ventilation, security and fire fighting facilities.

Mortuary

It provides facilities for keeping of dead bodies and conducting autopsy.

Engineering services

Electric sub station and stand-by generator room should be provided. Airconditioning and room heating in operation theater and neonatal units should be provided. Air coolers or hot air convectors may be provided for comfort of patients and staff depending on the local needs. Arrangement should be made for round the clock piped water

supply along with an overhead water storage tank with pumping and boosting arrangements.

Waste disposal system

Waste management and handling rules should be followed.

Residential quarters

All the essential medical and Paramedical staff should be provided with residential accommodation.

Manpower and equipment

Equipment norms are worked out keeping in mind the assured service recommended for various grades of the district hospitals. Manpower requirements have been detailed in the draft document.

Quality control

Internal and external Monitoring by Rogi Kalyan Samities and independent agencies.

Bibliography

1. Guidelines Directorate General of Health services Ministry of Health & Family welfare Government of India. January, 2007.

chapter 14

Important legislations

The Right to Information Act (15th June 2005)

This act is called the Right to Information Act, 2005. An act is to provide for setting out the practical regime of right to Information for citizens to secure access to information under the control of public authorities in order to promote transparency and accountability in the working of every public authority. Subject to the provisions of this act, all citizens have the right to information. Every public authority must maintain all its records duly catalogued and indexed in a manner and the form which facilitates the right to information under this act and ensure that all records that are appropriate to be computerized are, within a reasonable time and subject to availability of resources, computerized and connected through a network all over the country on different systems so that access to such records is facilitated. Every public authority must publish all relevant facts while formulating important policies or announcing the decisions which affect public. All materials must be disseminated taking into consideration the cost effectiveness, local language and the most effective method of communication in that local area and the information should be easily accessible, to the extent possible in electronic format with the Central Public Information Officer or State Public Information officer, as the case may be, available free or at such cost of the medium or the print cost price as may be prescribed. Every public authority has to designate as many officers as the Central Public Information Officers or State Public Information Officers, as the case may be, in all administrative units or officers under it as may be necessary to provide information to persons requesting for the information under this Act. A person, who desires to obtain any information in national or in the official language of the area in which the application is being made, accompanying such fee as may be prescribed, to public authority requesting for an

information, which is held by another public authority but is closely related, the public authority to which such application is made, has to transfer the application or such part of it as may be appropriate to that other public authority and inform the applicant immediately about such transfer. Public information officer, as the case may be, on receipt of a request must, as expeditiously as possible and in any case within thirty days of the receipt of the request, either provide the information on payment of such fee as may be prescribed or reject the request for any of the reasons specified in sections 8 and 9. Provided that where the information sought for concerns the life or liberty of a person, the same should be provided within forty-eight hours of the receipt of the request. Where a request has been rejected public information officer should communicate to the person making the request, the reasons for such rejection and the period within which an appeal against such rejection may be preferred. There shall be no obligation to give any citizen information, disclosure of which would prejudicially affect the sovereignty and integrity of India, the security, strategic, scientific or economic interests of the state, relation with foreign state or lead to incitement of an offence, information including commercial confidence, trade secrets or intellectual property, the disclosure of which would harm the competitive position of a third party or any other reason as specified in law. The Central Information Commission consists of Chief Information Commissioner and such number of Central Information Commissioners, not exceeding ten, as may be deemed necessary. The Chief Information Commissioner and Information Commissioners are appointed by the president on the recommendation of a committee consisting of Prime Minister who is the chairperson of the committee, the Leader of opposition in the Lok Sabha and a Union Cabinet Minister to be nominated by the Prime Minister. The Chief Information Commissioner and Information Commissioners are persons of eminence in public life with wide knowledge and experience in law, science and technology, social service, management, journalism, mass media or administration and governance. They must not hold any other office of profit or be connected with any political party or carry on any business or

pursue any profession. The state information commission consists of the state chief information commissioner and such number of state information commissioners, not exceeding ten, as may be deemed necessary. The State Chief Information Commissioner and the State Information Commissioners are appointed by the Governor on the recommendation of a committee consisting of Chief Minister who is the chairperson of the committee, the Leader of Opposition in the Legislative Assembly and a Cabinet Minister to be nominated by the Chief Minister. The State Chief Information Commissioner and State Information Commissioners are persons of eminence in public life with wide knowledge and experience in law, science and technology, social service, management, journalism, mass media or administration and governance. They do not hold any other office of profit or connected with any political party or carry on any business or pursue any profession.

The Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 (Amended 2003)

An act to provide for the regulation of the use of prenatal diagnostic techniques for the purpose of detecting genetic or metabolic disorders or chromosomal abnormalities or certain congenital malformation or sex linked disorders and for the prevention of the misuse of such techniques for the purpose of prenatal sex determination leading to female foeticide and for matters connected there with or incidental thereto. "Prenatal diagnostic test" means ultrasonography or any test or analysis of amniotic fluid, chorionic villi, blood or any tissue of a pregnant woman conducted to detect genetic or metabolic disorders or chromosomal abnormalities or congenital anomalies or hemoglobinopathies or sex-linked diseases. No genetic counseling center, genetic laboratory or genetic clinic unless registered under this act, shall conduct or associate with, or help in conducting activities relating to prenatal diagnostic technique or employ any person who does not possess the prescribed qualifications. No medical geneticist, gynecologist, pediatrician,

registered medical practitioner or any other person shall conduct or aid in conducting by himself or through any person, any prenatal diagnostic technique at a place other than a place registered under this act. No prenatal diagnostic technique shall be conducted except for the purposes of detection of any of the following abnormalities, namely chromosomal abnormalities, genetic metabolic diseases, hemoglobinopathies, sex-linked genetic disease. No prenatal diagnostic technique shall be used or conducted unless the person qualified to do so is satisfied that any of the following conditions are fulfilled, namely: (a) age of the pregnant woman is above thirty five years; (b) The pregnant woman has undergone two or more spontaneous abortions or fetal loss; (c) The pregnant woman had been exposed to potentially teratogenic agents such as drugs, radiation, infections or chemicals; (d) The pregnant woman has a family history of mental retardation or physical deformities such as spasticity or any other genetic disease. No person, being a relative or the husband of the pregnant woman shall seek or encourage the conduct of any prenatal diagnostic techniques on her except as specified in the act. No person conducting prenatal diagnostic procedure shall communicate to the pregnant woman concerned or her relatives the sex of the fetus by words, signs or in any other manner. The Central Supervisory Board is constituted by Central Government to exercise the powers and perform the function conferred on the Board under this act. The board consists of Minister in-charge of the Ministry or Department of family Welfare who is the Chairman, Secretary to the Government of India in-charge of the Department of Family Welfare, who shall be the Vice-Chairman, two members appointed by the Central Government to represent the Ministries of Central Government in-charge of Woman and Child Development, Law and Justice, Director of Health Services of the Central Government, ten members to be appointed by the Central Government, two each from amongst eminent medical geneticists, eminent gynecologists and obstetricians, eminent pediatricians, eminent social scientists and representatives of Woman Welfare Organizations, three women of Parliament of whom two are elected by the House of the People and one by the Council of State, four members appointed by the

Central Government by rotation to represent the State and Union Territories. The board performs following function: advice the Government on policy matters relating to use of prenatal diagnostic techniques, review implementation of the act and the rules made there-under and recommend changes in the said act and rules to the Central Government, create public awareness against the practice of prenatal determination of sex and female foeticide, lay down code of conduct to be observed by persons working at genetic counseling center, genetic laboratories and genetic clinics and any other functions as may be specified under the act. Any deviation from law by any individual would mean fine of an amount from ten thousand to fifty thousand and imprisonment for a period of three to five years.

Transplantation of Human Organs Act 1994 (Amended 2003)

An act to provide for the regulation of removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs and for matters connected therewith or incidental thereto.

Authority for removal of human organs

Any donor may, in such manner and subject to such conditions as may be prescribed, authorize the removal, before his death, of any human organ of his body for therapeutic purposes. If any donor had, in writing and in the presence of two or more witnesses (at least one of whom is a near relative of such person), unequivocally authorized at any time before his death, the removal of any organ of his body, after his death, for therapeutic purposes, the person lawfully in possession of the dead body of the donor shall, unless he has any reason to believe that the donor had subsequently revoked the authority aforesaid, grant to a registered medical practitioner all reasonable facilities for the removal, for therapeutic purposes, of that human organ from the dead body of the donor. Where no such authority was made by any person before his death but no objection was also expressed by such person to any of his human organs being

used after his death for therapeutic purposes, the person lawfully in possession of the dead body of such person may unless he has reason to believe that any near relative of the deceased person has objection to any of the deceased person's human organs being used for therapeutic purposes, authorize the removal of any human organ of the deceased person for its use for therapeutic purposes. Where any human organ is to be removed from the body of a deceased person, the registered medical practitioner shall satisfy himself, before such removal, by a personal examination of the body from which any human organ is to be removed, that life is extinct in such body or, where it appears to be a case of brainstem death, that such death has been certified. Where any human organ is to be removed from the body of a person in the event of his brainstem death, no such removal shall be undertaken unless such death is certified, in such form and in such manner and on satisfaction of such conditions and requirements as may be prescribed by a Board of medical experts consisting of the following: the registered medical practitioner incharge of the hospital in which brainstem death has occurred, an independent registered medical practitioner, being a specialist, to be nominated by the registered medical practitioner from the panel of names approved by the appropriate authority, a neurologist or a neurosurgeon to be nominated by the registered medical practitioner from the panel of names approved by the Appropriate Authority, the registered medical practitioner treating the person whose brainstem death has occurred. Appropriate authority means the authority appointed under section 13.

Removal of human organs is not to be authorized in certain cases. If the person required to grant such facilities, or empowered to give such authority, has reason to believe that an inquest may be required to be held in relation to such body in pursuance of the provisions of any law for the time being in force. No authority for the removal of any human organ from the body of a deceased person shall be given by a person to whom such body has been entrusted solely for the purpose of cremation or other disposal. In the case of a dead body lying in a hospital or prison and not claimed by any of the near relatives of the deceased person within forty-eight

hours from the time of the death of the concerned person, the authority for the removal of any human organ from the dead body which so remains unclaimed may be given, in the prescribed form, by the person incharge, for the time being, of the management or control of the hospital or prison, or by an employee of such hospital or prison authorized in this behalf by the person inchange of the management or control thereof. No authority shall be given if the person empowered to give such authority has reason to believe that any near relative of the deceased person is likely to claim the dead body even though such near relative has not come forward to claim the body. Where the body of a person has been sent for postmortem examination for medicolegal purposes by reason of the death of such person having been caused by accident or any other unnatural cause or for pathological purposes, the person competent under this act to give authority for the removal of any human organ from such dead body may, if he has reason to believe that such human organ will not be required for the purpose for which such body has been sent for postmortem examination, authorize the removal, for therapeutic purposes, of that human organ of the deceased person provided that he is satisfied that the deceased person had not expressed, before his death, any objection to any of his human organs being used, for therapeutic purposes after his death or, where he had granted an authority for the use of any of his human organs for therapeutic purposes, after his death, such authority had not been revoked by him before his death.

Preservation of human organs

After the removal of any human organ from the body of any person, the registered medical practitioner shall take such steps for the preservation of the human organ so removed as may be prescribed.

Restrictions on removal and transplantation of human organs

No human organ removed from the body of a donor before his death shall be transplanted into a recipient unless the donor is a near relative

of the recipient. Where any person authorizes the removal of any of his human organs after his death any person competent or empowered to give authority for the removal of any human organ from the body of any deceased person authorizes such removal, the human organ may be removed and transplanted into the body of any recipient who may be in need of such human organ. If any donor authorizes such removal of any of his human organs before his death for transplantation into the body of such recipient, not being a near relative, as is specified by the donor by reason of affection or attachment towards the recipient or for any other special reasons, such human organ shall not be removed and transplanted without the prior approval of the Authorization Committee. Authorization Committee means the committee constituted under clause (a) or clause; (b) of subsection; (c) of section 9. On an application jointly made, in such form and in such manner as may be prescribed, by the donor and the recipient, the Authorization Committee shall, after holding an inquiry and after satisfying itself that the applicants have complied with all the requirements of this act and rules made thereunder, grant to the applicants approval for the removal and transplantation of the human organ. No hospital, unless registered under this Act, shall conduct, or associate with, or help in, the removal, storage or transplantation of any human organ.

Punishment for removal of human organ without authority

Any person who renders his services to or at any hospital and who, for purposes of transplantation, conducts, associates with, or helps in any manner in the removal of any human organ without authority, shall be punished with imprisonment for a term which may extend to five years and with fine which may extend to ten thousand rupees.

Biomedical Waste Management and Handling Rules 1998 (Amended 2003)

These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle biomedical waste in any form.

Biomedical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals (means any preparation made from organisms or microorganisms or product of metabolism and biochemical reactions intended for use in the diagnosis, immunization or the treatment of human beings or animals or in research activities pertaining thereto).

This rule applies to all institutions generating biomedical waste which includes hospitals, nursing homes, clinics, dispensaries, veterinary hospitals, animal house, pathological lab and Blood Bank, etc. The Biomedical Waste (Management and Handling) Rules 1998, explicitly state that waste handling and treatment facilities shall have to be established within stipulated deadlines or earlier, for all waste generating establishments. It is also to be noted that the hospitals/clinics/nursing homes/dispensaries, etc. which treat below 1000 patients/month though do not have to apply for authorization, shall take all steps to ensure that such waste is handled without any adverse effect to human health and the environment. Every occupier, where required, shall set-up requisite biomedical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste or, ensure requisite treatment of waste at a common biomedical waste treatment facility or any other waste treatment facility.

Segregation, packing, transportation and storage

Biomedical waste shall not be mixed with other wastes. Biomedical waste shall be segregated into containers/bags at the point of generation prior to its storage, transportation, treatment and disposal. The containers shall be labeled biomedical waste. Untreated biomedical waste shall be transported only in such vehicles as may be authorized for the purpose by the competent authority as specified by the government. No untreated biomedical waste shall be kept/stored beyond a period of 48 hours. Provided that, if for any reason, it becomes necessary to store the waste beyond such period, the authorized person must take permission of the prescribed authority and take measures to ensure that the waste does not adversely affect human health and the environment.

Annual report

Every occupier/operator should submit an annual report to the prescribed authority in Form II by 31st January every year, to include information about the categories and quantities of biomedical wastes handled during the preceding year. The prescribed authority shall send this information in a compiled form to the Central Pollution Control Board by 31st March every year.

Authorization

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 clinic, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1,000 (one thousand) patients per month, shall make an application in Form 1 to the prescribed authority for grant of authorization.

Categories of biomedical waste, treatment and disposal

Category of biomedical waste	Treatment and disposal
1. Human Anatomical Waste (Human tissues, organs, body parts)	Incineration/deep burial
2. Animal Waste (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
3. Microbiology and biotechnology waste (Wastes from lab: cultures, stocks of specimens of micro-organisms, live or attenuated vaccines, human and animal inoculation, 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)	Autoclaving/microwaving

Contd...

Contd...

Category of biomedical waste	Treatment and disposal
4. Waste Sharps, Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps	Chemical/disinfection autoclaving/ microwaving and mutilation/ shredding
5. Discarded Medicines and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines)	Incineration and drug disposal in secured landfills
6. Soiled Waste (Items contaminated with blood and body fluids including cotton, dressing, soiled plaster casts, linen, beddings, other material contaminated with blood)	Incineration/autoclaving/ microwaving
7. Solid Waste (Waste generated from disposable items other than sharps such as tubings, catheters, intravenous sets, etc.)	Chemical disinfection autoclaving/ microwaving and mutilation/ shredding
8. Liquid Waste (Waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)	Treat chemically and discharge into sewerage treatment plants/drains
9. Incineration Ash (Ash from incineration of any biomedical waste)	Disposal in Municipal landfill
10. Chemical Waste (Chemical used in production of biological, chemicals used in insecticides, etc.)	Chemical treatment, disinfection and discharge into drains for liquid and secured landfill for solids

Notes

- Chemical treatment using at least one percent hypochlorite solution or any other equivalent chemical reagent should ensure disinfection.
- Mutilation/shredding must be such so as to prevent unauthorized reuse.
- There will be no chemical pretreatment before incineration. PVC shall not be incinerated.

The Central Pollution Control Board has recommended two types of incinerators:

- Incinerators for individual hospitals/nursing homes/medical establishments.

- Common incinerator to handle waste from number of hospitals/ nursing homes/pathological laboratories, etc.

Site for Incinerator

Incinerators should be installed at appropriate location to avoid nuisance to patients and neighborhood.

Color coding and type of container for disposal of biomedical waste

Color coding	Type of container	Waste category	Treatment options
Yellow	Plastic Bag	1,2,3 and 6	Incineration/deep burial
Red	Plastic Bag	3,6,7	Autoclaving/Microwaving Chemical Treatment
Blue/White/ Puncture Proof Translucent	Plastic Bag	4, 7	Autoclaving/ Microwaving/ Chemical treatment and destruction/shredding
Black	Plastic Bag	5, 9, 10	Disposal in secured landfill

Notes

- Color coding of waste categories with multiple treatment options as defined in schedule 1, shall be selected depending on treatment option chosen, which shall be as specified in Schedule 1.
- Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.
- Categories 8 and 10 (liquid) do not require containers/bags.
- Category 3, if disinfected locally need not be put in containers/ bags.

MTP Act 1971 and MTP (Amendment) Act 2002

Medical Termination of Pregnancy Act, 1971 provides for the termination of certain pregnancies by registered medical

practitioners and for matter connected therewith or incidental thereto. In accordance with Act, a MTP may be carried out either in a hospital established or maintained by Government, or at a place for the time being approved for the purpose of this Act by Government. A pregnancy may be terminated by a registered medical practitioner in the following conditions:

i. Where the length of the pregnancy does not exceed twelve weeks, or
ii. Where the length of the pregnancy exceeds twelve weeks but does not exceed twenty weeks, if not less than two registered medical practitioners are of opinion formed in good faith, that are:
   - The continuance of the pregnancy would involve a risk to the life of the pregnant woman or of grave injury to her physical or mental health.
   - If there is a substantial risk that if the child was born, it would suffer from such physical or mental abnormalities to be seriously handicapped.

The Drugs and Cosmetics Act, 1940 with the Drugs, Cosmetics Act 1995 and the Drugs and Cosmetics Rules, 1945 (as amended in 2006)

An act to regulate the import, manufacture, distribution and sale of drugs and cosmetics. Amendment 2006 is related to importing of drugs, (to be tested in India before release for sale in India).

Few salient features of the Act are:

- Enhancement of the quantum of punishment for offences relating to the manufacture or sale of adulterated, spurious drugs.
- The main objective of the Act is to prevent sub-standards in drugs, presumably for maintaining high standards of medical treatment.
- Substances governed by the Act can nevertheless be applicable to narcotic or intoxicating liquor.

The Consumer Protection Act 1986 (Amended 2002)

An Act to provide for better protection of the interests of consumers and for that purpose to make provision for the establishment of consumer councils and other authorities for the settlement of consumer disputes and for matters connected therewith.

The Central Consumer Protection Council

The Central Council consists of the following members, namely:

a. The Minister incharge of the consumer affairs in the Central Government, who is the Chairman
b. Such number of other official or non-official members representing such interests as may be prescribed. The council deals with cases involving more than one crore rupees.

The State Consumer Protection Council

The state council consists of the following members, namely:

a. The minister incharge of consumer affairs in the State Government who is the Chairman
b. Such number of other official or non-official members representing such interests as may be prescribed by the state government
c. Be nominated by the Central Government. The council has role where compensation claims are between 20 lakhs and one crore.

The district consumer protection council

Consists of the following members, namely:

a. The collector of the district, who is the Chairman
b. Such number of other official and non-official members representing such interests as may be prescribed by the state government. The council has a role where compensation claims are less than 20 lakhs.

As consumer protection applies to hospitals also, medical care given should be quality care. In addition to proving best possible care hospitals and doctors now need to have indemnity insurance to

protect themselves from litigations and claims. Doctors in West now do not hesitate to file counter suits to protect themselves from over-zealous patients.

Disaster Management Act

Disaster Management Act was enacted in 2005. Disaster management involves capacity-building by identification of existing resources and the resources to be acquired or created, acquiring or creating resources identified, organizing training of personnel. Disaster management means a continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary or expedient for prevention of danger or threat of any disaster, mitigation or reduction of risk of any disaster and its consequences, capacity building, preparedness, prompt response, assessing the severity of effects, evacuation, resource and relief, rehabilitation and reconstruction. The act established a (National Disaster Management Authority) which consists of Prime Minister of India as chairperson and other members not exceeding nine nominated by chairperson of Authority. The national authority meets as and when necessary. The national authority has the responsibility for laying down the policies, plans and guidelines for disaster management. The national authority may constitute an advisory committee consisting of experts in the field of disaster management. The members of advisory committee are paid allowances as prescribed by central government. The central government constitutes a national executive committee to assist the national authority in the performance of its functions. The members of National Executive Committee are Secretary to Government of India incharge of Ministry having administrative control of disaster management (chairperson) and secretaries to Government of India of few other departments. The National Authority lays down policies on disaster management, approve the national plan, lay down guidelines to be followed by the state authorities in drawing up the state plan, coordinate the enforcement and implementation of the policy and plan for disaster management, recommend provision of

funds for the purpose of mitigation, provide such support to other countries as determined by central government, take measures for prevention of disaster or the mitigation, etc. The national plan is prepared by the National executive committee having regard to the National policy and to be approved by National authority. The national authority recommends guidelines for the minimum standards of relief to be provided to persons affected by disaster which includes; minimum requirements to be provided in the relief camps in relation to shelter, food, drinking water, medical cover and sanitation, special provisions to be made for widows and orphans, exgratia assistance on account of loss of life as also assistance on account of damage to houses and for restoration of means of livelihood, etc. State disaster management authority consists of following members; the chief minister of state as chairperson, other members not exceeding eight to be nominated by chairman of state authority, chairperson of state executive committee. State authority has responsibilities of laying down plans and policies for disaster management in the state. District disaster management authority has Deputy Commissioner as its chairperson, elected representative of the local authority is co-chairperson. In any district where Zila parishad exists, the chairperson thereof shall be the chairperson of the district Authority. The district plan shall be prepared by district authority after consultation with local authorities and having regard to the National plan and the State plan to be approved by the State Authority.

The Act lays down for constitution of a "National Institute of Disaster Management." The Institute functions within the broad policies and guidelines laid down by National Authority and is responsible for planning and promoting training and research in the area of disaster management, documentation and development of national level information base relating to disaster management policies, prevention and mitigation; formulation of comprehensive human resource development plan covering all aspects of disaster management, develop educational material for disaster management, promote awareness of stake holders.

The Disaster Management Act 2005 also lays down for constitution of a National Disaster response force for the purpose of specialist response to a threatening disaster situation or disaster. The Central Government established a National Disaster response fund for meeting any threatening disaster situation or disaster. The National Disaster response fund is made available to the national executive committee for meeting the expenses for emergency response, relief and rehabilitation. The national disaster mitigation fund is constituted exclusively for the purpose of mitigation. States and Districts also have State disaster response fund, District disaster response fund, State Disaster Mitigation Fund and District Disaster Mitigation Fund. Where the national, state or district authority is satisfied that immediate procurement of provisions or materials is necessary it may authorize the concerned department to make emergency procurement and standard procedure requiring inviting of tenders shall be deemed to be waived and a certificate of utilization of provisions or materials by the controlling officer authorized shall be deemed to be a valid document. Whoever obstructs any officer or employee in discharge of his functions under this act shall be liable for punishment with imprisonment which may extend to one year or with fine or both. If the obstruction or refusal to comply results in loss of lives or imminent danger punishment may extend to two years. Whoever knowingly makes claim which he knows or has reason to believe to be false for obtaining any relief shall on conviction be punishable with imprisonment for a term which may extend up to two years and also with fine. Whoever being entrusted with money or materials meant for disaster misappropriates shall be punished with imprisonment up to two years and also with fine.

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chapter 15

Hospital architecture

Rapid changes in medical technology in the 20th century required changes in typical hospital environment in cycles of as few as 5 or 10 years. Because the process of design and construction is both long and expensive planners faced the challenge that many hospitals were out of date the moment they were commissioned. One of the challenges facing the architecture profession in the 21st century is how to design a flexible hospital to suit unpredictable future needs. Change overtime is a constant feature of architecture, yet the pace of change and its intensity are much greater in hospitals than in any other type of building. There is a need to design the health care facilities to allow for change and adaptability and also there is a need of humanizing the healthcare environment for patients and staff. There is a perceived need to shift the emphasis from a system empowerment perspective where staff and clinical needs prevail to one that emphasized the empowerment of the patient and their family as part of the health care process. Humanizing the health care environment means an emphasis on achieving natural light and ventilation, outlook and views for patients, thus producing pleasant and non-stress feel healing environment. We look for rooms and spaces that are interesting and pleasantly stimulating to be within, yet at the same time address the needs of patients. Patient empowerment is achieved but not at the expense of recognizing and responding to the reality of a health care facility as the primary work place for its staff. To remain competitive, facilities must be open to integrating new technologies. Despite its recent growth, introducing new technologies in hospitals is not a simple matter. New technologies are often not embraced by staff or they do not effectively mesh with existing systems. An engineering master plan goes beyond bricks and mortar to the heart of a building. Using variety of tools, an engineering master plan gauges compatibility of existing infrastructure with potential new technologies. It also sets the stage for facility growth.

Patient focused hospitals

Hospital should foster a connection to nature and should encourage caregivers to be responsive to patients. Value needs to be attached to way finding devices, views and public spaces. To achieve patient and family centered facility, hospitals feature single occupancy rooms and sleeping accommodation for patient's families. Family zones are integrated within each room. Floor to ceiling windows and internal courtyards ensure increased day light. However providing single occupancy rooms do not guarantee the best patient care environment especially if other factors were sacrificed in order to achieve them. Studies have shown that team work and communication involving the patient's family contribute to patient's safety. The active process of involving the patient and family with the care of the patient helps catch errors, so caregivers can recover potential adverse events. Each patient room in the facility is a private room allowing more space for staff to provide care and for family members who want to stay close to the patient. A small charting alcove adjacent to the room will allow nurses to observe without disturbing the patient's rest, creating a better healing environment. All rooms are truly standardized in layout and placement of equipment and supplies. A cabinet or nurse server in each alcove holds the patient's barcoded medication in a locked box along with other supplies needed for patient care. Noise reduction can be achieved through single rooms and the use of special noise absorbing ceiling tiles, structural systems designed to reduce vibrations, the elimination of over head paging and insulation between rooms. For added safety, patient rooms can be wired for the use of cameras, to assist with monitoring of high risk patients. The cameras connect directly to the nurses station or other appropriate location and will only be used with the consent of the patient. Additional technologies such as the use of automatic lights that go on when the patient attempts to get-out of bed are considered to reduce the potential for patient falls. Other design considerations to reduce patient falls are bathrooms at the head end of the bed with a handrail from bed to the bathroom,

beds that lower to reduce the harm to patients falling and rubber flooring that is safer than traditional hard flooring alternatives. In Europe in many instances the balance tips away from the higher proportion of patient single rooms that are often regarded as non-negotiable by Americans. In Europe single rooms is seen as having a place but the provision of all single rooms may not be the most important factor under consideration in terms of planning a facility. Tight urban sites mean that if the whole of a building's perimeter is allocated to the windows required by single patient bedrooms, there will be very little left for staff offices and recreational areas. Longer narrow buildings, often a combination of double loaded single corridors and deeper internally planned linking spaces mean that more external walls are available for a variety of purposes. However to ensure that staff walking distances are kept to a reasonable dimension requires that something has to be conceded. The wider incidence of few two, three or more bed patient rooms positively impacts the issue of ever lengthening corridors in health care buildings, reduces the initial capital cost of these facilities and often allows the allocation of windows and outlook to staff spaces such as offices and tea rooms.

Hospital can be made accommodating to children with positive distractions. When a child enters a hospital there should be journey of discovery by having distraction around every corner.

Hospital design and safety

In hospital there are active failures or latent conditions. Active failures are errors made by those who provide care and latent conditions arise from decision made by management, architects, designers and include lack of standardization of equipment, poor visibility, etc. Whereas a poorly designed and maintained hospital provides the conditions that precipitate accidents, a well-designed hospital has inbuilt safeguards that make it difficult for these accidents to occur or that may help stop the chain of events before they result in accidents. Aspects of hospital design such as air quality, lighting, patient room design and other interior design elements directly

impact safety outcomes such as nosocomial infections, patient falls and medical errors. The traditional architect's brief given by a hospital consultant requires architects to be provided program objectives, room requirements and functional space requirements but safety aspects get a back seat. The management team, facility advisors and department design teams should meet routinely with architects during the design process and Failure Mode and Effect Analysis (FMEA) should be used. FMEA is conducted at each major stage of the design process, schematics and design development. Although, the use of FMEA is very time consuming and often labor intensive, it is highly beneficial in identifying potential failures and developing innovative solutions associated with design considerations. A report by joint commission on accreditation of health care organizations cited physical environment as a root cause in 50 percent of patient falls. Studies have identified bedrails strongly linked with falls. Other studies have shown comprehensive multi-intervention strategies that include environmental modifications being effective in reducing falls. Among specific interior design elements, flooring can contribute to the incidence of falls and the severity of injuries upon impact. Healey reported patients suffer more injuries when they fall on vinyl floors compared with carpeted floors. Sampson et al reported that risk of fracture being lower for wooden subfloors compared with concrete subfloors.

Air borne infections are spread when dust and pathogens are released and are caused by contamination and malfunction of hospital ventilation systems. High-Efficiency Particulate Air (HEPA) filters can be highly effective in preventing air borne infections in hospitals. Provision of single rooms reduces incidence of nosocomial infection. Mullin et al reported a decrease in Acinetobacter baumanii in mechanically ventilated patients from 28.1 to 5 percent after moving from a unit with both enclosed and open patient care areas to one with all private rooms. Psychological and physiological effects of lighting in hospitals has been shown in literature. ICU psychosis in adult patients is partly attributed to bright or constant lighting conditions in ICUs that lack night/day cues. Buchanan et al found errors in dispensing medication in a high volume out-patient

pharmacy were significantly lower at an illumination level of 146 foot candles. Noise levels in most hospitals are higher than what WHO recommends. Common sources of noise include telephones, alarms, shift changes, trolleys, staff caring for other patients, door closings, staff conversations and patients crying or coughing. Noise can significantly be reduced by proper design and management measures in place. Nurses spend a lot of time walking which includes the time to locate and gather supplies and equipment and to find other staff members. One study found that 28.9 percent of nursing staff time was spent walking. Unnecessary walking leads to a waste of precious staff time and adds to fatigue and stress among staff. Studies suggest that bringing staff and supplies physically and visually closer to the patient help reduce walking. To take advantage of the idea many hospitals incorporate decentralized nurses stations and supplies servers next to patient rooms. This allows for increased time spent on direct patient care activities. One important way to avert adverse events related to patients is for the staff to have the ability to observe patients continuously and provide assistance as needed. Multiple decentralized nurse work areas and charting alcoves next to patient room help facilitate this activity. Hendrich showed that falls were cut by two-thirds after a move from an old unit with a centralized nursing station to a new unit with decentralized observation units.

Design for adaptability

Complexity of hospital operations and ever improving technology demands frequent alterations and expansion of buildings. The aim of hospital architect should be to design a building that inhibits change of function least and not that fits specific to facilitate the docking of mobile and plug-in modules. In future we may have specialized major diagnostic and therapeutic equipment manufactured in pre constructed modules intended for docking at strategic points. One should anticipate as far as possible where changes are most likely to occur, to provide maximum flexibility in design. Master planning remains a basic tool in planning for an unknown future,

yet its success depends on the clients understanding of architectural ideas and willingness of successive hospital authorities to honor the architect's original vision. In terms of providing expansion possibilities horizontal expansion is preferred to vertical although it requires large areas of land and consideration of walking distances. A concern for maximizing flexibility continues to be achieved by modularity, full or partial interstitial spaces and the separation of functions. Some of the areas of the hospital can be left unfinished to accommodate inward growth.

Security concerns

Security planning should proceed hand in hand with the architectural design process. The architect should acquaint himself with the range of security factors that affect design. Waiting until the last stages of the design process to begin thinking about security system requirements can spell trouble for budgets and construction schedules and is a sure way to guarantee that the system installed is less than optimal. Control of access has to be complemented by control of egress. Material property and information must be protected from harm. Connection between security and fire protection is obvious. Effective security is always an interplay of three elements: natural and architectural barriers, including anything from landscaping strategies that discourage access, to the number, location, size and type of doors and windows, human security including the protection provided by guards and other personnel and electronic security provided by any one of the array of systems available. Local building codes regarding ease of egress during fire and other emergency situations present another set of issues affecting building security. The design strategies that will ensure that a building is both secure and accessible to the disabled need to be carefully thought out, especially since this is new territory that remains relatively unexplored. Specialized functions within health care facilities also show how security needs are sometimes intimately linked to other aspects of facility management. This can be clearly seen in the containment and disposal of infectious and

other hazardous wastes where physical spaces and procedures must be carefully monitored to prevent liability suits. Security engineers help architects optimize a building's security system. Interaction between the architect and a security consultant can help with the minor details of architectural specification and decision-making, e.g. if a client plans to begin with a system of mechanical locks but hopes to convert to electronic door locks at a later time the security engineer can ensure that adequate conduits, cables and spaces to ease that transition are installed at the beginning.

Green building

Modern hospitals have earth friendly features which result in what we call Green building. Green building design features include cool roofs, low VOC materials and finishes, furniture and other contents built from recycled materials, high performance glazing, solar shading and efficient ventilation that uses fresh outdoor air. Cool roofs reflect solar heat to reduce air conditioning costs. Polyvinyl Chloride (PVC) is widely used in health care. PVC disintegrates to produce large volume of organochlorine which is a health hazard. VOCs are potentially harmful gases such as benzene, formaldehyde which are released into air by new interior finish materials.

Construction of building at an angle to sun is important. The major orientation of the building to face north and south maximizes use of natural light. Shades on south block unwanted direct sunlight. Rain water can be harvested. Waterless or ultra low flush toilets and low flow shower heads minimize waste water. Digital devices can be used in place of mercury devices. Landscaping, plenty of greenery and scenic views can be soothing to the eyes of patients and staff. Natural sounds including those created by running water have a calming and relaxing effect. This is used in the form of fountains. Energy-efficient features help the health care industry spend less on energy consumption. Some of the energy efficient building options are reflective roofing or cool roofs which reduces AC charges by 20 to 70 percent, high efficiency glass block heat and keep out cold, natural lighting allow more sunlight and less electricity spent on lighting,

alternative power sources such as solar or wind, high efficiency light fixtures with occupancy sensors, roof top gardens, buying organic foods, more efficient and alternative fuel vehicles, consider heat recovery systems, install lighting control system, install equipment to measure water and energy performance. In addition use rapidly renewable building materials such as bamboo flooring, strawboard, linoleum, etc. Use durable products and materials that require low maintenance track efforts to comply with recycling, think green during construction and comply with recycling, establish a team to monitor progress towards environmental goals.

Seismic design

The earthquake resistance of buildings depends upon three quite different processes in design. First is the overall layout of the building which determines the magnitude of the forces which come onto the building and their distribution, a distribution which is important in the vertical direction as well as in horizontal direction. Secondly there is the ability of the various parts of the building to resist these forces, the strength of individual members and the connection between them. Thirdly those aspects of construction which are rarely mentioned at all: non-structural or architectural aspects of building, non-load bearing walls and finishes. There behavior is quite independent from that of the main structural elements and is a serious danger to people or building.

There are three stages in ensuring adequate earthquake resistance. First there must be an adequate code to guide engineering designers. Secondly the provisions of the code need to be incorporated into designs and thirdly there must be a means of inspection to ensure that buildings are actually built according to appropriate designs and specifications. If met these three requirements cover the engineering aspects of buildings. They do nothing to ensure that architectural design is sensible and does not result in large forces with which the engineer has to cope, nor do they ensure that the non-structural components of the building are designed with earthquake effects in mind. Architects need to

take care of the forces generated by earthquake and the effect they have on hospital structure. Architects also need to take care of those aspects of the building which do not come under engineering scrutiny, e.g. suspended ceilings, non-load bearing partitions, etc. The architectural aspects of the earthquake performance of buildings are those features that are decided by architect before the engineer makes his contribution. On the other hand the architect may select or design non-structural elements or decide upon their configuration without reference to the engineer. Earthquake resistance is a shared architectural and engineering responsibility. Proper utilization of metallic truss especially in vertical columns and corners help to withstand earthquakes. Architects have started using seismic dampers in the form of friction pendulum bearings in one of the most modern hospitals in northern California. The first base isolated hospital will be able to move up to 30 inches horizontally and 2 inches vertically without incurring major damage during an earthquake of at least a magnitude of 8.0. In the base isolation system, 176 bearings were positioned between the foundation and the columns in the building. When an earthquake hits, the building slides on the bearings in a gentle pendulum motion. The ground beneath may move vertically, but it is independent of the building. Earthquakes generate strong forces that show up as strong lateral acceleration of the building. The buildings need to be exceptionally strong. The strong lateral acceleration generated during earthquakes at ground can magnify the problem at the roof generating twice the acceleration at upper levels of the building. Health care design firms use Building Information Modeling (BIM) technology to generate 3-D model of the entire project. The project firms are able to digitally model and integrate their respective systems into 3-D including mechanical, structural, electrical and plumbing system. The project team can use software to test various systems. The building information model can also enable the design team to simulate and create "halo" areas or clear zones around each of the base isolators to ensure that their movement during an earthquake would not cause them to collide with anything else.

Floor deflection and vibration is a major concern with steel floor system, especially under sensitive medical equipment. Concrete floor mass and monolithic construction can also address the design team's concern for deflection and vibration. Stair and elevator shafts are cast in place concrete and provide lateral force resistance and building stability. Higher strength concrete provides the added stiffness to control drift without additional shear walls.

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chapter 16

Hospital infection control measures

Nosocomial infections are infections that develop within a hospital or are produced by microorganisms acquired during hospitalization. Nosocomial infection can involve patients, staff, visitors, volunteers and delivery personnel. Nosocomial infections may become apparent while the patients are still hospitalized, however the onset of disease can occur after a patient has been discharged. Infections incubating at the time of the patient's admission to the hospital are not nosocomial, however they can serve as a ready source of infection for other patients or personnel. To determine whether a nosocomial infection problem exists in a particular hospital, one must relate the current frequency of cases to the past history of disease in that institution. To characterize the disease's frequency as sporadic, endemic or epidemic investigators must know something of the past occurrence of that disease in relation to time, place and person.

The center for disease control and prevention (CDC) has estimated that 88,000 patients die as a direct or indirect result of nosocomial infections in US hospitals annually. Nosocomial infections result in additional suffering, prolong stay and increase the cost of care significantly. With prospective payment plans, about 95 percent of the excess costs due to nosocomial infections have not been reimbursed by third-party payers in the US. It is therefore to the hospitals advantage to prevent infections because this saves lives and also the hospital money. Surgical wound infections also cause prolongation of hospital stay and excess cost. Urinary tract infections, the least severe but most frequent nosocomial infection have been associated with prolongation of stay ranging from one to three days in different studies.

Hospital infection control programs were introduced three decades ago to control nosocomial infections. Most effective programs in a study were associated with a 32 percent relative

reduction in nosocomial infections as compared with hospitals lacking infection control programs. Health care organizations can demonstrate a commitment to preventing transmission of infectious agents by incorporating infection control into the objectives of the organization's "patient and occupational safety programs."

A key administrative measure is provision of fiscal and human resources for maintaining infection control and occupational health programs that are responsive to emerging needs. Specific components include:

- Bedside nurse
- Infection prevention and control professional (ICP) staffing levels
- Inclusion of ICPs in facility construction and design decisions
- Clinical microbiology laboratory support
- Adequate supplies and equipment including facility ventilation systems
- Adherence monitoring
- Assessment and correction of system failures that contribute to transmission
- Provision of feedback to health care personnel and senior administrators
- Institutional leadership.

Infection control committee

An infection control committee should be present in every hospital and should have representation from most hospital departments. Although infection control committee is often independent and decisions taken are binding throughout the hospital they may require approval by top management. The committee has representation from the disciplines of medicine, surgery, obstetrics and gynecology, pediatrics, pathology, administration, nursing, microbiology section of the hospital laboratory, etc. The committee meets regularly usually monthly to deal with current developments and problems. The multidisciplinary representation is important for at least three reasons: first, since infection problems and control measures often cross departmental lines, effective decision-making requires regular participation of members from most departments. Second, to carry-

out the committee decision it is most effective to have committee members exert influence in their respective departments to ensure agreement and compliance. Third, multidepartmental representation acts as a advocate for the whole hospital and negates the interests of any individual departments.

Infection control physician is a physician who has special training in epidemiology. The position of the chairperson of the infection control committee is either held by administrator or by the hospital epidemiologist. Most of the teaching hospitals now have a full time hospital epidemiologist.

Infection Control Practitioner (ICP) or infection control nurse occupies the key position in the infection control program. There is agreement in the literature that one ICP per 250 acute care beds is no longer adequate to meet current infection control needs. A ration of 0.8 to 1.0 ICP per 100 occupied beds is an appropriate level of staffing. Infection control nurse holds a nursing position equivalent to nursing supervisor or higher and obtains advice and supervision from infection control physician. Infection control nurse should have had a training course in infection control. Infection control nurse should spend approximately half of her time on surveillance, one fourth on policy developments and the rest about equally divided between training, consulting and investigating potential outbreaks. Post of ICP can also be held by senior technologist with training in infection control.

Infection control Nurse liaison: The bedside nurse on a patient care unit is an infection control liaison nurse or link nurse who increases the awareness of infection control at the unit level, implements new policies or control interventions at unit level though maintaining the primary role as bedside caregiver.

A CDC study found that the most important predictors for infection control programs for covering infections were (in decreasing order of importance).

- Intensity of surveillance.
- Intensity of control measures.
- The ratio of the number of infection control practitioners (ICPs) to the number of patient beds.

- Having a trained hospital epidemiologist on staff.
- Providing surgical wound infection rates to surgeons.

There is an increasing evidence that the level of bed side nurse-staffing influences the quality of patient care. If there is adequate nursing staff it is more likely that infection control practices including hand hygiene and standard and transmission based precautions will be given appropriate attention and applied consistently. Over and hurried workers are likely to cut corners and this has resulted in epidemic infection in some situations.

Surveillance for hospital associated infections

Surveillance is an essential tool for case finding of single patients or clusters of patients who are infected or colonized with epidemiologically important organisms such as *S. aureus, S. pyogenes, C. difficile*, influenza virus, etc. Surveillance is defined as the ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality and to improve health. Surveillance of both the process measures and the infection rates to which they are linked are important for evaluating the effectiveness of infection prevention efforts and identifying indications for change. Surveillance is the only component of infection control program that results in reduced rates of nosocomial surgical site infections, pneumonia, urinary tract infection and bacteremia in acute care hospitals. The essential elements of a surveillance system are: (a) Standardized definitions; (b) Identification of patient populations at risk for infection; (c) Statistical analysis; (d) Feedback to caregivers.

It is of utmost importance to define carefully the events to be studied. For example, it is necessary to define or establish criteria to decide what will be called a urinary tract infection and what will be considered urinary catheterization. CDC has published guidelines for determining the presence of nosocomial infections. These guidelines are not rigorous definitions of disease but instead serve as practical, operational definitions for most hospitals. Data

gathering through surveillance of high-risk populations, device use, procedures and facility locations are useful for detecting transmission trends. Identification of clusters of infection should be followed by a systematic epidemiologic investigation to determine commonalities in persons, places and time and guide implementation of interventions and evaluation of effectiveness of those interventions. Targeted surveillance based on the highest-risk areas or patients has been preferred over facility—wide surveillance for the most effective use of resources however, surveillance for certain epidemiologically important organisms may need to be facility wide.

Some of the active and passive case finding methods used in surveillance in US hospitals are:

Active techniques

- Culture reports other than blood cultures are routinely reviewed and cases of suspected infections are investigated further.
- Blood culture reports are routinely reviewed and cases of suspected sepsis are investigated further.
- Hospitalized patients and their charts are examined on ward rounds by the infection control personnel.
- Ward nurses, physicians and other personnel are contacted regularly for reports of newly infected patients.
- Nurses vital charts are screened regularly to find new cases of hospital acquired infection.

Passive techniques

- Special infection report forms are filled out by ward nurses or physicians to alert the IC staff to new cases of infection.
- Charts of discharged patients are reviewed by the infection control personnel.
- Charts of discharged patients are reviewed by the medical records librarian to detect hospital acquired infections.
- Discharged patients or their physicians are surveyed regularly to identify cases of infection with onset after discharge.

The active techniques of case finding are strongly preferred to the passive techniques. Periodic ward rounds by ICP are an integral part of an effective surveillance programs. New infections are identified and previously identified are followed-up.

Clinical microbiology laboratory support

Health care organizations need to ensure the availability of the recommended quality of laboratory services, a sufficient number of appropriately trained laboratory staff members and systems to promptly communicate epidemiologically important results to those who will take action, i.e. Infection control committee members.

Adherence of health care personnel to recommended guidelines

Adherence to recommended infection control practices decreases transmission of infectious agents in health care settings. Health care personnel must use Personal Protective Equipment (PPE). PPE refers to variety of barriers and respirators used alone or in combination to protect mucous membranes, air ways, skin and clothing from contact with infectious agents. The selection of PPE is based on the nature of the patient interaction and likely mode of transmission.

Gloves

Gloves are used to prevent contamination of health care personnel hands when; (a) Anticipating direct contact with blood or body fluids, mucous membranes, non-intact skin and other potentially infectious material; (b) Having direct contact with patients who are colonized or infected with pathogens transmitted by the contact route, e.g. RSV; (c) Handling or touching visibly or potentially contaminated patient care equipment and environmental surfaces. The selection of glove type for non-surgical use is based on a number of factors including the task to be performed, anticipated contact with chemicals and chemotherapeutic agents, latex sensitivity, sizing and facility policies for creating a latex free environment. For contact with blood and body fluids during nonsurgical patient

care, a single pair of gloves generally provides adequate barrier protection. However there is considerable variability among gloves, both the quality of the manufacturing process and type of material influence their barrier effectiveness. Vinyl gloves have higher failure rates than latex or nitrile gloves. Heavier reusable utility gloves are indicated for non-patient care activities such as cleaning surfaces. During patient care, transmission of infectious organisms can be reduced by adhering to the principles of working from clean to dirty and confining or limiting contamination to the surfaces that are directly needed for patient care. It is sometimes necessary to change gloves during the care of a single patient to prevent cross-contamination of body sites. When gloves are worn in combination with other PPE, they are put on last. Hand hygiene following gloves removal further ensures that the hands will not carry potentially infectious material that might have penetrated through unrecognized tears or that could contaminate the hands during glove removal.

Isolation gowns: Isolation gowns are always worn in combination with gloves and when other PPE are indicated. Gowns are usually the first piece of PPE to be donned. Isolation gowns should be removed before leaving the patient care area to prevent possible contamination of the environment outside the patient's room. Isolation gowns should be removed in a manner that prevents contamination of clothing or skin. The outer contaminated side of the gown is turned inward and rolled into a bundle and then discarded into a designated container to contain contamination.

Masks

Masks are used for three primary purposes in health care settings: (1) Placed on health care personnel to protect them from contact with infectious material from patients; (2) Placed on health care personnel when engaged in procedures requiring sterile technique to protect patients from exposure to infectious agents carried in health care worker's mouth or nose; (3) Placed on coughing patients to limit potential dissemination of infectious respiratory secretions

from the patient to others. Wearing of masks, eye protection and face shield in specified circumstances when blood or body fluid exposures are likely to occur is mandated by the OSHA blood borne pathogens standard.

Goggles, face shields: Face shields provide protection to other facial areas in addition to eyes. Removal of a face shield, goggles and mask can be performed safely after gloves have been removed and hand hygiene performed. The ties, ear pieces and head band used to secure the equipment to the head are considered clean and therefore safe to touch with bare hands. The front of a mask, goggles and face shield are considered contaminated.

Respirator

Respiratory protection requires the use of a respirator with N95 or higher filtration to prevent inhalation of infectious particles. OSHA program components include medical clearance to wear a respirator, provision and use of appropriate respirators, education on respirator use and periodic reevaluation of the respiratory protection program when selecting particulate respirators. Models with inherently good fit characteristics are preferred and could theoretically relieve the need for fit testing. A user seal check should be performed by the wearer of a respirator each time a respirator is donned to minimize air leakage around the face piece. Retesting is indicated if there is change in facial features of the wearer, onset of a medical condition that would affect respiratory function in the wearer or change in the model or size of the initially assigned respirator, CDC currently recommends N95 or higher level respirators for personnel exposed to patients with suspected or confirmed tuberculosis, SARS, small pox, influenza, etc. Respirators are also currently recommended to be worn during the performance of aerosol generating procedures (e.g. intubation, bronchoscopy, suctioning) on patients with SARS, avian influenza, pandemic influenza, HINI virus, etc.

Prevention of needle and sharp related injuries

Injuries due to needles and other sharps have been associated with transmission of HBV, HCV and HIV to health care personnel. The

prevention of sharp injuries has always been an essential element of universal and now standard precautions. Proper disposal of biomedical waste and sharps as per biomedical waste management and handling rules is a legal binding on generators of such waste.

Visitors as sources of infection

Visitors can be a source of several types of hospital acquired infections. Such infections can be prevented by active and passive screening of visitors. Passive steps involve use of sign boards to alert family members and visitors with signs and symptoms of communicable diseases not to enter clinical area. More active screening tool or questionnaire which elicits information related to recent exposures or current symptoms. The information is reviewed by facility staff and the visitor is either permitted to visit or is excluded. Considering the experience of 2003 SARS outbreak and potential for pandemic influenza HINI out break, developing effective visitor screening will be beneficial. Barrier precautions can be used by family members and visitors depending on the level of interaction and organism suspected.

Respiratory hygiene/cough etiquette

New elements have been added to standard precautions. These are respiratory hygiene/cough etiquette and use of masks for insertion of catheters or injection of material into spinal or epidural spaces via lumber puncture procedures. While most elements of standard precautions evolved from universal precautions that were developed for protection of health care personnel, these new elements of standard precautions focus on protection of patients as well.

The respiratory hygiene/cough etiquette is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections and applies to any person with signs of illness including cough, congestion, rhinorrhea or increased production of respiratory secretions when entering a health care facility. These elements includes:

- Education of health care facility staff, patients and visitors.
- Posting sign boards in local language about do's and do not's.

- Covering mouth and nose when coughing.
- Hand hygiene after contact with respiratory secretions.
- Spatial separation ideally > 3 feet of persons with respiratory infections in common waiting areas when possible.

Safe injection practices

The main reason for outbreaks related to injection practices have been:

- Reinsertion of used needles into a multiple dose vial or solution container
- Use of single needle/syringe to administer intravenous medication to multiple patients

A survey of US healthcare workers found that one to three percent reused the same needle/syringe on multiple patients.

Isolation practices

Both positive and negative pressure rooms should be maintained in hospitals with specific engineering specifications.

Airborne infection isolation

Every acute care inpatient facility should have at least one room equipped for patients with air borne infections. The number of such rooms will depend on the type of hospital and disease pattern in the population. Airborne infection isolation (AII) refers to the isolation of patients infected with organisms spread via airborne droplet nuclei < 5 um in diameter. This isolation area receives numerous air changes per hour > 12 ACH for new construction and > 6ACH for constructions before 2001 and is under negative pressure such that the direction of air flow is from outside adjacent spaces into the room. The air in an AII room is preferably exhausted to outside but may be recirculated provided that the return air is filtered through a high efficiency particulate air filter. There has to be close monitoring of air flow direction using manometers or temporary or installed visual indicators (smoke tubes and flutter strips) placed in the room with the door closed. AII rooms are constructed either with or without an

anteroom. When recirculation of air from AII rooms is unavoidable, HEPA fitters should be installed in the exhaust ducts leading from room to the general ventilation system. UVGI (ultraviolet germicidal irradiation) can be placed in the ducts as an adjunct measure to HEPA filtration but cannot replace HEPA filter.

Protective environment

Protective Environment is a specialized patient care area in the hospital with a positive air flow relative to the corridor (i.e. air flows from the room to the outside adjacent space). The combination of HEPA filtration, high number of air changes per hour (> 12ACH) and minimal leakage of air into the room creates an environment that can safely accommodate patients who are immunocompromised, e.g. who have undergone stem cell transplant. Self closing doors are mandatory for both of these areas to help maintain the correct pressure differential.

Hand-hygiene practices

Hand wash is important to reduce potential risks of transmission of microorganisms to patients, to reduce health care worker infection caused by organisms acquired from the patient, to reduce morbidity, mortality and costs associated with health care associated infections. Indications for hand hygiene are contact with patients intact skin, contact with environmental surfaces in the immediate vicinity of patients and after glove removal. Education is the corner stone in improving hand hygiene practices. When hands are visibly dirty or contaminated with blood or body fluids wash hands with soap and water. If hands are not visibly soiled use an alcohol based hand scrub for routinely decontaminating hands. Washing hands with soap and water after each use of alcohol hand scrub is not necessary and not recommended because it may lead to dermatitis. However because personnel feel a build up of emollients on their hands after repeated use of alcohol hand gels, washing with soap and water after 5 to 10 applications of gel has been recommended. Pocket carriage of alcohol based hand rub solutions combined with availability of bed side dispensers has been associated with substantial improvement

in adherence to hand hygiene. To avoid confusion between soap and alcohol hand rubs, dispensers should not be placed adjacent to sinks. Do not add soap to a partially empty soap dispenser. This practice of topping up dispensers can lead to bacterial contamination of soap. The leading factor for non-compliance to hand hygiene is time constraint. Other reasons reported by health care workers for lack of adherence with hand hygiene recommendations include skin irritation by hand hygiene agents, inaccessibility of hand hygiene supplies, interference with health care worker patient relationship, patient needs perceived as a priority, wearing of gloves, forgetfulness, lack of knowledge of guidelines, high work load and under staffing and lack of scientific information showing a definitive impact of improved hand hygiene on hospital acquired infection rates. Guidelines for hand hygiene in health care settings have been revisited recently by an international group from the US Center for Disease Control and prevention (CDC). Health care Infection Control Practices Advisory Committee (HICPAC), the Society for Health Care Epidemiology of America (SHEA), the Association for Professionals in Infection Control and epidemiology (APIC) and the Infectious Diseases Society of America (IDSA). Recommended indications for hand hygiene during patient care, classified according to their level of evidence are (Table 16.1):

A. Wash hands with a non-antimicrobial soap and water or an antimicrobial soap and water when hands are visibly soiled or contaminated with proteinaceous material (1A)

Table 16.1: CDC/HICPAC system for categorizing recommendations

1A:	Strongly recommended for implementation and strongly supported by well-designed experimental, clinical or epidemiological studies.
1B:	Strongly recommended for implementation and supported by some experimental, clinical or epidemiological studies and a strong theoretical rationale.
1C:	Required for implementation as mandated by state regulation or standard.
II	Suggested for implementation and supported by suggestive clinical or epidemiological studies or a theoretical rationale.

B. If hands are not visibly soiled, use an alcohol based hand rub for routinely decontaminating hands in all other clinical situations described in items listed below (1A)

- Before having direct contact with patients (1B)
- Before donning sterile gloves when inserting a central intravascular catheter (1B)
- Before inserting indwelling urinary catheters, peripheral venous catheters or other invasive devices that do not require a surgical procedure (1B)
- After contact with a patient's intact skin as in taking pulse or blood pressure or lifting a patient (1B)
- After contact with body fluids or excretions, mucous membranes, non-intact skin or wound dressings as long as hands are visibly soiled (1A)
- If moving from a contaminated body site during patient care (II)
- After removing gloves (1B)

C. Wash hands with antimicrobial/non-antimicrobial soap and water if exposure to *Bacillus anthracis* is suspected or proven. The physical action of washing and rinsing hands under such circumstances is recommended because all antiseptics have poor activity against spores.

Disinfection

Medical equipment surfaces can become contaminated with infectious agents and contribute to the spread of health care associated infections. Environmental surfaces can also contribute to cross transmission by contamination of health care personnel from hand contact with contaminated surfaces, medical equipment or patients. In an investigation of the cleaning of hospital floors the use of soap and water was less effective (80%) in reducing number of bacteria than a phenolic disinfection (94%). However, a few hours after floor disinfection, the bacterial count is nearly back to the pretreatment level. Reasons exist for using a detergent alone on floors because non critical surfaces contribute minimally to endemic health care associated infections and no difference has been found in health care-associated infection rates when floors are cleaned

with detergent rather than disinfection. Spot decontamination of fabrics that remain in hospitals or clinic rooms while patients move in and out also should be considered. One study demonstrated the effectiveness of spraying the fabric with 3 percent hydrogen peroxide. Some hospitals have begun using a new mopping technique involving microfiber materials to clean floors. Microfibers are densely constructed polyester and polyamide fibers that are approximately 1/16th the thickness of human hair. The positively charged microfiber attract dust and are more absorbent than a conventional cotton loop mop.

Following measures need to be taken to reduce the frequency of bacterial growth in disinfectants and the threat of serious health care associated infections from the use of such contaminated products:

- Some disinfectants should not be diluted
- Do not use contaminated containers for dilution if required
- Stock solutions of germicides must be stored as indicated on the product label.

Microorganisms may be protected from disinfectants by production of thick masses of cells and extracellular materials or biofilms. Biofilms are microbial communities that are tightly attached to surfaces and cannot be easily removed. These biofilms make microbes resistant to disinfectants.

Ultraviolet radiation

Ultraviolet light is used as a supplemental air cleaning measure in hospitals, but it has only a minimal inactivating effect on fungal spores.

Ultraviolet Germicidal irradiation (UVGI) is also used in air handling units to prevent or limit the growth of bacteria and fungi. Most commercially available UV lamps used for germicidal effect are low pressure mercury vapor lamps that emit radiant energy predominantly at a wave length of 253.7 nm which is near the maximum microbiological activity. Two systems of UVGI have been used in health care settings: duct irradiation and upper room air irradiation. In duct irradiation systems, UV lamps are placed inside ducts that remove air from rooms to disinfect

the air before it is recirculated. When properly designed, installed and maintained high levels of UVGI can be attained in the ducts with little or no exposure of persons in the rooms. In upper room air irradiation UV lamps are either suspended from the ceiling or mounted on the wall. UVGI units have two basic designs (a) A pan fixture with UVGI unshielded above the unit to direct the irradiation upward; (b) A fixture with a series of parallel plates to columnize the irradiation outward while preventing the light from getting to eyes of the room occupants.

Design considerations

Infection control has to be kept in mind when designing hospitals. Traffic flow has to be regulated so that there is no criss cross. Operating suite needs to be zoned with sterility increasing from protective zone to the sterile zone. Sterile supplies should be segregated from non sterile supplies. The corridors leading to OT and intensive care areas should not be used as thorough fare corridors. In wards the flow of supplies should be such that sterile supplies do not mix-up with non-sterile supplies.

Sterilization

Proper sterilization of supplies and equipment is backbone of any infection control process. Sterilization by equipments like autoclave, ethylene oxide and plasma sterilizers has been recommended. Central Sterile Services Departments (CSSD) are established in hospitals to ensure proper sterilization of equipment and also its monitoring. In large hospitals separate sterilization facilities Theater Sterile Services Unit (TSSU) are recommended for theaters.

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chapter 17

Digital hospital

Sky rocketing costs, reports of medical errors, consumers demanding better care and the ever-growing need to move away from paper charts are all restructuring the health system. For a while experts in information technology have been luring hospitals to slim down on the paper patient files and prescription slips and get into better digital shape. While many of the individual pieces of equipment in health care are now computerized, capturing data from these devices and storing in a centralized system which allows for an effective transmission of information to right people, at right time lag far behind. The concept of a digital hospital might evoke images of an impersonal facility but the reality is just the opposite. By definition the digital hospital is connected which leads to better efficiency and information flow laying the ground work for better patient care. One reason that hospitals have been slow to adopt such tools is that they are expensive. Now several big players in health care and data management are bringing their expertise and money to bear on the problem. It may include patient beds with information screens connected to a central data base, electronic medical records storage, digital imaging of X-ray films and wireless communication network that will permit doctors and nurses to update and access patients medical records using hand held devices. Data is available to every department, so prescription can be automatically checked for possible interactions and tests won't be repeated in different departments.

More and more hospitals across world are embracing health information technology and its benefits for quality of care and patient safety. Hospitals also reported dramatic increases in the use of computerized alerts to provide negative drug interactions. Fifty-one percent of American hospitals were using real time drug interaction alerts in 2006.

The size of the hospital also plays considerable role in its IT use. The hospital with 500 beds or more show 74 percent use of

moderate or high health IT in 2006 in US whereas only 23 percent of hospitals with 50 or fewer beds were in the top two levels of IT use. Hospitals in urban areas, teaching hospitals and with better financial health use more IT.

Digitally advanced hospitals experience greater reductions in the average length of patient stay and larger increases in operating revenues. Health care services productivity has risen about 2 percent annually since 2001. Recent developments in IT made the idea of a digital hospital seem logical and cost effective. Not only could electronic transmission help eliminate errors, it could also eliminate two or three hours a day that nurse spend charting patient data and dramatically improve communication between different departments. Experiences of hospitals in developed countries suggest that health care really is making its way into the digital age. Some of these hospitals have successfully put in place an electronic prescription drug system. Information Technology (IT) in hospitals is saving lives. Poor information kills some 7000 Americans each year just by missing drug interaction problems. Early evidence indicates that proper technology can reduce the toll. Hospitals that have begun using electronic prescription systems have seen up to 80 percent fewer prescription errors.

Nurses in these hospitals use wireless laptops on wheels to log in to this system to record patients symptoms and get all the information to shuttle patients through their stay. Doctors tap into the network via wireless laptops or PCs to order prescriptions and lab tests. Everything else is linked into the system from automated pharmacy to radiology. It means moving from scribbled notes and paperwork to networked software that accurately registers and quickly transmits patient records. With touch of a finger doctors and nurses have immediate access to high resolution digital images, laboratory results and medication histories that results in more informed decisions about diagnosis and treatment, which saves time, money and lives. By 2010 the European commission predicts that 5 percent of national health budgets will be invested in e-health systems and services.

Some of the problems encountered before the implementation of Digital hospital are:

- Too much time spent on tedious menial tasks
- No access to critical information at patient's bedside
- Slow retrieval or loss of critical information
- Disruption to patients rest
- Illegible documentation by clinicians
- Slower response time to unexpected abnormal vital signs readings
- Human errors
- Heavy usage of paper.

Through the use of innovative technologies the expected outcomes include:

- Reduction in time spent on tedious menial tasks
- Ability to have access to critical information at the patients bedside
- Faster retrieval of critical information
- Less disruption to patients rest, over all improvement for inpatient stay experience
- Online documentation by clinicians
- Fast response time to unexpected abnormal vital signs readings
- Better reach and care for overseas and traveling patients
- Reduction in human error
- Reduced usage of paper
- Automated tracking of door access data, staff attendance and staff immunization data.

Benefits of digitalization

- Enables sharing of information which leads to better clinical decision making, leading to improved patient care, safety and management across clusters.
- Information technology empowers both clinicians and patients with the power of knowledge and information, anytime anywhere. Through telecare, the secure massaging provides a

human touch through timely replies from clinicians to problems raised by patients.

- Digitalization improves patient doctor relationship and care provision. Clinicians have a convenient and efficient means to access patients medical information thereby improving patient dialogue and care provision.
- Digitalization results in time and cost savings. There are immense time savings which result from online access to complete information versus manual paper based reports and time spent making phone calls to laboratory and radiology departments for information. Nursing staff time to retrieve clinical information for review by clinicians is reduced significantly. There are cost savings for the patients by as much as $100 per patient as repeated laboratory tests and radiology procedures are avoided when a patient goes to another institution.
- There is improved quality of care and enhanced patient safety with quick online access to more complete, better quality and up-to-date clinical information and system alerts for abnormal results, duplicate medication orders and drug to allergy interactions.
- *Clinical quality improvement*: Every hospital in America is thinking about quality. Employees are backing e-solutions for quality improvement.
- *Care management*: The science of care management has been translated into care management protocols and electronic data analysis. In Baltimore specialists from John Hopkins University have developed an electronic ICU monitoring and telemedicine system that tele-monitors ICU patients on 24×7 basis. They showed a 60 percent reduction in severity adjusted mortality, 40 percent fewer complication, 30 percent decrease in length of stay and a 28 percent reduction in cost per case.
- *Reducing variation*: The use of benchmarks among top hospital is providing momentum to e-based initiatives to reduce variation like clinical variation. Among the solucient top 100 hospitals, length of stay averaged 4.1 days last year, which is seven percent lower than national average of 4.4 days. Longer inpatient stays

and more intensive use of resources make a big difference in the financials.

- *Physician networks*: Doctors are showing more interest in computer linkages as more physicians become regular internet users.
- *Medication safety systems*: Medications safety systems like Bridge Medical, an Ameri source Bergen Company based in Solano Beach, Calif use barcodes on unit-dose medication packages checked against a patients drug orders and drug allergies. The wireless computer assisted drug dispensing systems utilize sophisticated software and expert knowledge basis to attack the problem of a 1 to 3 percent estimate of medication errors in many US hospitals. Medication errors cost the nation an estimated $2 billion in terms of cost, lost economic productivity, disability, legal and health care costs.
- *Improved diagnostic accuracy*: Digital technology and diagnostic software can assist with problem of errors in diagnosis.

Process re-engineering

The focus on costs in health organizations is leading to renewed initiatives in re-engineering and process improvement. Capital investments in electronic medical records will pay off because they address one of the greatest inefficiencies in health care because medical records are not mobile, the health system has always moved the patient rather than the information from location to location.

Online recruitment

Internet access and interactive web sites are providing some solutions to health care's staffing crisis. Use of online recruitment is increasing rapidly among health care organizations.

Singapore health services believe there are three main pillars towards building a digital hospital. These are digital ward, digital clinic and Tele-care, Telemedicine and Home care. The digital ward was initiated by Singapore health services with the objective of transfering the way health care professionals capture and access clinical information. The digital ward project is made up of IT

professionals from sing health Innovative Technology Application Group (ITAG). The project team works closely with users such as clinicians, nurses and operations colleagues of various sing health Institutions. Various wireless technologies and devices being implemented in the digital ward are:

Computer on wheels

Computer on wheels (COW) are WiFi notebooks on ergonomically designed mobile trolleys which enable clinicians to access patients medical records and digital radiology images as well as document patients progress anywhere anytime in the ward.

Mobile electronic X-ray computing

Mobile Electronic X-ray Computing is motorized WiFi enabled system with dual, triple or quadruple panel display screens which enable patient's electronic medical records and digital radiology images to be displayed across different screens. Clinicians can access these records and images wirelessly at the patient's bedside to explain various therapies and clinicians options to them. This innovation serves to enrich the face to face communication not only with patients but also with their family members.

VEGA

The integrated wireless VEGA system enables remote automated monitoring of patients vital signs such as blood pressure, pulse rate, electrocardiogram (ECG), pulse oximetry, temperature and respiratory rate. The system also provides proximity contact tracing and location tracking. The patient's vital signs are captured automatically via customized monitoring devices (using WiFi and active RFID technologies) and clinicians can view the vital signs charts online. This reduces potential human errors and enhances patient safety. With this system nurses also spend less time on tedious menial tasks, enabling them to devote more time in delivering quality patient care. In addition patients can have an undisturbed rest without having their signs taken manually by the nurses.

To enable proximity contact tracing specially designed wearable tags are issued to patients and hospital staff in the ward for the purpose of automatically and wirelessly recording and tracking people with whom to come into contact within the ward. The contact data captured in the tag is then automatically and periodically uploaded into the services using industry standard WiFi access points. Hospital staff can search, view and print records of the contact tracing details online.

Patient bedside terminal

Patient Bedside Terminal (PBT) is a touch screen integrated information system that provides both the clinic and patients an efficient and convenient means to access information within the hospital and globally. With PBT clinician can retrieve and display medical record and digital radiology images as well as their medical conditions at patient's bedside. Through the terminal patients can speak to the nurse on duty using a video nurse call function while nurses can order meals for patients electronically instead of ordering manually. In addition patients can also access a wide variety of entertainment and internet services.

Mobile clinical assistant

Mobile Clinical Assistant (MCA) is a specially designed highly portable health care tablet PC equipped with an integrated camera for visual clinical documentation. The build in barcode/RFID reading is used to verify the patient's identification. MCA is also WiFi enabled empowering clinician with secured anywhere, anytime access to hospitals EMR systems and other clinical information. Through the Bluetooth wireless technology it can interface with other medical devices, e.g. vital signs monitors to obtain patient data from existing medical device and directly transmit captured patient data into hospital clinical application in real time.

Such a mobile point of care solution helps in improving the quality of patient care and enhancing the production by enabling clinicians to quickly retrieve and document patient's information. This is especially critical in a fast environment.

Smart card

With smart card technology hospital staff carries only one card for multiple purposes. Besides door access control the same card can be used for tracking of attendance at staff events or trainings. Its tap and track method makes the whole process faster and easier. Staff immunization can be tracked by smart card.

How secure is digital hospital?

Biggest barrier to high technology is security of data. Wireless networks use shared radiofrequencies to move data, so security concerns about this method of information transmission have always been high. Wired Equivalent Privacy (WEP) protocol was meant to be a crack proof method of securing data that was being transmitted using wireless devices by encrypting the data. WEP has major security flaws. A cracker just needs some easily obtained equipment to be able to intercept the wireless transmission, change the data contained in those transmission and access the contents of wireless network. The flaw seriously undermines the security claims of the system. Hospitals use strong encryption and other methods to protect data but actual technology that will be used is under discussion and development. Hospitals make patient records available to doctors and patients via the internet and have not had any security or privacy problems. Vital factors essential for making the jump from personal usage to clinical use include integrating technology into work flow at the point of care, addressing privacy and security concerns and demonstrating how online technologies will help physicians practice medicine more efficiently and effectively.

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chapter 18

Making most of manpower

First and foremost responsibility of human resource manager is recruiting personnel. Most important functions in this respect are:

1. Attraction
2. Selection
3. Retention
4. Development
5. Assessment
6. Adjustment

Attraction involves activities of identifying the job requirements within an organization, determining the number of personnel required and qualities necessary to perform the job and making it public. Selection is the process of choosing the best fit for the job. Retention involves keeping the personnel motivated for performing effectively and ensuring safe and healthy work environment. Development involves enhancing the competence of personnel by improving their knowledge, skills and other abilities. Assessment involves observation and evaluation of performance of personnel. Adjustment involves discipline, promotions and transfers.

An occupation is a group of similar jobs found in different organizations at different times. The term job is used more narrowly and implies a within organization reference. The term occupation implies an across organization reference. The term job analysis describes the process of obtaining information about jobs. It includes information about the tasks to be done on the job and the personnel characteristics necessary to do the tasks.

An overall written summary of task requirements is called job description and overall written summary of worker requirements is called job specification. Together job description and job specification comprise job analysis.

Five popular job analysis methods are:

Job performance

An analyst actually does the job under study to get first hand exposure to what it demands. This method is inappropriate for jobs that require extensive training or are hazardous to perform.

Observation

The analyst records information about a job by actually observing workers on job. Disadvantage of this method is that if the work in question is primarily mental, observations alone may reveal little useful information.

Interview

The jobs which are not easy to perform or where observation is not possible, information about jobs can be obtained by interview. Skills of interviewer and worker suspicion and motives are real concerns.

Critical incident

Larger number of brief actual reports collected give a fairly clear description of jobs in question. It takes considerable time to gather, abstract and categorize the incidents.

Questionnaires

The workers are subjected to a structured questionnaire. Questionnaires are often time consuming to develop but quicker to administer than other methods.

Human resource planning

Human resource planning is defined as an effort to anticipate future business and environmental demands of an organization and to provide the personnel to fulfill that business and satisfy those demands. Human resource planning can be strategic (Long-term and general) or tactical (short-term and specific). At the level of operational or tactical planning, HRP is concerned with detailed

forecasts of employees supply and employee demand. Based on the forecasts specific action plans can be undertaken. These include recruitment, derecruitment, promotions, training or transfers. In labor market forces of supply interact with the forces of demand and thereby determine the price of labor. In a tight labor market reverse is true. One use of human resource information system is in the development of a personnel inventory for human resource planning. To estimate demand for manpower one must know conditions within the organization such as age, distribution of work force, terminations, retirements, etc. This is done by management succession plan which includes setting a planning horizon, identifying replacement candidates for each key position, assessing performance and readiness for promotion, identifying career development needs and integrating the career goals of individual with institutions goal. Another approach that can be used to develop a forecast of the internal supply of human resources is Markov analysis. It tracks past patterns of personnel movements and uses them to project future patterns. A 5 to 10 years base period is used. The longer the base period the more meaningful will each past movement represent a probability of future movement. Demand forecasting on the other hand is beset with multiple uncertainties such as changes in technology, consumer attitudes and patterns of customer requirements and characteristics. Forecasts of human resource demand are often more subjective than quantitative. This can be done by Delphi technique and trend analysis. Delphi technique is an approach for reaching a consensus among experts about future development. In trend analysis we identify an appropriate business factor that relates to the work force in terms of size and constitution. Then we measure the past trends of this business factor in relation to the number of people employed and we project from that what the future trend will be and hence the future demand in terms of manpower.

Making most of health work force

A well performing work force is one that works in ways that are responsive, fair and efficient to achieve the best health outcomes possible given available resources and circumstances. The

performance of manpower depends on availability, competence, responsiveness and productivity. Human resource indicators to assess health work force performance are shown in Table 18.1.

The instruments that influence personnel performance include clear job descriptions, professional norms and code of conduct, the proper matching of skills to the tasks in hand and supervision. Job descriptions that clearly set out objectives, responsibilities and lines of accountability are consistently associated with improved achievement of work goals for all sorts of workers. Health workers are expected to conduct themselves with integrity, selflessly to apply know how and to put the interests of the patients above their own. Professional codes of conduct are often instilled through unwritten channels and take time to develop, but can become a significant source of internal motivation. Many employers are now introducing written codes of conduct for all their employees. To have the desired effect such rules and regulations need to be well publicized and actions taken when they are broken. Tasks to be performed must match an individual workers skills. Workers are not always at work at the times when work load is highest. Shift patterns and time flexibility provide a way to increase workers productivity. Delegation is another way to increase over all worker productivity. Supervision especially coupled

Table 18.1: Human resource indicators to assess health workforce performance

Dimension	Possible indicators
Availability	Staff ratios Absence rates Waiting time
Competence	Individual: prescribing practices Institutional: readmission rates, live births, cross-infections
Responsiveness	Patient satisfaction; assessment of responsiveness
Productivity	Occupied beds, out patient visits, interventions delivered per worker or facility

Adopted from human resource indicators to monitor health service performance keele University

with audit and feedback to staff, has been consistently found to improve the performance of many types of health workers from providers to managers. Supervision is not effective if it is used as a fault finding and punitive tool. Supervision that is supportive, educational and consistent and helps to solve problems can improve performance, job satisfaction and motivation. Every health worker needs some key supports to perform his or her job: remuneration, information and infrastructure including equipment and supplies. Three aspects of remuneration influence the behavior of health workers: the level and regularity of pay, the way people are paid and other incentives. Health workers must be paid reasonably for the work they do. They need to receive a living wage, they also need to believe that the wage is commensurate with their responsibilities and that it is fair when compared with others in the same or equivalent jobs. Salary increases alone are not enough to change performance. These must be combined with other strategies to create significant change. Any efforts to improve overall work force productivity need to be based on reliable data about work force level, distribution and skill mix, coupled with information on the factors thought to be constraining better health worker performance and intelligence on potential policy options. No matter how motivated and skilled health workers are, they cannot do their jobs properly in facilities that lack clean water, adequate lighting, heating, vehicles, drugs, working equipment and other supplies. The physical environment needs to be safe. Health workers require up-to-date knowledge to perform well. Rapid increases in knowledge and changing health systems make this need even more essential today. Off site training courses have a poor track record for changing the actual practice of health workers. In service training is most likely to change worker behavior when it is interactive, based on real life problems and coupled with continuing, intermittent support.

An extremely important part of professional treatment lies in the manager's leadership style. Authoritarian approaches are less likely to work with professional employees than with non-professionals. On the other hand, consultative and participative approaches are far more appropriate to professional employees. Frequent conflicts

arise as managers and professionals collide in matters of professional versus managerial judgment. In some such conflicts it is all too common for the authoritarian manager to wield the authority of the boss and overrule the professional. In an industry such as hospitals in which many judgments involve patient safety, however both the parties have equal responsibility for making judgments. The leader has to keep his manpower motivated to produce the best results. The motivation to work is not present to an equivalent degree in all persons. The importance of work as part of one's life varies from top priority to last place. Popular theories of motivation work well with some people and combination of these theories work well with most people. Abraham Maslow's theory (1943) of motivation says that people in their drive to advance themselves and improve the quality of their lives, tend to move upward through a hierarchy of needs. When a given level of a need is met, an individual aspires to meet the next level in the hierarchy. The needs proceed from lower to higher levels in this manner: physiological needs (food, thirst, sex, etc.), safety needs, affiliation needs (acceptance needs, social needs), esteem needs (recognition) and need for self actualization (personal fulfillment). Frederick Herzberg concluded that true motivators are inherent in the work and he called them hygiene factors, i.e. those things making up the environment surrounding the work are not motivators but rather potential dissatisfiers. Herzberg classified factors having a bearing on individuals relationship with their work into environmental factors and motivating factors. Environmental factors even if present do not necessarily motivate but if not acceptable have a strong potential to act as dissatisfiers. Some of the environmental factors which act as dissatisfiers when absent are; appreciation of one's efforts, tactful discipline and reasonable privacy, opportunity for growth and advancement, feeling of security, working conditions, etc. True motivation factors are opportunities to learn, achieve, assume responsibility, work that is interesting and challenging, etc. A manager has lot of opportunities to keep his staff motivated provided he has full knowledge and understanding of different motivational theories. Frequently managers in pursuit of their ego and authoritarian behavior make a mess of things. The

primary reason is their lack of knowledge and understanding of vital organizational issues. Here comes a need for a qualified hospital administrator who can use his skills and tools appropriately. He has to use different leadership styles and skills at different times and with different class of employees. There is need to attract meritorious students into the specialty of hospital administration who when trained can utilize resources provided to them in an optimal manner. The manager can influence both motivating factors and environmental factors. However, it also depends on the job and partly on the organization and in particular on how much latitude the individual managers are allowed. Managers must conduct exit interviews to study the factors that led employees to leave the job.

Mc Gregor gave theory X and Y of leadership in his work "The human side of enterprise". Theory X says that people have an inherent dislike for work and they need to be directed and controlled actively to achieve the goals. This theory believes in pure autocratic leadership. In health care organizations this applies to lower class employees like sanitary workers, etc. Theory Y on the other hand believes that people are not naturally passive or resistant to work. If they appear to have become so, the reason lies in the management of organization. The management must organize conditions and methods of operation in a way that people are motivated to achieve the best.

Performance appraisal

Performance appraisal's which were the least favorite tasks for most managers are becoming more common now. The primary purpose of performance appraisal is to encourage improved performance for employee in job and to provide opportunity for those employees who wish to expand their knowledge and pursue promotion and growth. The performance appraisals should not be negatively oriented focusing primarily on criticism and fault finding. To start with each employee is given a chance of self appraisal and is asked to access his performance in the organization himself. He writes the appraisal and then appraisal interview is conducted. In performance appraisal systematic description of an employee's job-relevant strengths

and weaknesses is done. Feedback is provided to the employees. Those who are outstanding performers are promoted (Fig. 18.1). Performance appraisals interfere with more constructive supervisor-subordinate coaching relationships. Appraisal tend to encourage the superior position of the supervisor thus, countering his vital role of a coach. The appraisal system should be relevant, sensitive, reliable, acceptable and practical. Formal appraisal should be done once or best twice a year. Many rating formats focus on employee behaviors either by comparing the performance of employees to each other (relative rating systems) or by evaluating each employee in terms of performance standards without reference to others (absolute rating systems). Other rating formats place primary emphasis on what an employee produces, so-called results oriented systems.

Commonly used methods of performance appraisal

Commonly used methods of performance appraisal are:

Ranking

Simple ranking requires a rater to order all employees from best to the worst. In alternate ranking the rater chooses the first best and the first worst, then second best and the second worst and keeps on alternating like this till all are ranked. In paired comparisons each employee is compared with every other employee. These

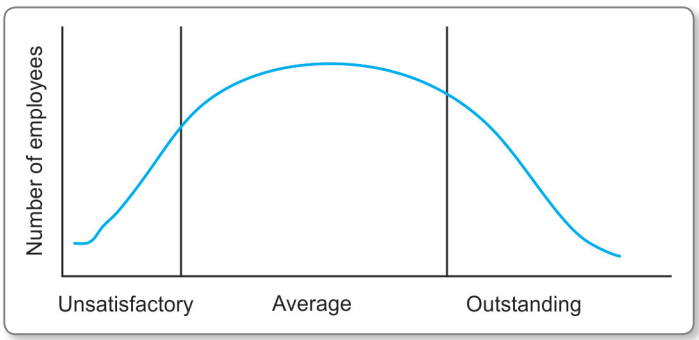

Figure 18.1 Performance of employees

comparisons are based on the overall performance, i.e. present value to organization.

Forced distribution

Over all distribution of ratings is forced into a normal or bell shaped curve. Some of the employees are outstanding, some average and some unsatisfactory. Most of the employees are average performers.

Checklists

The rater here is provided with a series of statements that describe job-related behavior. The task is simply to check which statements best describe the employee behavior. In forced-choice system checklist items are arranged in groups from which the rater chooses statements that are most and least descriptive of each employee. Weights are assigned to all statements and these weight are kept secret from rater. An overall rating for each employee is then derived by applying a special scoring key to the rater's descriptions.

Critical incident

The critical incident approach to appraisal requires that manager keeps a running log of interesting events narrated by each employee. All critical incidents that fall outside the realm of so-called normal performance are recorded as they occur. At the time of formal review the manager simply assembles the series of anecdotal notes into a picture of the employee's over all performance for the year.

Career ladder

Career ladder is the series of internal advancements available to an employee who remains within a particular occupational field. The advancement possibilities are limited by the number of levels on the career ladder and the number of positions available at each level. The biggest problem in health care organizations is when specialists reach the top in their career ladder and remain there for sometime they begin to feel the effects of limited opportunity and feeling of lack of expanding challenge. This is called topping out.

These specialists then aspire for the post of chief executive. These specialists although trained in their field of specialization are not necessarily suited to top management. The result is poor or marginally effective managers. Not only is a specialist lost but resources at hand are also not effectively used. If this position is given to a trained, competent hospital administrator, effective utilization of resource and quality health care can be ensured. Some organizations have established parallel growth paths (parallel path progression) such that more senior and more accomplished employees can acquire pay and benefits equivalent to those associated with top managerial positions. This can ensure advancement in chosen fields of specialists without pursuing movement into management.

Developing pay systems

Pay systems assign monetary value to each job in the organization and an orderly procedure for increasing the same based on merit and seniority. To start with job analysis is done for identifying the relative worth of the job to the organization. Job evaluation is done to rank jobs in terms of relative worth to the organization. EN Hay developed one of the popular methods of job evaluation. He compared those aspects of jobs that were common to all jobs rather than comparing whole jobs. Three factors identified were know-how, problem solving and accountability. Evaluation committee develops a point profile of each job on each factor. Evaluation is done to start with for "Benchmark" jobs, i.e. those which have clear job content, represent large number of inhouse jobs. Total point totals are translated into pay structure after surveying the relevant labor market in industry.

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chapter 19

Managing organizations

Leadership skills

There are three types of skills which a manager should have. Technical skills, i.e. knowledge of the Job, Human skills, i.e. skill needed in dealing with people and conceptual skills, i.e. Vision and Mission and understanding of organization. Technical skills are important for lower level managers. Human skills are needed at all the three levels of managers, i.e. lower level managers, middle levels managers and top level managers but are most important for middle level managers. Conceptual skills are most important for top managers who have to make Policy decisions for the organizations.

Leadership styles

In autocratic style of leadership decisions are taken by the leader and subordinates have to carry them out. In participative management the leader presents a tentative decision that is subject to change, gets suggestions and makes the final decision. The area of decision freedom to subordinates here is much greater. In democratic style of leadership subordinates have a wide range of decision freedom within the boundaries of activity set by the leader.

Delegation

Delegation is a key management function through which a manager gets work done through subordinates. Delegation is important because it means lower management cost as jobs are done by lower level supervisors who are paid less and top level manager gets more time to plan and do those things for which he only has skill, knowledge and authority to handle. Delegation also provides an

opportunity for lower level managers to grow. First step in the process of delegation is to select and define the task to do. The tasks usually delegated are technical in nature. The pure managerial tasks such as planning, decision-making, budgeting, etc. are not delegated. The tasks should be of repeated occurrence in the organization so that time of manager is saved. Second step is to select the person to whom to delegate a task. The person should be ready to accept the challenge. He should be reasonably qualified to do the Job. He should be motivated to do the Job and results expected from him need to be made clear. Sufficient authority needs to be provided for accomplishing the task however the manager continues to retain the responsibility for the task in question. Another step in process of delegation is establishing controls and check points. Since, manager remains accountable for the work he delegates, it is essential to follow through by way of formal and informal meetings, written reports or by walking out. Delegation has been proven to improve effectiveness of managers. Decentralization differs from delegation in that in former both accountability and responsibility is shifted to subordinate manager and it is more useful where greater geographical area is involved.

Management by objectives

Management By Objectives (MBO) has been defined as continual process whereby superior and subordinate managers periodically define their common goals, define each individuals major areas of responsibility in terms of results expected and use agreed upon measures as guides for each operating department and for assessing the contribution of each manager to the work of the entire institution. Basic ingredients of management by objectives are establishing specific goals and objectives which have to be communicated properly to subordinate managers. MBO is not simply getting results done but achieving them within a time frame. There has to be a calendar when specific elements are to be achieved and when goal as a whole is to be completed. Quantifiable mile stones towards an objective can be effective in positive and negative feedback. There has to be coordination

between individual managers and they have to be motivated towards achieving common goals established.

Unionization

Unionization is result of unfulfilled needs of employees in terms of conditions of employment, fairness in work setting and content of employees. Content employees do not unionize. The ability of individuals, and work groups, to have greater responsibility, particularly for professional employees to have some control over the parameters of one's Job and organization change and to be able to obtain satisfaction from employment are important to employees. The hospital manager should be aware of the many factors that cause employee dissatisfaction and individual and group behavior outcomes. If the hospital employees perceive their needs, aspirations and expectations are not being met, they will probably seek for a mechanism to correct them and could be joining a union. Unionization has serious impacts on management not in terms of higher costs due to higher wages but most importantly due to restriction on management to manage. Collective bargaining limits managements flexibility in terms of promotions, demotions, discipline and bring about organizational change. The best strategy is to create an environment which is progressive and constructive with balancing interests of patients, employees and management.

Top management groups of health care organizations have paid dearly for operating under the assumption that all supervisors and middle managers are philosophically opposed to collective arrangements and thus, guaranteed to be on sides of management. Much of what can be said about middle management is the same as what many are saying about professional employees. Specifically middle management frustration and discontent are increasing particularly because of prevailing working conditions, decreasing economies, job security and a declining sense of personal realization and achievement in their jobs. Top managements long-term behavior has great deal to do with whether the organization is a fertile ground for union organizing activity, and the manager's conduct and actions during a union organizing campaign exert a

significant influence on the employee's reaction to the organizing drive. When initially the organizing activity begins the management may know nothing about it. Outside agencies may exploit the situation in the organization by looking for inside organizers, who are active, influential, popular, articulate and discontent with top management. If union organizers feel that ground is not fertile for unionization they simply withdraw without ever making their presence known. If the ground is fertile the organizers step up their activities and attempt to uncover issues to be used for employee support and sympathy. They play on emotions of employees by highlighting instances of unfair treatment and discriminations. Management has to counter such moves by appropriate counter-organizing activities without making any commitments but listening to employees patiently.

Collective bargaining is process of joint decision-making and basically represents a democratic way of life in hospital. It is the process of negotiation between hospital's and workers representatives for the purpose of establishing mutually agreeable conditions of employment. It is a technique adopted by two parties to reach an understanding acceptable to both through the process of discussion and negotiation. International labor organization has defined collective bargaining as negotiation about working conditions and terms of employment between an employer and a group of employees or one or more employee, with a view to reaching an agreement wherein the terms serve a code of defining the rights and obligations of each party in their employment with one another. Collective bargaining involves discussion and negotiations between two groups as to the terms and conditions of employment. It is called "collective" because both the employer and the employee act as a group rather than as individuals. It is known as 'bargaining' because the method of reaching an agreement involves proposals and counter proposals, offers and counter offers and other negotiations.

Management of change

There are two types of leadership in organizations. Transformational management which binds the employees as a group for

achievement of objectives and goals which are laid by leader and transactional which keeps the organization on track once direction is decided. Transformational management may mean that people have to change their behavior or acquire new skills or develop different attitudes. Ideally the aim is to achieve absolute commitment to the proposed direction and objectives. However the ideal cannot always be achieved. The next best thing would be for compliance to the changes. This is where there is an acceptance by staff of the need for change and the approaches to achieving it. The least desirable state of mind is brought about when coercion has to be used to make people change. Transactional leadership deals with day-to-day business.

Change management entails thoughtful planning and sensitive implementation and above all consultation with and involvement of the people affected by the changes. If you force change on people problems arise. Change must be achievable, realistic and measurable. Change needs to be understood and managed in a way that people can cope effectively with. Change can be unsettling and managers need to have a settling influence. Check that people affected by the change agree with or at least understand the need for change and have a chance to decide how the change will be managed. Change should be steady as quick change prevents proper consultation and involvement which leads to difficulties that take time to resolve. Consulting with people and helping them to understand does not weaken your position, it strengthens it. Leaders who fail to consult and involve there people in managing challenges are perceived as weak and lacking in integrity. Responsibility for managing change is with management and executives of the organization, they must manage the change in a way that employees can cope with. Manager's role is to interpret, communicate and enable — not to instruct and impose which nobody really responds to well. If people are not approaching their tasks or the organization effectively then system in the organization is wrong and not the people. Change such as new structures, policies, targets, acquisitions, disposals, relocations, etc. create new systems and environments which need to be explained to people as early as possible so that people's involvement in change process is obtained. Whenever change is brought there are some

people who are in loss. Treat these people with respect and avoid keeping them in dark. They must know what is happening and why. Strong resistance to change is often rooted in deeply conditioned or historically reinforced feelings. Patience and tolerance are required to help people in these situations to see things differently.

The transformational leader can use following approaches:

Integration approach

The aim is to facilitate the integration of individual goals and needs with those of organization. People should understand what has to be done and they must participate in bringing in change.

Educational approach

People must be educated about the need for change and the reason for it.

Contextual change approach

Forced changes in relationships created by changed organizational positions will lead to behavioral change. This would mean organizational restructuring.

Negotiating approach

Managers negotiate with the employees putting up resistance. The essence of this approach is doing deals. They may agree to the changes on the understanding that they gain some benefits to themselves either from changes or something else.

Political approach

The manager develops a power base and then use this power to force change. Resistance can develop to this approach.

Threat approach

This approach is the least desirable and works in short-term. The employees should feel that there is threat against them and to the existence of the organization if change is not implemented, however threat cannot be effective if the threat is constant.

Behavioral science approach

This approach is based on amalgam of approaches described above.

Typology of change

Change interventions fall into three main typologies:

1. *Top down change management*: It is based on the assumption that if managers plan things properly change can be executed smoothly. The focus should be on changing the culture of an organization.
2. *Transformation change management*: Transformational leaders innovate and think outside the routine and provide safe environment for change.
3. *Strategic change management*: The leader introduces new behaviors at work allowing people to witness the benefit for the organization and thus, based on evidence internalize the change in their ways of working. All approaches highlight the importance of leadership, communications and involving people in the change process.

Managing the environment of change

Creating the momentum

Includes making the case, visioning, empowerment and voicing activities; by definition this is step for leadership to principally act upon. The employees can be motivated for change by advocacy activities, i.e. sharing the rationales for change openly and transparently with key stake holders mainly employees. There has to be vision for the future. Visioning seeks to create consensus and commitment among all stake holders to a vision for the future. Defining a vision and having a broad consensus on goals and values to guide organizational change is an essential step in systems change. It is critical to building support for change among stake holders and within the organization itself. There should be empowerment of stake holders who may be discriminated against or are otherwise disadvantaged.

Analysis of the change context

There has to be stake holder analysis to identify their knowledge, attitudes and practices in regard to the underlying issues. The main idea is to identify who are the net gainers and net losers in the process. For the losers not to put resistance to change, it is important to find areas where win-wins for all can be demonstrated. A SWOT analysis of change would be helpful. Operations research is necessary to support decision-making and to know the potential impact of proposed changes or the actual impact of changes as they are implemented.

Facilitation of change

Process consultation

This is engaging of individuals to facilitate change processes. A process consultant enables "learning by doing" and thereby facilitates organizational learning. They start with whatever problem the organization is addressing at the time in order to gain experience and built trust. They identify, endorse and promote leadership in the various stakeholder organizations that will own as well as lead the change process. Change that is locally owned is sustainable and the change which has been prescribed by outsiders usually is not. The process consultants sequence activities so as to logically lead to decisions, ensuring open processes to maximize the flow of new ideas and engender commitment from stakeholders.

Consensus building exercises

Consensus building facilitates change process and help in overcoming resistance to change.

Leadership

Leadership is key component of successful change and leaders can increase performance by changes in organizational culture.

Communications about change

Multimedia communication activities

Factual information and stakeholder positions should be communicated widely to all concerned parties. Information dissemination should include mass media such as newspapers, radio, television, Internet, etc.

Interactive communications and public outreach

This is done by report cards, TV and radio discussions, websites, Internet chat rooms, workshops, etc.

Measuring progress

Measuring progress, seeking feedback and continuing to adjust and improve are all important for following through on change programs.

Stress management

Stress is epidemic in the work place. Stress is the manifestly uncomfortable feeling that an individual experiences when he or she is forced to deviate from normal or desired patterns of functioning. The signs of stress are short temper, lassitude or fidgeting. Stress results in significant organizational losses therefore managers have to develop strategies to minimize stress. Several studies have linked stress to decreased productivity, increased absenteeism, increased turnover, decreased employee health and decreased organizational commitment. Accumulation of job related stress results in burn out where mental and physical exhaustion usually coexist. Managers should be able to recognize signs and symptoms of stress. Determination of sources of stress is important so that treatment can focus on underlying problems rather than on symptoms. The diagnosis of stress is made only by proper communication with employees. Nature of the Job also results in stress. Jobs which are routine or too complex or involve physical strain create stress. Other factors leading to stress are long working hours, unhealthy environment, inadequate equipment, equipment break downs, lack of respect

at work place, role ambiguity, role conflict, inadequate salary, lack of opportunity for advancement, inadequate staff, inadequate supervision, lack of recognition for good work, responsibility without authority, etc.

Most important strategy to ease stress is eliminating stressors and creating a warm, supportive and welcoming work place. Coping is the adaptive effort that individuals make to manage the demands that cause stress. Problem focused coping consists of taking action to change peoples behavior or change the environment. Emotion focused coping consists of attempts to decrease the emotional distress caused by stressors which may include not thinking about stress inducing situations.

Individuals can cope with stress by acknowledging stress is good, i.e. use stress to push yourself little bit harder when it counts most, avoid stress sneezers, i.e. limiting your contact with people in whom you recognize stress, learn from best stress managers, practice socially avertable heavy breathing (Breathe in Slowly for a count of 7 then breath out for a count of 11), do not worry needlessly about stressors, know your trigger points and hot spots (knowing what causes you stress is powerful information, so that action can be taken to make it less stressful) and have adequate sleep, diet and proper exercise.

Decision-making

Decision-making is at the core of planning and involves choosing the appropriate course of action. First step in decision, making is to have clear planning about what is to be achieved. Second step would be development of alternatives in the light of resources available. Third step is evaluating alternatives in terms of the goals sought and fourth is choosing an alternative.

Alternatives are always available in any situation and it is the responsibility of a manager to identify them. If a manager has only one way of achieving a result then the manager probably has not worked for development of alternatives. The ability to develop alternatives is as important as selecting correctly from amongst them.

There are two approaches for making a decision. The first is concerned with development and application of normative decision rules based on formal logic based on economics and statistics. The second involves descriptive accounts of how people actually go about making judgments and choices.

Normative analysis

A distinction is made between riskless choices and risky choices. The riskless choices are called certain outcomes and risky choices are called uncertain outcomes.

Certain outcomes

Multi-attribute utility (MAU) involves obtaining a utility value for each decision alternative and then selecting the alternative with the highest value. The utility for an alternative is derived from a weighed sum of separate part utilities for various attributes. Linear models are based on multiple regression analyses.

Uncertain outcomes

A decision tree is a graphical model that displays the sequence of decisions and the events that comprise a sequential decision situation. As adequate information is seldom available to make a confidential accurate decision at a given time, the tree depicts future decision points and possible chance events usually with a notation of the probabilities of the various uncertain events happening. The tree shows the manager in what direction the chance events are. There is a need for assessment of the probabilities of each course of possible events. As chance events increase the decision tree becomes more complicated and the compounding of various probabilities makes the solution much more difficult. In real life situations a computer may be necessary to calculate them. The Decision tree makes it possible for managers to see the major alternatives available to them and by incorporating probabilities of various events in the tree, it is possible to comprehend the tree probability of a decision leading to results desired. Decision tree has been used to guide risky decision-making such as marketing strategy, policy planning, etc.

Descriptive analysis

Descriptive analysis is concerned with accounting for the discrepancies between normative rules and actual behavior.

All approaches of decision-making reflect the importance of Ben Franklin's original insight into the problem decomposition, i.e. breaking a problem into parts, working on them and then combining them to make a final decision.

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chapter 20

Violence in hospitals

For any given person in any job at any given work site, working entails interactions with permutations of peers, subordinates and superiors and in some jobs interacting with external clients or customers including the public at large. National Institute for Occupational Safety and Health (NIOSH) US defines work place violence as violent acts directed toward persons at work or on duty. These can range from verbal threats to physical assaults ranging from slapping and beating to rape, homicide, muggings and use of firearms. Violence is a significant concern for health care workers and risk managers. Considering violent and abusive behavior of patients, visitors or staff to be "part of the Job" is not acceptable nor is it safe as facilities find themselves confronted with more and more dangerous situations everyday. Violence in health care industry is endemic and it is increasing in severity and frequency. According to estimates of the Bureau of Labor statistics (BLS), US, 2637 nonfatal assaults on hospital workers occured in 1999 — a rate of 8.3 assaults per 10,000 workers. The rate is much higher than the rate of non-fatal assaults for all private sector industries which is 2 per 10,000 workers. In an American Management Association Survey about 52 percent of human resource managers reported at least one violent incident involving their companies since 1990. Fox et al. (1994) found that in 1993 nurses in several agencies had the highest rate of injury from workplace violence in a group of twenty six Federal government agencies studied for injury rates. Assaults on health care workers are found in all areas of practice and constitute a serious hazard.

Risk factors

Risk factors may be viewed under following headings.

1. Environmental factors
2. Work practices
3. Perpetrator and victims.

Environmental factors

Violence in hospitals occurs more frequently in Psychiatric areas, emergency rooms, waiting rooms and is often precipitated by long wait for services, overcrowded and uncomfortable waiting rooms, patients under influence of drugs or alcohol, inadequate security, access to fire arms, poorly lit corridors, parking lots and unrestricted movement of public.

Work practices

Many studies and reports have implicated staffing patterns as a major contributor to the problem of violence. Other work practices which place health care workers at increased risk include: isolated work with clients in examination or treatment activities, working alone or in remote locations in high crime areas, long waiting times, inadequate security and poorly lit campus.

Perpetrator and victims

Perpetrators of violence in health care settings are more often male, with a wide age range. Drug and alcohol abuse may contribute to violent behavior due to the lowering of inhibitions and the problems associated with addiction. The California department of industrial relations division of occupational safety and health divides events of work place violence into three categories.
Type I: The perpetrator has no legitimate relationship to workplace.
Type II: Is committed by someone who is the recipient of a service provided by the work place or the victim.
Type III: Perpetrator has an employee related involvement with the workplace such as current or former staff member.

Jan FA et al, found in a study that 83.5 percent of employees faced type II violence, 15 percent Type III and 1.4 percent faced Type I violence. Although any one working in a hospital may become a victim of violence, nurses and nursing aides who have the most direct contact with patients are at higher risk. Other hospital personnel at increased risk of violence include emergency response personnel,

hospital safety officers. Jan FA et al, found that eighty percent of employees working in accident and emergency faced violence, 40.5 percent employees working in wards faced violence and 27 percent employees in laboratories faced violence. Hundred percent medical postgraduates and security attendants faced violence. Eighty-five percent of the senior residents faced violence.

Hospital staff is untrained in recognizing and controlling escalating hostile behavior and management of assaultive people. Often they have no protective equipment such as communication devices or alarm system.

Violence prevention program

Management commitment

Management has to show commitment and involvement in violence prevention programs. It should be placed in the priority lists and at the same level as patient safety. Violence prevention programs should be integrated with diagnostic and therapeutic services so that it is a part of hospital daily activities. Management has to assign and communicate the responsibility for various aspects of safety and security to managers, supervisor, doctors and all other categories of staff. Management has to show zero tolerance for violence in hospitals. Managers and supervisors have to be held accountable.

Employee involvement

An effective program includes a commitment by the employer to provide for and encourage employee participation by encouraging reports from them regarding any incidents which should be analyzed and effective corrections then recommended. These incident reports may help to identify violent patients and to develop safe methods of managing difficult cases.

Record review

There has to be periodic review of the reports of incidents and near incidents of violent behavior. This will help identify and analyze trends in injuries by area of work, employee category, time of the day and perpetrator characteristics.

Identification of risk factors

Based on the analysis of incident reports and investigations carried out risk factors can be identified and addressed while reviewing the violence prevention program. Use a checklist to identify high-risk factors that includes type of client, physical risk factors of the building, isolated locations, job activities, lighting problems, lack of communication devices, areas with uncontrolled access and areas of previous security problems.

Written program

In large organizations effective implementation requires a written program for job safety, health and security that is endorsed and advocated by the highest level of management. The program should establish goals and objectives. The written program should be suitable for the anticipated hazards and for the size type and complexity of the facility and its operations.

Prevention strategies

Although risk factors for violence are specific for each hospital and its scenarios, employees can follow general prevention strategies.

Engineering controls

- Develop emergency signaling, alarms and monitoring systems.
- Install security devices such as metal detectors to prevent armed persons from entering the hospital.
- Install other security devices such as cameras and good lighting in hallways.
- Provide security escorts to the parking lots at night.
- Design waiting areas to accommodate and assist visitors and patients who may have a delay in service.
- Provide staff restrooms and emergency exits.
- Provide enclosed nurses stations.
- Arrange furniture and other objects to minimize their use as weapons.
- Curved mirrors should be installed at hallway intersections and concealed areas.

Administrative controls

- Design staffing patterns to prevent personnel from working alone and to minimize patient waiting time.
- Restrict the movement of the public in hospital by card controlled access.
- Develop a system for alerting security personnel when violence is threatened.
- When there is a well established risk, there should be a trained response team which can provide transport or escort services or respond to emergencies without leaving another unit's staff at risk.
- Manager should be available to assist in emergencies, provide advise, make decision and help in difficult situations.
- Administrator should work with local police to establish liaison and response mechanisms for police assistance and facilitate the hospital's assistance to local police in handling emergency cases.

Behavior modifications

Hospital should train all workers in recognizing and managing assaults. Training for all employees should encompass recognizing assaults, resolving conflicts and maintaining hazard awareness.

Post-incident response

The employees who have been attacked should be given due medical and psychological support. "Critical Incident Debriefing" program should be established and provided whenever staff is victim of assaults. Counselers should be well trained with a understanding of the issues of assault and its consequences.

Safety tips for hospital workers

Watch for signals that may be associated with impending violence:

- Verbally expressed anger and frustration
- Body language such as threatening gestures
- Signs of drug or alcohol use
- Presence of a weapon.

Maintain behavior that helps diffuse anger
- Present a calm, caring attitude
- Do not match the threats
- Do not give orders
- Acknowledge the person's feelings
- Avoid any behavior that may be interpreted as aggressive
- Be alert
- Evaluate each situation for potential violence
- Be vigilant.

Proactive security departments

According to one definition the role of health care security is and always will be the protection of people and property with a secondary role to provide other specifically defined services to the hospital community.

One program approach to security

- Effective screening (visitations and identification policy and procedures)
- Effective use of security technology
- Appropriate security staffing (numbers, training, skill mix and deployment)
- An informed and involved hospital staff
- Continuous quality improvement
- Effective communication with staff.

Important function of security program

Access control maintenance, administrative escorts, alarm monitoring, bomb threat investigation, crime prevention, currency escorts, domestic violence issues investigated, door openings, disaster committee participation, elevator entrapment assists, fire safety, gunshot wound evidence, hazardous material spills protection, helipad responders, key control, liaison with law enforcement agencies, media assists, missing person searches, motor vehicle assists including parking, patients valuable assists, store luggage for visitors, incident reporting.

OW Wilson one of the greatest police executives has defined preliminary investigation as:

P ⇨ Proceed to scene with safety
R ⇨ Render assistance to injured
E ⇨ Effect arrest of perpetrator
L ⇨ Locate and identify witness
I ⇨ Interview complainant and witness
M ⇨ Maintain scene and protect evidence
I ⇨ Interrogate suspects
N ⇨ Note all conditions, events and remarks
A ⇨ Arrange for collection of evidence
R ⇨ Report freely and accurately
Y ⇨ Yield responsibility to investigators or higher authority

Post-assignments

Fixed post-assignment

The individual assigned to a post generally has no discretionary autonomy in terms of geographical location and cannot leave the post unless relieved by another individual.

Modified post-assignment

In this deployment the officer is mandated to be in a rather close geographical area such as emergency department, lobby, or staff entrance.

Sectored or zone post-assignment

In this type persons are assigned to a specific geographical area of patrol and are generally dispatched to calls for service. These persons may also be dispatched out of their zone to provide back up support to another zone officer.

Full-time equivalent

The number of full-time equivalent persons required for any staffing plan is the total weekly hours of scheduled coverage divided by 40.

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chapter
21

Utilization of operation theater

The term "hospital utilization" denotes the manner in which a certain community makes use of its hospital resources. Various indices are commonly used in the assessment of hospital utilization, but no one of them alone can give a full picture of the utilization pattern. The different indices may be calculated on gross or specific basis. A gross index is an index expressing the overall average utilization for all types of hospital in the area. The specific index, on the other hand, expresses the utilization of a certain type of hospital or of a certain service within the hospital. Lot of literature is available on utilization of various hospital services such as out-patient services, accident and emergency services, radiological services, etc. but very few studies have been conducted on utilization of operating services.

Operating room utilization is noted by using formula

$$URJ = \frac{\sum_{n=1}^{N}(\text{room clean 1} - \text{open sterile supply 1})}{(\text{RA stop} - \text{RA start})}$$

(adapted from American Hospital Association)

Where

URJ = room utilization

J = room number

Room clean = time room is ready for next usage.

Open sterile supply = time first supply package is opened for that patients care.

1 = number of patients served.

N = total number of patients in room J/day.

RA stop = expected conclusion of surgery and end of day clean-up.

RA start = expected time at which first case set-up may begin.

Utilization analysis

Utilization analysis involves surgical scheduling methods, instrument sterilization techniques, storage space utilization, equipment utilization and anesthetic procedures. Planning of surgical suite directly influences utilization of operation theater. Operating room utilization is calculated for the normal day starting and stopping hours. Utilization is measured on week days as night and weekend cases represent a separate issue. One hundred percent utilization/day for particular operating room would be 8 hours/day. Few hospitals regularly achieve 100 percent operating room utilization. For hospitals performing a representative diversity of cases 80 percent utilization is considered acceptable. If the average case length is short, acceptable utilization may be 50 percent. Therefore utilization has to be viewed in context of other information available such as the average case length for the institution. The longer the average case length the higher the expected utilization. Researchers found operating room utilization rates (operating time as a proportion of a notional 8 hours working day) to be low overall approximately 40 to 60 percent in widely varying settings including Chicago, Columbia and the United States department of Veterans affairs. A study of 76 operating rooms in Columbia conducted in 1974 showed that utilization was only 41.6 percent. In another study classic utilization for each block-day by surgical subspecialty ranged from 44 to 113 percent. Average daily block-specific underutilization ranged from 16 to 60 percent whereas overutilization ranged from 4 to 49 percent. A study by Jan FA et al, showed theater utilization of 64.3 percent. Underutilization and overutilization are important measures because they may be used to evaluate the quality of OR schedules and the efficiency of OR utilization. In a study, time utilization of operating rooms in a large teaching hospital, the maximum utilization was found to be between 10 A.M. and 1 P.M. Delay was caused by surgeons resulting in the operating rooms remaining idle to the extent of 105 minutes on an average. Jan FA showed idle time of 128 minutes per day in OT. Unplanned scheduling of operations and late arrival of surgeons were the main causes.

The classic definition of OR utilization needs to be improved. As encountered in the literature, classic utilization is defined as the ration of the total OR time used to the total OR time allocated or budgeted. This definition of utilization is inadequate because it fails to differentiate the quality of utilization. Consider a simple example: a single OR is budgeted for 8 hours with two surgeries scheduled each of 4 hours duration. If the surgeries are performed consecutively within the budgeted work day, classic utilization is measured as 100 percent with no wasted resources. By contrast, consider the same OR when one 4 hour surgery is performed during regular hours and the other is performed entirely after regular hours. In the latter scenario there are 4 hours in which an expensive OR remains unused and 4 additional for which personnel must be recalled and overtime costs apply. Each scenario is an example of 100 percent classic utilization, but in the latter there is both under and over utilization, with penalties to the staff and institution inherent in each. Under utilization and over utilization as defined herein, are important measures because they may be used to evaluate the quality of OR schedules and the efficiency of OR utilization.

In one study it was shown that out of the available time, 54 percent of time was spent on actual surgery, 31 percent for supportive services and 15 percent waiting while the operating room was being made ready for operation. Jan FA found 66.02 percent was spent on actual surgery, 21 percent on supportive services and 12.9 percent on making room ready for surgery out of the utilized time.

In a study at University of California for each patient undergoing operation following times were recorded: OR (operating room) ready, patient enters OR, anesthesia induction complete, surgery start, surgery end, patient leaves OR. It was observed that patients were brought into the OR just before the scheduled start time. Surgical incision was made 21 to 49 minutes after the patient was brought into the OR. Room turnover time (time from patient in to patient out) was almost uniformly 36 minutes. Patient turnover time (time from end of surgery in one patient to end of induction of next patient) was generally 1 hour. The time between cases when no surgery was occurring was significantly longer than room turnover time because of the need to wake-up one patient and induce the following patient.

With a well coordinated team minimal turnover time between operations can be accomplished; in an average time of 15 to 20 minutes the room will be ready for the next patient.

Scheduling strategy

Schedule efficiency

It is not a trivial matter to achieve a high level of utilization in the operating room (OR). The surgeon must give attention to schedule efficiency to contain costs. Surgeons should be aware that 100 percent utilization of OR time is unrealistic except when there are repetitive, uniform – length procedures. A regular utilization rate below 50 percent should suggest overstaffing, overbuilding or poor schedule management. Lessons from scheduling computer use can help make OR utilization more efficient. If a selective effective algorithm is used in scheduling, norms of utilization should be above 60 percent and peaks should exceed 75 percent. For efficiency of scheduling, all ORs should be completely modular and should be large enough to accommodate any type of surgery.

Block or scheduling

Operating rooms in hospitals represent big investments and must be utilized efficiently. Sequencing procedures for operations within an operating room is important in this regard. Before managed care all available operating rooms were essentially staffed eight hours a day and procedures were booked on a first come, first served basis. Hospital collections for OR exceeded five times hospital costs, so there was little concern over how efficiently the ORs were scheduled. The primary goal was to provide as much care and surgical convenience as possible. As available ORs became filled with cases and surgeons experienced difficulty in booking elective cases, blocks of OR time were given to busy surgeons or surgical services. Because rewarding block time greatly increased surgeon satisfaction, hospital administrators felt pressure to grant it, especially if competing hospitals provided it. OR utilization is maximized by filling block time with as many hours of cases as possible. The key to maximizing OR utilization then is to

determine: (i) the appropriate amount of block time to allocate to each surgeon and (ii) how to choose which day to schedule a patient for surgery?

Estimating case duration

Accurate predictions of operating room times for surgical procedures are probably a prerequisite for matching operating room suite workload to capacity. Wright and colleagues showed that the use of surgeons estimates can increase the accuracy of the commercial scheduling software to predict duration of surgery. Improvements in predicting case duration are of interest to hospitals because they may be able to produce cost swings. Improved operating room scheduling could reduce costs by reducing underutilization (operating rooms empty earlier than expected) and /or by reducing unplanned extension of the work day (operating rooms occupied later then predicted). The benefits of better scheduling would also extend to patients (i.e. reduce unnecessary waiting time). When no historical time data are available for a surgeon scheduling a procedure, the mean of the duration of cases of the same scheduled procedure performed by other surgeons is as accurate a method to predict case duration as are more sophisticated analysis.

The goal of estimating case duration is to determine whether a case can fit into a "hole" (gap) in the OR schedule or whether an add on case will be completed within available time, then the maximum amount of time that a case is likely to require needs to be determined. The "upper predictive bound" specifies with a certain probability (e.g. 90%) that the duration of new case will be less than or equal to the bound. Upper predictive bounds measure the risk of an unusual and undesired event occurring (e.g. case runs over).

Sequencing cases

The OR manager can use statistical decision theory to sequence cases to decrease the impact of limitations in equipment or personnel on case scheduling. One study recommends that a surgical suite manager should consider a probability of 80 to 90 percent of no overlap being an acceptable risk in scheduling of cases.

Predicting surgical groups needs of block time

Block OR scheduling requires accurate forecasting of each surgical groups future need for OR time. A common approach to forecasting OR needs is to use the average of a surgical groups recent total hours of elective cases. Forecasting surgical groups need for OR time is necessary to ensure there is adequate staff available either to complete the work in a manner that minimizes labor costs or during regularly scheduled OR hours. It was found that total hours of elective cases over four weeks period can be normally distributed and unchanging overtime. Consequently an OR manager can use equations based on normal distributions to calculate the upper prediction bounds (upper limit) for total hours of elective cases. The average of the most recent two to four weeks period can be used to predict surgical groups future use of block time.

Effect of waiting time on utilization

How patients are scheduled into OR block time varies among surgical suites. Patient requests to be scheduled varies among surgical suites. Usually a patient needing surgery is given the first available surgical date for which the surgeon has open block time. Patient then wait to have surgery from the time they are given a surgical date until their day of surgery. Increasing the mean length of this waiting period (e.g. for 1 to 3 weeks) decreases the week to week variability in the surgical groups work load. Surgical suites with longer average length of time that patients wait to have elective surgery are more likely to have accurate forecasts of workload. This is because surgical suits with longer average patient waiting periods will have more flexibility in finding the best date to schedule a case to match the expected case duration with the open block time that day.

Optimizing or utilization

The results of one study suggest that to optimize OR utilizations add on cases should be considered simultaneously at a cut-off time (e.g. 4 p.m. the day before surgery) and then scheduled based on scheduled duration from longest to shortest. In a study it was shown that staffing costs were lowest when the operating room

manager did not incorporate surgeon and patient preferences when scheduling cases into over flow block time. Overflow block time is operating room time for a surgical groups cases that cannot be completed in the regular block time allocated to each surgeon in the surgical group.

Cost of canceling a case

A study showed that cost of postponing a late day case is always greater than that of proceeding regardless of whether the costs were absorbed by patient, society or the hospital. It was concluded that a "zero tolerance for overtime" policy may be too rigid to be consistently cost effective. In any event every effort should be made to publish next day's operating list by 14.00 hour on day before surgery.

Factors affecting utilization of operating room

A number of factors affect utilization of operation theater. Most important ones of them are:

Theater layout

Theater layout directly affects utilization of operation theater. A centralized operation theater suite has many advantages in this regard as there is efficient use of staff and facilities, better supervision, flexibility in scheduling operations and problem of supplies is simplified.

Operation list scheduling

Operating scheduling after the case duration has been estimated for every surgeon and for every type of surgery will prevent idle time and also overruns thus, improving utilization.

Level of care

The utilization will also depend on the level of the care a hospital is providing. In secondary care hospitals, the utilization may be less and the turn over of cases will be more as compared to tertiary care medical centers where the complexity of the case will affect the utilization (which will be more) whereas the turnover will be less,

e.g. neurological, cardiovascular and plastic surgery cases consume more time.

Anesthetic practice

If anesthesia is given in separate room, the operating room can be used for more number of cases and number of the cases done will increase; increasing utilization.

Timing

The starting time of theater has direct effect on utilization. If there is any delay in starting a case utilization is going to be affected.

Turnover times

Room turnover time, i.e. the time between one patient out and second in also affects utilization. Longer turnover time means decreased utilization.

Case duration

If case length is short utilization is less because, more time is wasted between cases than if case length is long.

Type of surgeries

In an institution where similar type of surgeries are performed utilization is expected to be more than in an institution where diversity of cases are done.

Canceling of surgeries

Canceling a case means no work for scheduled hours decreasing utilization. Therefore, cancellation of cases needs to be avoided by fully preparing the cases and by proper scheduling.

Supportive services

There should be no electric breaks, no faults in supply of anesthetic gases. Proper suction, equipment and sterilization facilities should be available.

Motivation of staff

There needs to be proper motivation of staff to do the job, they are expected to do. Cooperation between different staff members is a must for utilization of any facility.

Adequate staff

The number of surgeons, anesthetists, nurses and nursing aides also affects the utilization. The number of different staff members should be optimal.

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chapter
22

Crisis management in hospital

Crisis in hospital has a wide spectrum. The reasons can be external or internal. The external factors are those which interfere in the normal functioning of hospitals or those which put additional burden on hospitals in meeting demand for delivery or provision of services for which infrastructure is inadequate. Some of the external causes are wars, natural calamities (earthquake, floods), epidemics, blasts, bioterrorism, etc. Internal factors can be fire, equipment breakdown, electric failure, collapse of building, strikes, increased rate of nosocomial infections, breakdown of supply, etc. Crisis puts the hospital and its management to test.

Every hospital must have a crisis management program and a crisis management committee. A written crisis management committee is called "Incident command group" and its composition is as follows:

- Chief executive
- Chief of human resources
- Chief of Finances
- Medical superintendent
- Chiefs of Pharmacy, house keeping and sanitation, security, laboratory services, materials management, dietetics, laundry, telecommunication.
- Chief of engineering services.

If there is no organized command structure in place, it is impossible to efficiently manage the response, the information and the resources. The primary responsibility of the group is establishment of a "First incident action plan."

Incident action plan should take into consideration the different events and their implications on hospitals. Incident action plan should identify the place in the hospital from where the plan can be operated at the time of crisis. This room is called incident command room or control room. The roles and responsibilities are decided and distributed among members. Over all command will depend on:

- What resources are available?
- Which resources need to be mobilized?
- Capacity to respond.
- Coordination with external agencies.
- Management information.
- Anticipation to take proactive decision.

Incident action plan lays down SOP's (standard operating procedures) to avoid chaos and confusion. Incident command group should meet every three hours or earlier depending on how the situation demands. Incident action plan identifies the capacity and capability of the hospital and probable evolution overtime. Assess risks and consequences of event on functioning of hospital. Some of the priority issues which must be addressed are:

Human resources

Medical surge capacity of the hospital largely depends on the availability of staff necessary to deliver services. Availability of the staff is assessed and following points addressed

- If any staff needs to be called
- How they can access hospital
- Ensuring their safety
- Where they will receive briefing and information
- Additional staff needed
- Providing any training to staff.

Logistics and supplies

Logistics and supplies need to be ensured. Identify

- What you have (critical equipment and essential supplies)
- Consider the possibility of being isolated from outside sources and the possibility to evacuate the hospital
- Develop action plan for resupply of critical items; for enhancing continuity of operations
- Identify the sources
- Prioritize resources that need to be acquired
- Maintain record
- Centralize logistic management.

Communication

Incident command room should have time tested methods of communication which can be useful in linking with external agencies as well as internal departments in difficult circumstances. Backup systems must be available, the adequacy and resilience of which has been tested. Information Management aims not only at responding to the event but also at anticipating and recovering from the event. Information sharing within the hospital should be given high priority. At early stages of response one needs to identify the core data that must be collected and main processes for information management. The data which are needed in crisis are:

- The data for assessing the possible damages to the hospital and or the consequences on delivery of essential services
- The data for assessing the probable demand for services
- The data on availability of resources
- The data concerning the dead and the missing
- Data pertaining to health information.

Standard operating procedures

Standard operating procedure define how, when, what must be done and by whom for ensuring the provision of services from a particular unit or for a specific procedure.

They include also how information must be shared, what has to be recorded and how; whom to report, how and when. The issues to be addressed are:

- Activity to be done
- Description and sequence of activities
- Methodology
- Sequence of activities
- Safety rules and checking procedures
- Control and quality
- Time frame
- Coordination with other stakeholders
- Reporting and recording
- Persons involved
- Monitoring
- What to record and to whom to report how and when

- Who can assist in case of major problems or doubts
- Where to find phone numbers or addresses of people needed
- Safety and security issues
- Time frame for performing the activities.

Maintenance

Electricity, water supply, roads and transport are life lines of hospital. Continuous supply and provision of these are important.

Security

Security of buildings, staff, visitors, patients, equipment and data is essential.

Food supply

Administration must ensure supply of clean food to patients and staff.

Waste management

Whatever the circumstances hospital needs to be kept clean and nosocomial infection kept under control. Both internal and external constraints along with limited capacity for storing and managing hospital waste can be major challenges.

Laundry

The main challenges for laundry services are sudden increase in consumption of linen, sudden increase of workload for cleaning linen and limitation in hospital capacity to manage laundry overload.

Laboratory services and blood bank

Guidelines for infection control and prevention have to be strictly adhered to in addition to quality control. Universal and standard precautions are to be followed.

Pharmacy

Guidelines to ensure continuity of supplies, means for assessing suppliers and transporting items need to be sought out.

Epidemics

The basic measures which should be in place to stop patients transmitting infection are:

- Limit the number of staff in patients environment to a minimum
- Encourage the patient to maintain a distance of at least 1 meter from others
- Provide personnel protective equipment to patients and staff
- Instruct on respiratory/cough etiquette and hand hygiene
- Make infection control supplies available.

Psychosocial support: Psychological counseling is most important at the time of crisis especially for victims and their attendants.

Joint action sheets: Job action sheets (JAS) is a simple method for assigning and identifying roles and responsibilities and actions to be taken in a logical and sequential manner. Joint action sheets must be stored in a secured box and be accessible at any time. A full set must also be kept in incident command room.

Services provided

Whatever the crisis the hospital has to provide quality services and maintain its image in the public. Severe crisis may sometimes force administration to cut back on less important activities and augment some of the activities. Cold and elective cases may have to be discharged, out patient services minimized and more stress given on emergency services and ensuring optimal utilization of meager resources.

Crisis drills

The organization has to be in a state of preparedness and need to conduct drills at least twice a year.

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chapter 23

Drug utilization

Drugs are a critical component in the modern health care system. Past two decades have witnessed introduction of myriad of new pharmaceutical products that have revolutionized medicine and this has resulted in growth of their share in overall spending in health. Are these increased health expenditures getting translated into improved health outcomes?

Some of the drug utilization indicators related to expenditure are:

- Total drug expenditure as a percentage of total health care spending
- Prescribed drug expenditure as a percentage of total drug expenditure
- Non-prescribed drug expenditure as a percentage of total drug expenditure
- Hospital drug expenditure as a percentage of total hospital expenditure
- Prescribed drug expenditure per capita
- Publicly insured drug expenditure as a percentage of prescribed drug expenditure.
- Privately insured drug expenditure (excluding out-of-pocket) as a percentage of prescribed drug expenditure nationally
- Out-of-pocket drug expenditure as a percentage of prescribed drug expenditure nationally.

Drug utilization research has been defined by WHO as "the marketing, distribution, prescription and uses of drugs in a society with special emphasis on the resulting medical, social and economic consequences."

Pharmacoepidemiology is defined as " The study of the use and effects/side effects of drugs in large numbers of people with the purpose of supporting the rational and cost-effective use of drugs in the population thereby improving health outcomes."

Pharmacosurveillance and pharmacovigilance are terms used to refer to the monitoring of drug safety such as spontaneous adverse effect reporting systems, case-control and cohort studies. Descriptive drug utilization research describes pattern of drug utilization and identifies problems deserving more detailed studies. Analytical studies try to link drug utilization data to figures on morbidity, outcome of treatment and quality of care with the ultimate goal being to assess whether drug therapy is rational or not.

Drug utilization and pharmacoepidemiology is useful for:

- Studying patterns of drug use, i.e. extent and trends in drug use and costs overtime
- Comparing actual use to prescribed guidelines, choice of drug, combinations, dosage, etc.
- Studying outcomes of use.

Prescribing and dispensing data are useful for determining some of the quality indicators of drug use recommended by WHO. These include:

- Average number of drugs per prescription.
- Percentage of drugs prescribed by generic name.
- Percentage of encounters with an antibiotic prescribed.
- Percentage of encounters with an injection prescribed.
- Percentage of drugs prescribed from national list of essential drugs.
- Average drug cost per encounter.

Drug use evaluation assesses actual process of medication, i.e. indication, drug selection, dose, route of administration, duration of treatment, drug interactions and outcomes of treatment. The main source of data for drug use evaluation is the patient records. Every hospital needs to have a "Drugs and Therapeutic committee" which carries out drug use reviews in the hospital or health facility. This group has the responsibility of drawing up the guidelines, criteria, indicators and thresholds for the evaluation. Drug use evaluation may be based on data collected prospectively or retrospectively.

Units of measurement for drug utilization

Drug utilization can be quantified by a variety of volume measures including number of filled prescriptions, number of different drugs, quantity dispensed, prescribed daily dose (PDD) and defined daily dose (DDD). None of these measures alone gives a complete picture of drug utilization, however used in combination they answer a variety of questions.

Number of different drugs

Counting the number of different drugs used by a patient provides a useful measure of drug use profile per patient.

Quantity dispensed

Counting the number of dispensing units (tablets, inhalers, packages, grams, liters, etc.) can be used for quantifying drug utilization. This approach can be applied only when the use of one drug or a well defined product is evaluated as it is meaningless within and across classes. Another limitation is that tablets of same drug may come in different strengths and thus, it is inappropriate to combine them by merely summing the number of tablets or the drug may come in different dosage forms, e.g. tablets and liquids.

Prescribed daily dose

Prescribed daily dose (PDD) is the average daily amount of a drug that is actually prescribed. PDD can be determined from prescription studies and medical or pharmacy records. PDD should be interpreted with knowledge of the diagnosis as the recommended dose can differ from one indication to another. Dosage can also vary by age and on ethnicity. Prescribed daily dose does not necessarily reflect actual drug utilization. Some prescribed medications are not dispensed and the patient does not always take all the medications that are dispensed. Patient interviews will be required to measure actual drug intake at the patient level (consumed daily dose).

Defined daily dose

Defined daily dose(DDD) is the assumed average maintenance dose per day for a drug used for its main indication in adults. DDD does not necessarily agree with the recommended or prescribed daily dose (PDD). DDD is a technical unit of measurement assigned by WHO collaborating center for drug statistics methodology and developed to work with the Anatomical Therapeutic Chemical classification system. Drug utilization figures are presented as numbers of DDDs/1000 inhabitants/day or when in hospital as DDDs per 100 bed days. DDD is quite useful for bench marking in hospitals.

When there is a substantial discrepancy between the PDD and the defined daily dose (DDD), it is important to take this into consideration when evaluating and integrating drug utilization figures particularly in terms of morbidity. The DDD standardizes measurement of drug utilization within and across drug classes and can be used to describe drug utilization across a population. When the number of DDDs dispensed to the population is calculated, it provides a rough estimate of the proportion receiving the drug at the average daily dose for the drug's major indication. The DDD provides for a reasonable mechanism for aggregating drug use across the different dosages of a specific drug.

Prescriber is a critical point in determining drug use. Some researchers even claim that doctors markedly differ in prescribing and these differences often lack rational explanations. Studying the factors that determine prescribing behavior is central to understanding how and why drugs are prescribed.

Not all drug therapy problems can be identified from the prescription, or profile review. Researchers/audit committees make a point of gathering additional information to ensure that the intended outcome of therapy is achieved and that no drug therapy problems occur (Table 23.1).

Prescription register

Number of countries keep a record of data on drug use in the form of a prescription register. Such information is useful in clinical as well

Table 23.1: Causes of drug therapy problems

Drug therapy problem	Cause
Unnecessary drug therapy	– No medical indication
	– Additional/recreational drug use
	– No drug therapy more appropriate
	– Duplicate therapy
	– Treating avoidable adverse reaction
Wrong drug	– Dosage form inappropriate
	– Contraindication present
	– More effective drug available
Dosage too low	– Wrong dosage
	– Frequency inappropriate
	– Duration inappropriate
	– Incorrect administration
Adverse drug reaction	– Unsafe drug for patient
	– Allergic reaction
	– Incorrect administration
	– Drug interaction
	– Dosage increased or decreased too quickly
	– Undesirable effect
Dosage too high	– Wrong dose
	– Frequency inappropriate
	– Duration inappropriate
	– Drug interaction
Inappropriate compliance	– Drug product not available
	– Cannot afford drug
	– Cannot swallow or otherwise administer drug
	– Does not understand instructions
	– Patient prefers not to take drug
Need additional drug therapy	– Untreated condition
	– Synergistic therapy
	– Prophylactic therapy

Adapted from Tomechko MA, Strand LM, Morley PC, Cipolle RJ. Q and A from Pharmaceutical Care Project in Minnesota. AM Pharm. 1995; N s 35 (4): 30-9.

as administrative discussions concerning rational use of drugs. The prescription register is based on computerized prescriptions from all the pharmacies. Main objective of a prescription register is to improve knowledge of the drug utilization in the general population after the drug has been marketed.

This can be undertaken by:

- Identifying benefits and potential problems to the public health linked to utilization of given drugs or drug groups
- Assessing the safety and effectiveness of medications
- Making drug utilization data available to the prescribing doctors as part of an audit
- Method to improve the quality of prescribing practices
- Doing health economic analysis
- Developing and validating procedures for collection, analysis and interpretation of drug utilization data
- Comparing drug utilization data across countries.

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