UNIT - 1 HSM

Need for Evolving Health Policy

According to WHO, "**Health policy,** refer to decisions, plans, and actions that are undertaken to achieve specific health care goals within a society. An explicit health policy can achieve several things: it defines a vision for the future which in turn helps to establish targets and points of reference for the short and medium term. It outlines priorities and the expected roles of different groups; and it builds consensus and informs people."

There are many categories of health policies, including personal health care policy, pharmaceutical policy, and policies related to public health such as vaccination policy, tobacco control policy. They may cover topics of financing and delivery of health care, access to care, quality of care, and health equity.

Implementation of A Health Policy

Health-related policy and its implementation is complex. Conceptual models can help show the flow from health-related policy development to health-related policy and program implementation and to health systems and health outcomes. Policy should be understood as more than a national law or health policy that supports a program or intervention. Operational policies are the rules, regulations, guidelines, and administrative norms that governments use to translate national laws and policies into programs and services. The policy process encompasses decisions made at a national or decentralized level (including funding decisions) that affect whether and how services are delivered. Thus, attention must be paid to policies at multiple levels of the health system and over time to ensure sustainable scale-up. A supportive policy environment will facilitate the scale-up of health interventions.

There are many topics in the politics and evidence that can influence the decision of a government, private sector business or other group to adopt a specific policy. Evidence-based policy relies on the use of science and rigorous studies such as randomized controlled trials to identify programs and practices capable of improving policy relevant outcomes.

The modern concept of health care involves access to medical professionals from various fields as well as medical technology, such as medications and surgical equipment. It also involves access to the latest information and evidence from research, including medical research and health services research.

A Health Policy is Based Upon

Right to health:

Many countries and jurisdictions integrate a human rights philosophy in directing their health care policies. The World Health Organization reports that every country in the world is party to at least one human rights treaty that addresses health-related rights, including the right to health as well as other rights that relate to conditions necessary for good health. The United Nations' Universal Declaration of Human Rights (UDHR) asserts that medical care is a right of all people:

- UDHR Article 25: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, illness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control."

In some jurisdictions and among different faith-based organizations, health policies are influenced by the perceived obligation shaped by religious beliefs to care for those in less favorable circumstances, including the sick. Other jurisdictions and non-governmental organizations draw on the principles of humanism in defining their health policies, asserting the same perceived obligation and enshrined right to health.

Health care financing:

Many types of health policies exist focusing on the financing of health care services to spread the economic risks of ill health. These include publicly funded health care (through taxation or insurance, also known as single-payer systems), mandatory or voluntary private health insurance, and complete capitalization of personal health care services through private companies, among others.

Advantages of Private Funding

- Government spending on health is essential for the accessibility and sustainability of health care services and programmes.
- For those people who would otherwise go without care due to lack of financial means, any quality care is an improvement.
- Since people perceive universal health care as free (if there is no insurance premium or co-payment), they are more likely to seek preventive care which may reduce the disease burden and overall health care costs in the long run.

Advantages of Public Funding

- Perceptions that publicly funded health care is free can lead to overuse of medical services, and hence raise overall costs compared to private health financing.
- Privately funded medicine leads to greater quality and efficiencies through increased access to and reduced waiting times for specialized health care services and technologies.
- Privately funded and operated health care reduces the requirement for governments to increase taxes to cover health care costs, which may be compounded by the inefficiencies among government agencies due to their greater bureaucracy.

Medical research policy:

Medical research can be both the basis for defining evidence-based health policy, and the subject of health policy itself, particularly in terms of its sources of funding. Those in favor of government policies for publicly funded medical research posit that removing profit as a motive will increase the rate of medical innovation,Those opposed argue that it will do the

opposite, because removing the incentive of profit removes incentives to innovate and inhibits new technologies from being developed and utilized.

Health workforce policy:

Some countries and jurisdictions have an explicit policy or strategy to plan for adequate numbers, distribution and quality of health workers to meet health care goals, such as to address physician and nursing shortages.

Health in foreign policy:

Many governments and agencies include a health dimension in their foreign policy in order to achieve global health goals. Promoting health in lower income countries has been seen as instrumental to achieve other goals on the global agenda, including:

- Promoting global security
- Promoting economic development
- Promoting social justice

Global health policy:

Global health policy encompasses the global governance structures that create the policies underlying public health throughout the world. In addressing global health, global health policy "implies consideration of the health needs of the people of the whole planet above the concerns of particular nations." Distinguished from both international health policy (agreements among sovereign states) and comparative health policy (analysis of health policy across states), global health policy institutions consist of the actors and norms that frame the global health response.

UNIT - 1

Health Organization in State

At the State level, a State Health Mission headed by the Chief Minister has been constituted with similar composition, as that of the National Steering Group. State Health Mission's role include the following:

- **Actively undertake Policy and Institutional Reforms to enable effective implementation of NRHM**

The State will review and amend existing policies (cadre management arrangements, financial and administrative authority at various levels, role of PRIs, procurement and logistics systems etc.) to ensure that the policy environment is consistent with the Mission objectives. Additional resources to be provided to the states under the Mission would require policy reforms to be in place.

- **State level planning, implementation and monitoring**

The State Health Plan (long term/annual) has been developed in accordance with the GoI (Government of India) Guidelines and necessary approvals from GoI and signing of a Memorandum of Understanding (MoU) with the MoHFW need to be taken. Implementation will have to be facilitated in line with the approved plan, monitor and take corrective action as and when necessary and carry out independent impact assessment studies (base-line, periodic) and take appropriate corrective action.

- **Support District level planning, implementation and monitoring**

The State will provide support in preparation of health plans by districts in accordance with the GoI guidelines through mobilization of technical assistance. The District Action Plans will be assessed on the basis of appropriate evaluation criteria that have to be made available to the districts in advance. A system for monitoring performance of districts against their own work plans and comparison across districts will also be developed.

- **Provide Training support to districts**

Various training programmes are being developed including management training modules for the programme managers and the staff of the State and district societies, designing "multi-skilling" training packages for doctors (e.g. anesthesia training for MBBS doctors) and paramedical workers (e.g. "multi-skilling" of lab technicians) and facilitate selection and training.

- **Coordination across relevant departments**

Mechanisms have been put in place to ensure coordination across Departments especially Health and Family Welfare, AYUSH, Department of Women and Children, and the Public Health and Engineering Department; to identify bottlenecks for effective delivery of services and to take necessary action through government orders or other means.

- **Sharing of experiences across districts**

Workshops will be conducted during various phases to disseminate experiences/ innovations/ lessons learnt across districts.

- **Management of cash flows**

Processes are being put in place for annual/ quarterly cash flow projections; closely monitoring and highlighting, well in advance, anticipated temporary shortage of funds. It will be ensured that funds are released to districts in accordance with the agreed district plans. The State will ensure that districts send their expenditure reports and other consolidated statements to GoI/ concerned agencies. Stringent monitoring mechanisms will be in place to ensure that all conditions are met for subsequent release of fund tranches.

- **Financial accounting/ administration**

The State will ensure maintenance of necessary books of accounts and ensure adherence to procedures laid out for procurements and payments. They will carry out audits of a sample of districts in each quarter, and facilitate the sharing of audit findings across all districts.

In order to meet the above objectives/ outcomes and carry out necessary tasks, the state has registered a single State Health Society through merger of all state level societies in the Health and Family Welfare sector, except the State Aids Control Society. These Societies will maintain separate Bank Accounts even under the unified structure. Funds for separate programmes would continue to flow under Sub-Budget Heads of the omnibus NRHM Budget Head.

The Integrated State Health and Family Welfare Society has a full-time secretariat to act as the State Programme Management Support Unit (SPMSU), headed by a full time Executive Director. The SPMSU will:

(a)assist the Directorate of Health & FW in implementation,

(b)act as the coordinating agency with other Departments for the Mission and

(c)perform the role of the secretariat of the State Health Mission

HS&M UNIT-1

What is Health Insurance?

Health Insurance is an insurance policy that ensures that you get cashless treatment or expense reimbursement, in case you fall ill. It is a contract between a general insurance company and one, which considers expenses incurred when availing treatment. However, the insurance company would pay for your treatment if the medical condition is covered by your policy. As per IRDAI, the premiums payable towards such an insurance policy have tax advantage under section 80D of Income Tax Act, 1961.

Individual Plans Cashless Hospitalization: Medical expenses are sky-rocketing! Get **health insurance** for your medical outlay. With cashless facility, stay tension-free and cure yourself faster. Approved by IRDAI, PolicyBazaar helps you compare and find the best plan.

- Individual Health Insurance Plan from Top Insurers
- Lowest Premium On Medical Insurance
- Compare Policies Instantly

mportance of Health Insurance

There is no debating on the importance of having insurance in a country like India that ranks very low on human life index. Everyone must buy a good health plan that includes medical outlay, hospitalisation costs, medication and laboratory test costs, including critical illness. As is rightly said, "Health is wealth", one must be prepared to manage such a situation in life. Don't get confused with questions like – Which health policy to buy? Does this consider everything? What illnesses are excluded from this cover? PolicyBazaar is here to resolve all such confusions.

Just compare health insurance policies from top health insurers on our website and buy the best health plan. Let us know your basic requirements and we will find the best-suited health insurance quotes. You can, then, compare health insurance policies side by side, based on the parameters like health insurance cost; riders etc., and choose the **best health insurance** for self and/or your family members.

The treatment cost is getting way too expensive. Health insurance prevents a medical emergency from turning into a financial emergency. It makes sure that health care needs of one are taken care of without depleting one's savings and compromising on one's future goals. The contract of health insurance requires the provider to pay some or all of one's health care costs in exchange of a periodic imbursement. Additional advantages of health insurance policies include regular health check-ups, cashless services, pre and post hospitalization expense reimbursement etc.

Health insurance policies allow you save thousands on taxes under section 80D of Income Tax Act, 1961. The premiums paid towards the policy reduce your annual tax liability, thereby reducing your taxable earnings per year.

Best Health Insurance Policies in India By Top Health Insurance Companies

Insurance Company	Coverage	Incurred Claim Ratio	Waiting Period	Renewability	Network Hospitals
ICICI Lombard Health Insurance	4 members of the family (2 adults + 2 children)	82.09%	4 years	Lifelong	Over 4000
Max Bupa Health Insurance	4 members of the family (2 adults + 2 children)	59.53%	4 years	Lifelong	Over 3500
HDFC ERGO Health Insurance	4 members of the family (2 adults + 2 children)	51.00%	4 years	Guaranteed Lifelong Renewal	Over 4800
Bharti AXA Health Insurance	4 members of the family (2 adults + 2 children)	85.42%	4 years	Lifelong	Over 5000
SBI Health Insurance	4 members of the family (2 adults + 2 children)	54.41%	1 to 4 years	Lifelong	Over 3000
L&T Health Insurance	4 members of the family (2 adults + 2 children)	46.52%	3 years	Lifelong	Over 2800
Bajaj Allianz Health Insurance	6 members of the family (2 adults + 4 children)	74.94%	4 years	Lifelong	Over 3700
Reliance Health Insurance	6 members of the family (2 adults + 4 children)	95.87%	4 years	Lifelong	Over 4000
National Health Insurance	6 members of the family (2 adults + 4 children)	110.40%	4 years	Lifelong	Over 6000

Note: Figures shown in the table above belong to the Financial Year 2015-16.

Types of Health Insurance Policies in India

One needs to ensure the security of health of oneself as well as of the family. With the increasing cost of healthcare in India, health insurance has become almost mandatory for everyone. Health insurance makes sure not only health security but also hassle-free claim resolution. In today's world of advancements, people have different choices when it comes to purchasing health insurance. There are various plans readily available in India to include every aspect of a medical emergency. Some popular types of policies are explained below:

- Individual Health Insurance Policies:

This health insurance policy considers one against several illnesses, offering advantages like cashless hospitalisation and various add-ons. The entire amount is available for only one and is determined by the age of the insured. Under this policy, each insured member is entitled to receive the entire amount separately.

- **Family Floater Health Insurance Policies**:

With this health insurance policy, you can include all your family members against multiple diseases under a single cover. Family floater Mediclaim offers a fixed assured amount for the family members that can be availed either by one or as a lump-sum for treatment of one person. Family benefit means that the sum, as specified for the proposer under the policy, is available for any one or all members of his/her family for one or more claims during the tenure of the policy. Family mediclaim plans come at a marginally incremental expense.

- **Surgery & Critical Illness Insurance Plans**:

This is usually brought as a standalone policy or a rider for the treatment of various critical illnesses, such as kidney failure, paralysis, cancer, heart attack etc. As the medication of such illnesses is expensive, the imbursement is also very high. A critical illness is a serious, possibly terminal disease, strictly defined by the provider. Most critical illness policies provide a lump-sum benefit if the insured is diagnosed with one or a number of specified terminal conditions.

- Pre-Existing Disease Cover:

After a time of 2-4 years, various policies consider pre-existing diseases, e.g. diabetes, hypertension, kidney failure, cancer etc. Pre-existing disease cover includes the illness that the insured had before purchasing the policy.

- **Senior Citizen Health Insurance Plans** :

This health insurance plan is designed particularly for anyone with age above 60 years, offering protection from health issues during old age. According to IRDAI, every firm must include people up to the age of 65 years.

- Preventive Healthcare:

Undoubtedly, healthcare is very expensive and nobody wants to fall ill; anyways. So, now we have preventive health care that takes care of you and does not let you fall sick. This policy

considers preventive care, such as regular health check-ups, concession in X-ray fees, consultation fee etc. By offering various healthcare good, this plan aims at keeping you healthy, thereby considering health check-ups at regular intervals. Preventive care is medical care rendered not for a specific complaint but focused on prevention and early-detection of ailments.

- **Maternity Health Insurance**:

Health insurance companies today covers such additional costs, including both pre and post natal care, child delivery (normal or caesarean), which sometimes lead to vaccination of newborn babies. This insurance covers the newborn baby up to the validity of this insurance policy. It also covers transportation fee for ferrying the mom-to-be to the nearest network hospital of choice.

- **Personal Accident Cover**:

These personal accident plans are frequently provided as riders to standard health insurance plans, which consider hospitalisation and bear medical outlay, in the event of an accident. These are issued as fixed benefit policies, where specified sums are paid on occurrence of specified or unforeseen events, such as accidents. Such events can result in death or disability of the person. However, the payout is not related to the expenditure.

Health education

Health education is the profession of educating people about health.

Areas within this profession encompass environmental health, physical health, social health, emotional health, intellectual health, and spiritual health.

"Health education is the process by which individuals and group of people learn to ":

- **Promote**
- **Maintain**
- **Restore health**

The Joint Committee on Health Education and Promotion Terminology of 2001 defined Health Education as "any combination of planned learning experiences based on sound theories that provide individuals, groups, and communities the opportunity to acquire information and the skills needed to make quality health decisions."

The World Health Organization defined Health Education as "compris[ing] [of] consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health."

The Role of the Health Educator

A health educator is "a professionally prepared individual who serves in a variety of roles and is specifically trained to use appropriate educational strategies and methods to facilitate the development of policies, procedures, interventions, and systems conducive to the health of individuals, groups, and communities

Responsibility I: Assessing Individual and Community Needs for Health Education

* Provides the foundation for program planning
* Determines what health problems might exist in any given group
* Includes determination of community resources available to address the problem
* Community Empowerment encourages the population to take ownership of their health problems
* Includes careful data collection and analysis

Responsibility II: Plan Health Education Strategies, Interventions, and Programs

* Actions are based on the needs assessment done for the community (see Responsibility I)
* Involves the development of goals and objectives which are specific and measurable
* Interventions are developed that will meet the goals and objectives
* According to Rule of Sufficiency, strategies are implemented which are sufficiently robust, effective enough, and have a reasonable chance of meeting stated objectives

Responsibility III: Implement Health Education Strategies, Interventions, and Programs

* Implementation is based on a thorough understanding of the priority population
* Utilize a wide range of educational methods and techniques

Responsibility IV: Conduct Evaluation and Research Related to Health Education

* Depending on the setting, utilize tests, surveys, observations, tracking epidemiological data, or other methods of data collection
* Health Educators make use of research to improve their practice

Responsibility V: Administer Health Education Strategies, Interventions, and Programs

* Administration is generally a function of the more experienced practitioner
* Involves facilitating cooperation among personnel, both within and between programs

Responsibility VI: Serve as a Health Education Resource Person

* Involves skills to access needed resources, and establish effective consultive relationships

Responsibility VII: Communicate and Advocate for Health and Health Education

* Translates scientific language into understandable information
* Address diverse audience in diverse settings
* Formulates and support rules, policies and legislation
* Advocate for the profession of health education

HSM

UNIT-I

(1)

HIS

Hospital information system

These are comprehensive, integrated information systems designed to manage the medical, administrative, financial and legal aspects of a hospital and its service processing.

One of the most important issues is health services. Hospitals provide a medical assistance to people.

The best introduction for hospital information systems has been made in 2011 International Conference on Social Science and Humanity, which is;

Hospital Information Systems can be defined as massive, integrated systems that support the comprehensive information requirements of hospitals, including patient, clinical, ancillary and financial management.

Hospitals are extremely complex institutions with large departments and units coordinate care for patients.

Architecture

Hospital Information System architecture has three main levels, Central Government Level, Territory Level, and Patient Carrying Level. Generally all types of hospital information system (HIS) are supported in client-server architectures for networking and processing.

The patient carries system record patient information, patient laboratory test results, and patient's doctor information. Doctors can access easily person information, test results, and previous prescriptions. Patient schedule organization and early warning systems can provide by related systems.

HIS can be composed of one or several software components with specialty-specific extensions, as well as of a large variety of sub-systems in medical specialties, for example Laboratory Information System (**LIS**), Policy and Procedure Management System,[6]Radiology Information System (**RIS**) or Picture archiving and communication system (**PACS**).

Aim

As an area of medical informatics the aim of an HIS is to achieve the best possible support of patient care and outcome and administration by presenting data where needed and acquiring data when generated with networked electronic data processing.

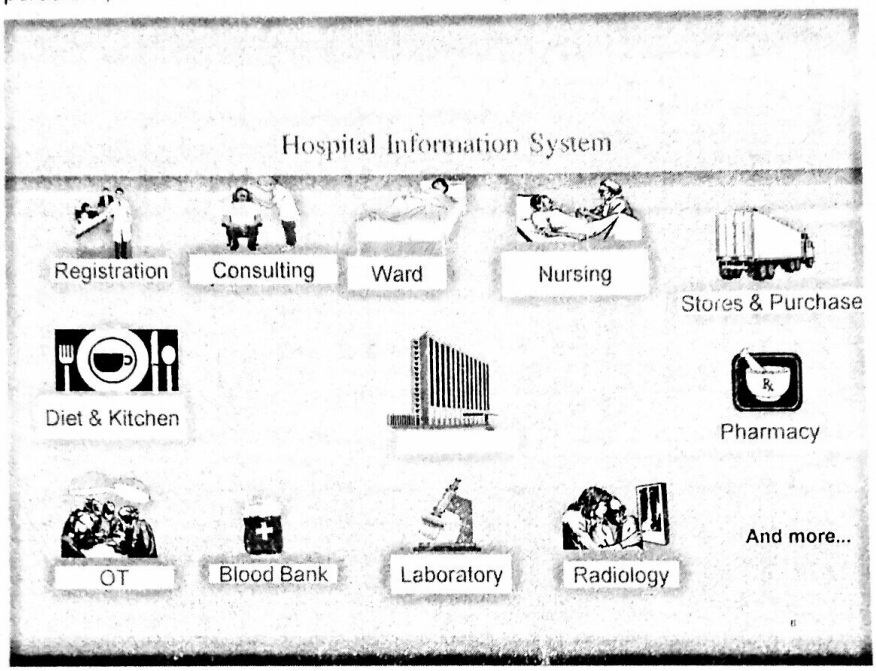
Hospital Information Systems main demands are correct data storage, reliable usage, fast to reach data, secure to keep data on storage and lower cost of usage.

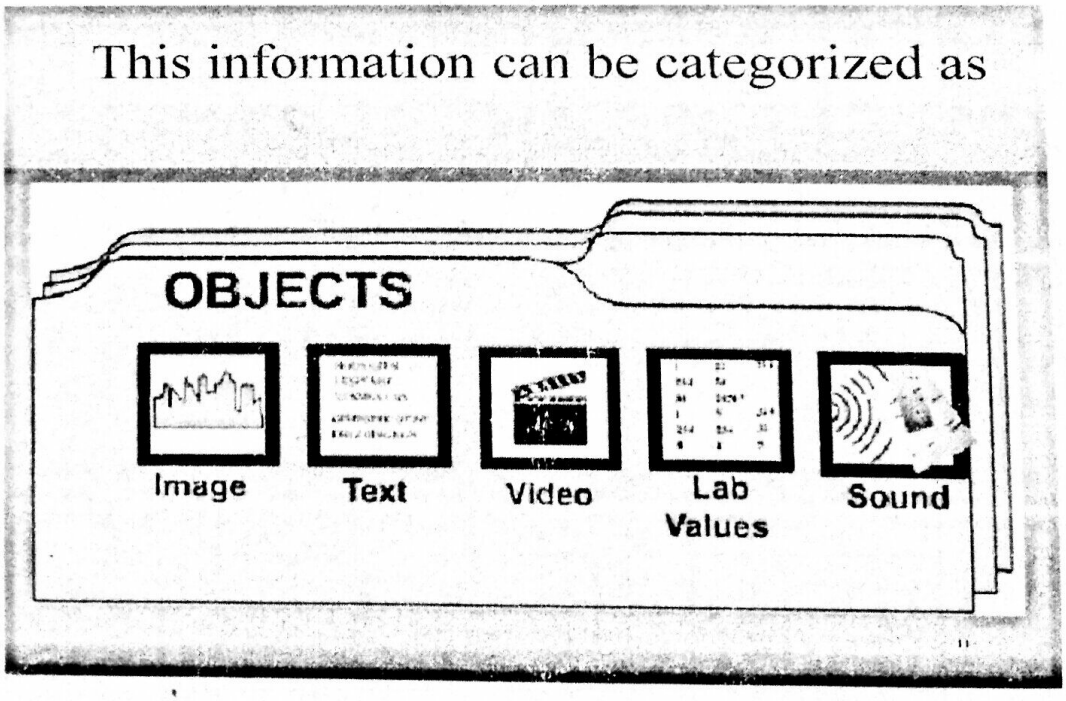
Hospital Information Systems provide a common source of information about a patient's health history. The systems have to keep data in secure place and controls who can reach the data in certain circumstances.

These systems enhance the ability of health care professionals to coordinate care by providing a patient's health information and visit history at the place and time that it is needed. Patient's laboratory test information also visual results such as X-ray may reachable from professionals. HIS provide internal and external communication among health care providers.

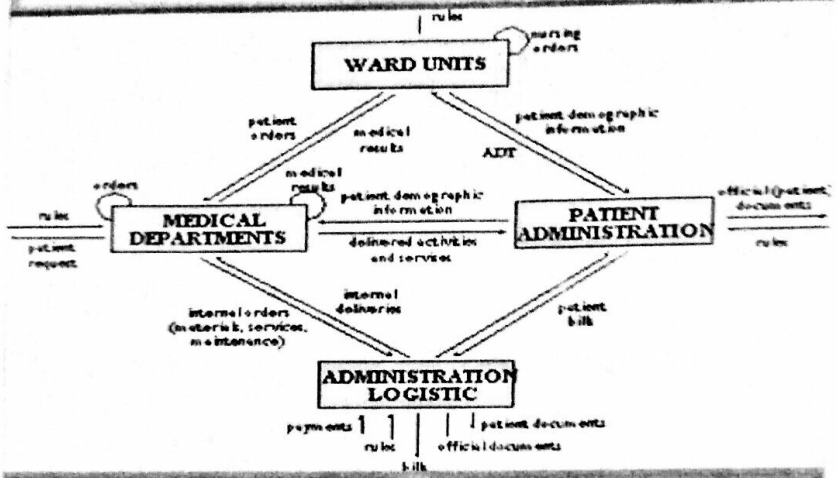
The HIS may control organizations, which is Hospital in these case, official documentations, financial situation reports, personal data, utilities and stock amounts, also keeps in secure place patients information, patients medical history, prescriptions, operations and laboratory test results.

The HIS may protect organizations, handwriting error, overstock problems, conflict of scheduling personnel, official documentation errors like tax preparations errors.



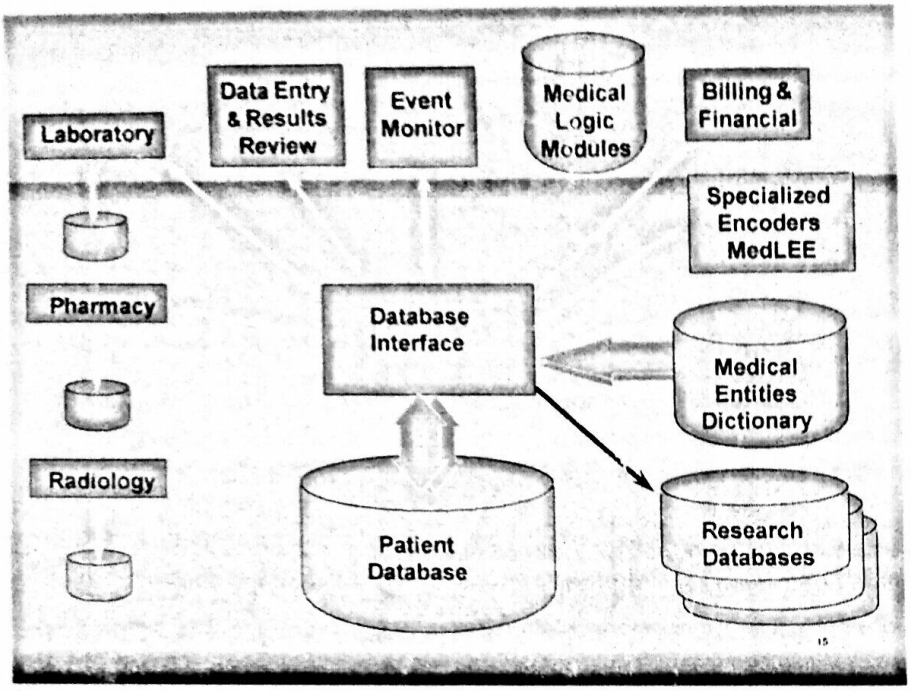


Simple Model of Hospital Information System (HIS) & Data Movement



Information will be used by the areas

- **Patient Administration**
- **Clinical Management**
- **Resource Management**
- **Financial Management**
- **Management Information System**
- **And more…**



Benefits of HIS

- Easy access to doctors data to generate varied records, including classification based on demographic, gender, age, and so on. It is especially beneficial at ambulatory (out-patient) point, hence enhancing continuity of care. As well as, Internet-based access improves the ability to remotely access such data.
- It helps as a decision support system for the hospital authorities for developing comprehensive health care policies.
- Efficient and accurate administration of finance, diet of patient, engineering, and distribution of medical aid. It helps to view a broad picture of hospital growth
- Improved monitoring of drug usage, and study of effectiveness. This leads to the reduction of adverse drug interactions while promoting more appropriate pharmaceutical utilization.
- Enhances information integrity, reduces transcription errors, and reduces duplication of information entries.
- Hospital software is easy to use and eliminates error caused by handwriting. New technology computer systems give perfect performance to pull up information from server or cloud servers.

The purpose of a hospital information system (HIS) is to manage the information that health professionals need to perform their jobs effectively and efficiently. Information Requirements:

- Operational Requirements
  - up-to-date factual information
  - necessary for day to day tasks
- Planning requirements

    - short- and long-term decisions about patient care
    - decisions about hospital management
- Documentation Requirements
    - the maintenance of records
    - accreditation
    - legal record

It costs a lot of money to deal with the information in a hospital.

Functional model for an HIS:

- Core Systems
    - patient scheduling
    - admission
    - discharge
    - admission-discharge-transfer (ADT)
- Business and Financial Systems
    - payroll
    - accounts receivable
- Communications and Networking Systems
    - integration of all parts of the HIS
    - order entry & results reporting
- Departmental-Management Systems
    - the needs of individual departments can be met
    - those subsystems can be useful in a macro-system
- Medical-Documentation Systems
    - collecting, organizing, storing, and presenting
    - Quality Assurance (QA)
- Medical Support Systems
    - assistance in interpreting data
    - issue alerts, provide advice

It can be useful to integrate the clinical and the administrative information into the same information system. This can create a "rich database for decision making."

UNIT I Room Dy

CLINICAL ENGINEER

KK

Health
NSW Northern Sydney Local Health District

WHAT IS A CLINICAL ENGINEER?

"A Clinical Engineer is a professional who supports and advances patient care by applying engineering and managerial skills to healthcare technology."

-ACCE Definition, 1992

As clinical medicine has become increasingly dependent on more sophisticated technologies and the complex equipment associated with it, the Clinical Engineer, as the name implies, has become the bridge between modern medicine and equally modern engineering.

ROLES OF A CLINICAL ENGINEER

Clinical engineering is an interdisciplinary field practiced in a variety of settings and presenting a diversity of challenges. The Clinical Engineer is, by education and training, a problem solver, working with complex human and technological systems.

In the hospital, shared service, and asset management firm, the Clinical Engineer often functions as the technology manager for medical equipment systems. The responsibilities in this setting include financial or budgetary management, service contract management, data processing systems for managing the medical equipment, and coordination of service agreements and in-house operations. The hospital-based clinical engineer may also have responsibility for supervision of the in-house maintenance staff, depending on his or her skill set and the structure of the department. Hospital-based clinical engineers also fill other important functions in assuring that the medical equipment is safe and effective.

These functions include participation in the planning process and in the assessment of new technology, assuring regulatory compliance in the medical technology management area, investigation of incidents, and active participation in training and education of technical and medical personnel. The scope of these activities is expanding significantly as medical technology continues to become integrated into systems and the line between medical, communications, and information systems continues to blur.

Clinical Engineers employed in industry work to assure that new products will meet the needs of tomorrow's medical practice. They are involved in all aspects of the development process, from medical device design and development, through product sales and support. Often, they work with teams of nurses and other hospital-based professionals in evaluating new products or concepts, and during clinical trials.

Clinical Engineers also work in private practice, consulting in a variety of settings as expert witnesses, problem solving, or serving on governmental or international bodies such as ECRI the Food and Drug Administration or the World Health Organization.

Clinical Engineers also have a long history of collaboration to find economic approaches to broad technology issues facing the healthcare system. They played a significant leadership role in calming the hysteria over electrical safety in the 1970's and Y2K at the turn of the century. Clinical Engineers in the US provided technical leadership to the medical telemetry task force and clinical engineers are actively working in patient safety through medical error reduction.

Adapted from Australian Government Department of Education, Employment & Workplace Relations Job Guide www.jobguide.dest.gov.au and SSWAHS staff and reviewed by NSLHD staff.

CLINICAL ENGINEER

Health
Northern Sydney Local Health District

Clinical Engineers do many things throughout the healthcare profession, but most importantly, they try to make a difference to patient outcomes through the safe application of technology.

CAREER OPPORTUNITIES / QUALIFICATIONS REQUIRED

Clinical Engineering education is based in classical engineering (usually Electronics or Mechanical), supplemented with a combination of courses in physiology, human factors, systems analysis, medical terminology, measurement, instrumentation, computer programming, information technology.

SUPERVISION PROVIDED

Formal training is often supplemented with an Industrial Placement at a Public Hospital and courses from vendors on specific items of equipment either in Australia or overseas. Together this training gives the Clinical Engineer a firm grounding in hospital technology, operations, protocols, and ethics.

All of this background prepares the clinical engineer to fill a variety of roles in research, design, academia, and most often, in the clinical environment. In daily practice, the Clinical Engineer often serves as the translator walking between the worlds of the medical, engineering, and business professionals. Today, healthcare technology extends into information and communications systems and traditional medical equipment is more complex than ever. Assessing, managing, and solving problems in this hyper-tech world is the work of the clinical engineer.

CLINICAL ENGINEERS ARE PROFESSIONALS

Clinical Engineers, by education and training, are members of a proud profession. Through their professional society, the Engineers Australia (Biomedical College), they have established a code of ethics, pursued peer recognition and certification programs, and developed a heritage of publishing, teaching and humanitarian programs designed to "give back" to society and to prepare the next generation of practitioners. Clinical Engineers, whether employed in hospitals or elsewhere, understand that the opportunity to practice in healthcare carries the responsibility to always give one's best, maintain appropriate discretion, and keep the well-being of the patient as the highest priority.

CLINICAL ENGINEERS AND BMETS ARE DIFFERENT

Clinical Engineers are often confused with another professional group in the hospital, the Biomedical Equipment Technicians (BMETs). In reality, these two groups perform different but equally valuable functions. The BMET is the person responsible for direct support, service, and repair of the medical equipment in the hospital. BMET education and training is usually of a more directly technical nature, and is supplemented with specific schooling in service to the equipment. BMETs answer the call when medical equipment fails to function properly and must work closely with nurses and other hospital staff, as well as the equipment vendor, as they service and maintain the equipment. The job of the clinical engineer, however, is somewhat different.

Adapted from Australian Government Department of Education, Employment & Workplace Relations Job Guide www.jobguide.dest.gov.au and SSWAHS staff and reviewed by NSLHD staff.

UNIT - I

Clinical Engineering Program

Clinical engineering is a speciality within biomedical engineering responsible primarily for applying and implementing medical technology to optimize healthcare delivery. Roles of clinical engineers include training and supervising biomedical equipment technicians (BMETs), working with governmental regulators on hospital inspections/audits, and serving as technological consultants for other hospital staff (i.e. physicians, administrators, IT, etc.). Clinical engineers also advise medical device producers regarding prospective design improvements based on clinical experiences, as well as monitor the progression of the state-of-the-art in order to redirect hospital procurement patterns accordingly.

Clinical engineering is a sub-discipline of biomedical engineering and it concerns the design and records management of biomedical technology systems and equipment for hospitals and medical clinics. Most students interested in clinical engineering pursue a bachelor's or master's degree in biomedical engineering. High school diplomas or bachelor's degrees are necessary for admission to these programs.

Enrolled students will explore biomechanics and tissue engineering in preparation for pursuing careers as tissue and clinical engineers, or, in the case of master's-level students, as the managers of such professionals. While there are no graduate certificate programs exclusively in clinical engineering, some schools offer a 1-year graduate certificate program in biomedical engineering, for which a bachelor's degree is required. All programs should include laboratory and classroom components. Related doctoral programs also exist.

Main job roles

- designing and developing instruments for patient monitoring, diagnosis, treatment or research
- responsibility for quality assurance of patient connected equipment in hospitals
- building and testing of new joint replacements, active implants and equipment used for various types of non-invasive - 'keyhole' - or precision surgery
- those working in the rehabilitation field may deal with custom design and manufacture of aids such as wheelchairs or speech synthesisers etc. and research into the mechanics of the body.

Clinical engineers work closely with patients, technical and medical staff and administrative staff as well as equipment manufacturers. Many engineers work in large departments that deal with a variety of medical physics activities and are encouraged to share their specialist knowledge.

Clinical Engineering is Different from Biomedical Engineering

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usually of a more directly technical nature, and is supplemented with specific schooling in service to the equipment. BMETs answer the call when medical equipment fails to function properly and must work closely with nurses and other hospital staff, as well as the equipment vendor, as they service and maintain the equipment. The job of the clinical engineer, however, is somewhat different.

EDUCATIONAL RESPONSIBILITIES:

A clinical engg is responsible for educating hospital staffs like doctors, nurses and engineers. The knowledge of a clinical engg about various medical equipments is distributed among the hospital staffs. This is done by the means of seminars, webinars and special classes.

Clinical engineers also take part in active research ~~and~~ projects. These research projects are to aid the doctors who are in need for a different solution for a particular patient suffering from a particular disease.

There is a constant contact between the doctors and the clinical engg and the clinical engg and patients. This help in efficient working of any hospital.

STUDY PPT also

UNIT - 1

Roopam Dey

Health Legislation

According to WHO; "**Health legislation** encompasses the laws, ordinances, directives, regulations and other similar legislative instruments that deal with all aspects of health protection and promotion, disease prevention, and delivery of health care."

Acts and Regulations

Administered by the Minister for Ageing

- *Supported Residential Services (Private Proprietors) Act 2010* (jointly administered with the Minister for Community Services)
    - *Supported Residential Services (Private Proprietors) Regulations 2012*

Administered by the Minister for Health

- *Abortion Law Reform Act 2008* (jointly administered with the Minister for Women's Affairs)
- *Ambulance Services Act 1986*
- *Anglican Welfare Agency Act 1997*
- *Assisted Reproductive Treatment Act 2008*
    - *Assisted Reproductive Treatment Regulations 2009*
- *Cancer Act 1958*
    - *Cancer (BreastScreen Victoria Registry) Regulations 2003*
    - *Cancer (Reporting) Regulations 2012*
- *Cemeteries and Crematoria Act 2003*
    - *Cemeteries and Crematoria Regulations 2005*
- *Crown Land (Reserves) Act 1978* (provisions relating to specific Crown land)
- *Drugs, Poisons and Controlled Substances Act 1981* (jointly administered with the Ministers for Mental Health and Agriculture and Food Security)
    - *Drugs, Poisons and Controlled Substances Regulations 2006*
    - *Drugs, Poisons and Controlled Substances (Commonwealth Standard) Regulations 2011*
- *Epworth Foundation Act 1980*
- *Food Act 1984*
    - *Food (Forms and Registration) Regulations 2005*
- *Gene Technology Act 2001*
    - *Gene Technology Regulations 2011*
- *Health (Commonwealth State Funding Arrangements) Act 2012*
- *Health (Fluoridation) Act 1973*
- *Health Practitioner Regulation National Law (Victoria) Act 2009*
    - *Health Practitioner Regulation National Law Regulation 2010*
- *Health Practitioners (Special Events Exemption) Act 1999*
- *Health Records Act 2001*
    - *Health Records Regulations 2012*
- *Health Services Act 1988* (jointly administered with the Ministers for Community Services and Mental Health)
    - *Health Services (Prescribed Regions Regulations) 2004*
    - *Health Services (Private Hospitals and Day Procedure Centres) Regulations 2002*

- *Health Services (Conciliation and Review) Act 1987*
- *Human Tissue Act 1982*
  - *Human Tissue Regulations 2006*
- *Land Act 1958* (provisions relating to specific land)
- *Lord Mayor's Charitable Fund Act 1996*
- *Medical Treatment Act 1988*
- *Non-Emergency Patient Transport Act 2003*
  - *Non-Emergency Patient Transport Regulations 2005*
- *Pharmacy Regulation Act 2010*
- *Prohibition on Human Cloning for Reproduction Act 2008*
- *Public Health and Wellbeing Act 2008*
  - *Public Health and Wellbeing Regulations 2009*
- *Radiation Act 2005*
  - *Radiation Regulations 2007*
- *Research Involving Human Embryos Act 2008*
- *Royal Melbourne Hospital (Redevelopment) Act 1992*
- *Safe Drinking Water Act 2003*
  - *Safe Drinking Water Regulations 2005*
- *Therapeutic Goods (Victoria) Act 2010*
- *Tobacco Act 1987*
  - *Tobacco Regulations 2007*

Administered by the Minister for Mental Health

- *Crimes (Mental Impairment and Unfitness to be Tried) Act 1997* (jointly administered with the Attorney-General and the Minister for Community Services)
  - *Crimes (Mental Impairment and Unfitness to be Tried) Regulations 2009*
- *Drugs, Poisons and Controlled Substances Act 1981* (jointly administered with the Ministers for Health and Agriculture and Food Security)
  - *Drugs, Poisons and Controlled Substances (Precursor Chemicals) Regulations 2007*
- *Mental Health Act 1986*
  - *Mental Health Regulations 2008*
- *Severe Substance Dependence Treatment Act 2010* (jointly administered with the Attorney-General)
  - *Severe Substance Dependence Treatment Regulations 2011*

What does Biomedical Engineer do in Hospital and Industry?

Role of Biomedical Engineer In a Hospital:

Purchase of equipment's (which includes inviting quotations/tenders for purchasing new equipment's/machines & preparing comparison chart for the same).
Writing specifications for all the new equipment's & machinery.
Evaluating the equipment &machinery on the basis of its initial cost as well as its operating cost: since many times, the high maintenance & operating cost of the equipment turns out to be much higher than the initial cost.
Inspection of incoming equipment & machinery and doing pre-acceptance checks before official acceptance & payment.
Maintaining records; for e.g. equipment history.
Setting standards & ensuring their compliance.
Maintaining the equipment to the best of its performance by organizing a planned maintenance program for all equipment's and attending to emergency breakdowns and repairs.
Arranging for training programs for personnel in clinical engineering department as well as the end users.
Advising & providing expertise to the medical staff & administration.
Maintaining equipment inventory for all existing & incoming equipment's.
Active involvement in the activities of the hospital's safety committee & checking safety hazards.
Monitoring contract services viz. A.M.C. and C.M.C.
Keeping record of the Spares/consumable items.

Role of Biomedical Engineer in an Industry:

List of 25 Dream companies every biomedical engineer would want to work for.

Preparing quotations/ tenders.
Maintaining records; for e.g. equipment history.
Setting standards & ensuring their compliance.

(5)

UNIT I

Roopen Dey

UNIT-1

Only study the flow chart and the main texts.

American College of Emergency Physicians

MEDICAL STAFF STRUCTURE

Medical Staff Structure
Information Paper

Overview

As we approach the 21st century, many health care entities have moved toward consolidation. Concurrently, medical staffs have come to the realization that they, too, must reassess their structure in order to remain an effective partner in the hospital-physician relationship. In a recent study 30% of medical staffs are in the midst of reorganizing, 29% have reorganized, or 23% are thinking about it. Must commonly, the objectives are to improve staff efficiency and reduce staff/committee meetings.[1]

The JCAHO recently implemented a change in their MS.1 standard to allow for more than one medical staff in a particular health care organization if it makes sense to do so. This change in JCAHO philosophy emanated primarily from hospital mergers/affiliations whereby a much larger and potentially geographically distanced organization with multiple "campuses" replaced multiple independent facilities. Nonetheless, JCAHO would prefer to see consolidation of the medical staffs of previously independent facilities wherever possible.

Emergency medicine is deeply involved in this change process. This is due not only to health care entity mergers, but also to the unique contractual arrangements that exist between hospitals and emergency medicine groups. In many instances the emergency department (ED) services contract is written in a manner that supersedes the medical staff bylaws, therefore often relinquishing due process rights and effectively ceding to the administration total control of the hospital-based contracted physician groups. Emergency medicine has always been a transitional specialty and needs to continue to be aware of the environmental needs and changes.

An additional consideration is that emergency physicians (EPs) are often viewed by other medical staff members as "fence sitters", due to the close contractual relationship that exists between the hospital and the ED group. The perception is that EPs are more aligned with the interests of the hospital than with the bulk of the medical staff. This perception makes it more difficult for EPs to have a core and meaningful role in medical staff organizations and medical staff structures.

Medical staff structure models vary tremendously. As pertains to the interests and concerns of emergency medicine, direct hospital employment of EPs where such arrangements exist, as well as unique ED services contract considerations, often influence how the emergency medicine department is structured within a given medical staff configuration. Emergency medicine has achieved autonomous department level status in many institutions, yet with the trend to minimize the number of meetings and members of the hospital governance groups, this is likely to change in coming years.

In this information paper, we will discuss some of the more common medical staff organization models in an attempt to broaden our membership's awareness of these issues. As in politics, medical staff structures are local, i.e., arranged to meet the overall needs and desires of a given medical staff. There is no right or wrong. The bottom line is that individual EP groups and EDs must understand the pros and cons of the various medical staff structures, in order to advocate for the most useful local relationship.

---

[1] *Healthcare Leadership Review*, November 1997.

Types of Medical Staff Structures

Many medical staffs are structured with an autonomous Department of Emergency Medicine, similar to other clinical departments such as medicine, surgery, anesthesiology, obstetrics, pediatrics, etc. There is a chairperson for each department who sits on the Medical Staff Executive Committee meeting, usually chaired by the president of the medical staff. A typical medical staff organization is shown in Figure 1.

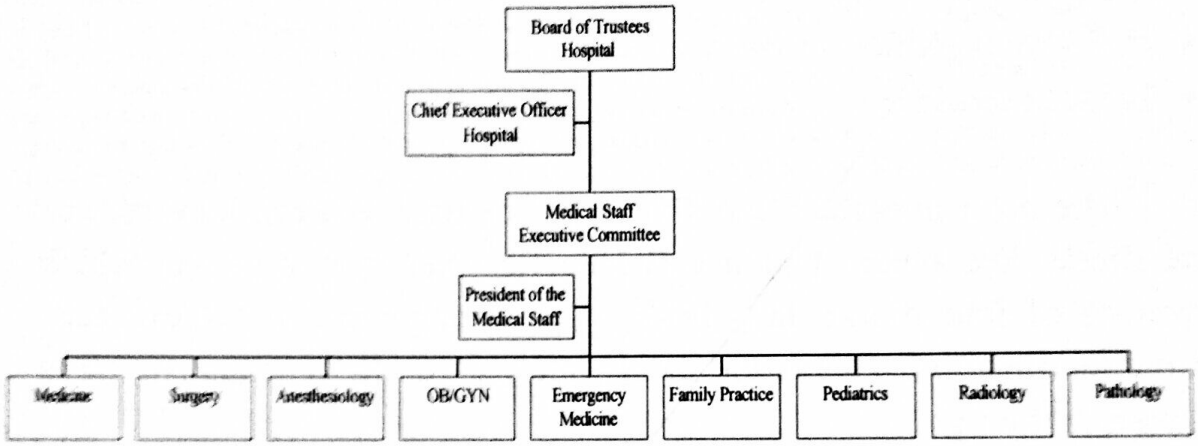


Figure 1. Typical Medical Staff Structure

There are advantages to an autonomous Department of Emergency Medicine. The staff physicians feel they have more input into the patient care policies and can better advocate directly for their patients.

Peer review and credentialing are usually the responsibility of the department chairperson, who is usually an EP. The staff EPs often feel that their issues and their concerns are being heard by a person who understands the unique practice of emergency medicine.

The department chair in this model sits on the Medical Staff Executive Committee and, therefore, is involved with the global issues of the medical staff and/or the hospital. He/she is able to directly address these issues from an emergency medicine standpoint.

There are disadvantages also to an autonomous Department of Emergency Medicine. There are more monthly meetings that need to be attended by physicians, especially the department chairperson and other medical staff leaders who are trying to resolve interdepartmental issues. The bureaucracy of trying to get agreement on policies and issues affecting multiple departments can be both time-consuming and frustrating.

When the Department of Emergency Medicine speaks at the Medical Staff Executive Committee or with hospital administration, it is often viewed as a small department without a significant power base, again causing delays and frustration in effecting change.

To mitigate some of the disadvantages, the chairperson of the Department of Emergency Medicine must be a good communicator. He/she must build bridges with the chairs of the other clinical departments and with hospital administration. The chairperson should spread some of the administrative duties to other members of the department to allow them to have a real input into the clinical affairs affecting patient care. In addition, this will free the department chair to meet on a frequent basis with his/her peers. Both intradepartmental and interdepartmental meetings must have specific agendas and be time limited. Unnecessary meetings must be eliminated.

Many medical staffs are restructuring to become more efficient. There is usually a consolidation of departments and/or committees. Often, emergency medicine is placed in the Department of Medicine (Figure 2). Other services often contained within the Department of Medicine include internal medicine, family practice, neurology, psychiatry and radiology. In a similar model, emergency medicine is placed in the Department of Surgery (Figure 3), which may also include anesthesiology, pathology, and various surgical subspecialties. In some instances, emergency medicine is part of a separate department of Community/Ambulatory Medicine (Figure 4). Within this department, there are other services such as family practice, psychiatry, outpatient medicine, as well as emergency medicine.

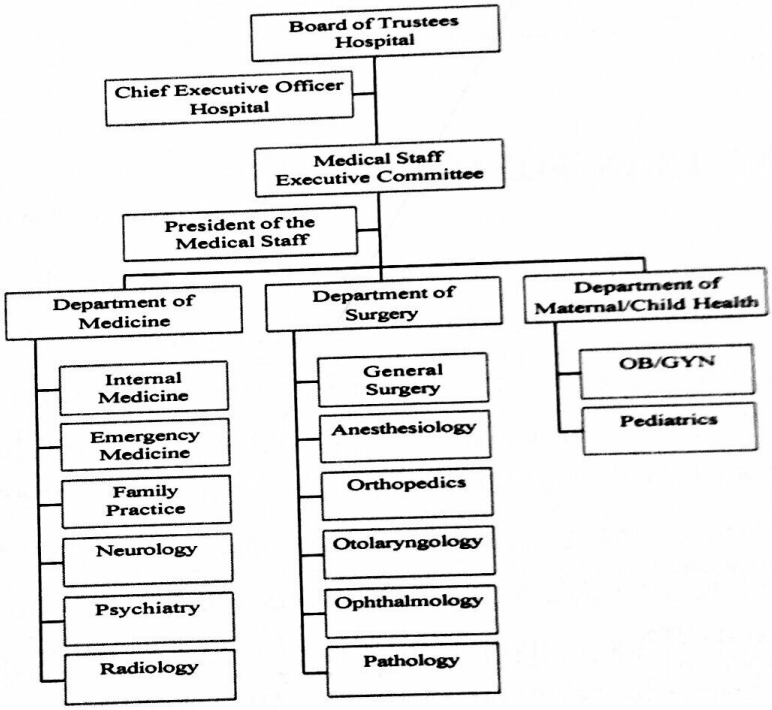


Figure 2. Department of Medicine Structure

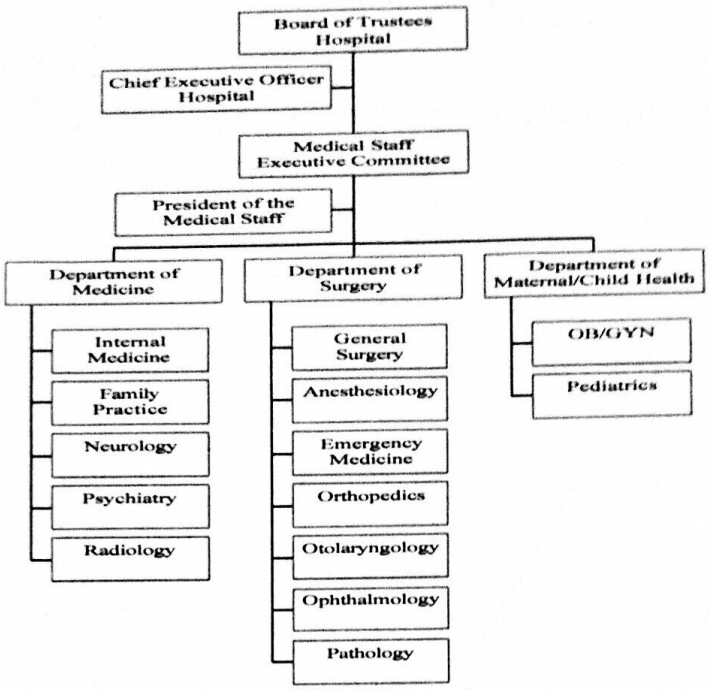


Figure 3. Department of Surgery Structure

Less common models of medical staff structure may include: a department of hospital-based physicians, a multispecialty group, or a physician-hospital organization. A Department of Hospital-Based Physicians may include emergency medicine, radiology, anesthesiology, pathology, and hospitalists; leadership of the department may rotate from one specialty to another, or a strong leader could provide ongoing direction.

For a multispecialty group, a good example is the Permanente Medical Group, which is part of the Kaiser Permanente health maintenance organization. Once a physician is voted in as a Permanente shareholder, he/she has equal standing and a vote in the governance of the medical group. An elected chief of the ED negotiates with the physician-in-chief of the Permanente medical facility to allocate resources within the budget.

Physician hospital organizations (PHOs) are becoming more common as a vehicle for contracting with insurers/employers to assure quality care and manage costs. As managed care continues to increase, such joint ventures between physicians and hospitals are also likely to increase and may ultimately be incorporated into the medical staff structure.

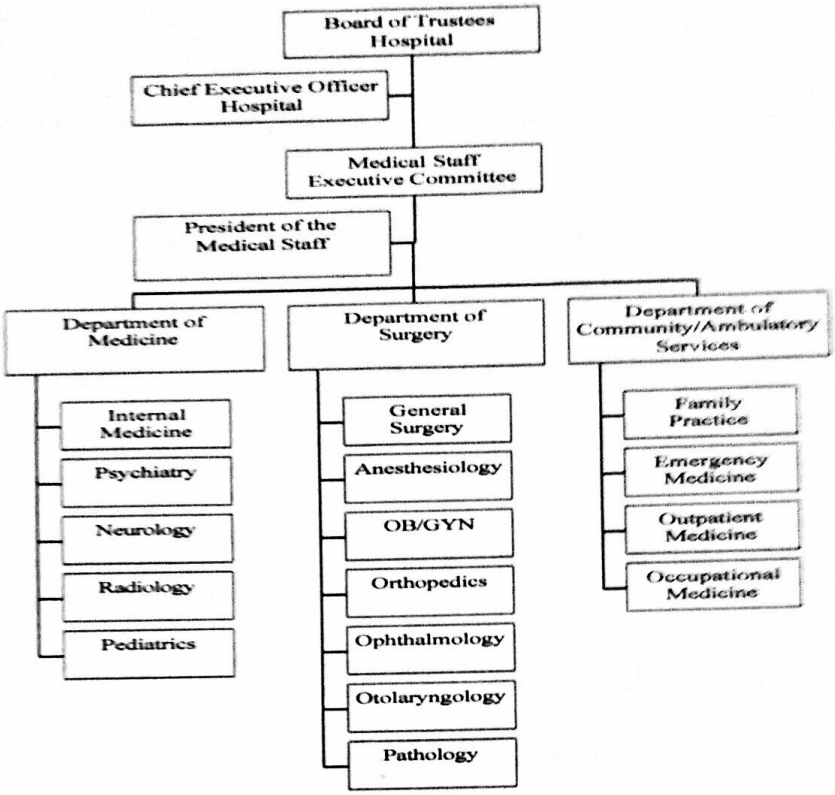


Figure 4. Department of Community/Ambulatory Services

There are certain advantages for emergency medicine to be in a larger department. The consolidation of departments means fewer meetings for medical staff members to attend and a decrease in the bureaucracy. Issues that need resolution can be handled within the department as opposed to additional separate meetings between two autonomous departments. Once consensus within the department occurs, there is an increased ability to negotiate with other departments and hospital administration. Decisions within the department are then easier to implement. Communication among the different services within the department is enhanced.

With the consolidation of departments, fewer medical staff leaders are needed, freeing other members of the department to pursue other activities. The medical staff leader or department chair has a broadened area of responsibility and, therefore, a greater knowledge of the issues facing the medical staff and the hospital. Getting agreement on a course of action is easier with fewer medical staff leaders or department chairs because of their greater understanding of the issues.

The disadvantages of consolidated departments with fewer medical staff leaders are that EPs and other members of the medical staff may feel disconnected and disenfranchised. Emergency physicians and other members of the medical staff may feel a loss of their ability to advocate for patients and a loss of professionalism. Staff EPs may feel a loss of influence on patient care policies. Because peer review and credentialing usually fall into the purview of the department chair, EPs may have difficulty if the department chair does not understand the role of EPs.

HSM

UNIT - II

Unit-2

Designing a Training Programme:-

The training programme is an integral part of human resource management.

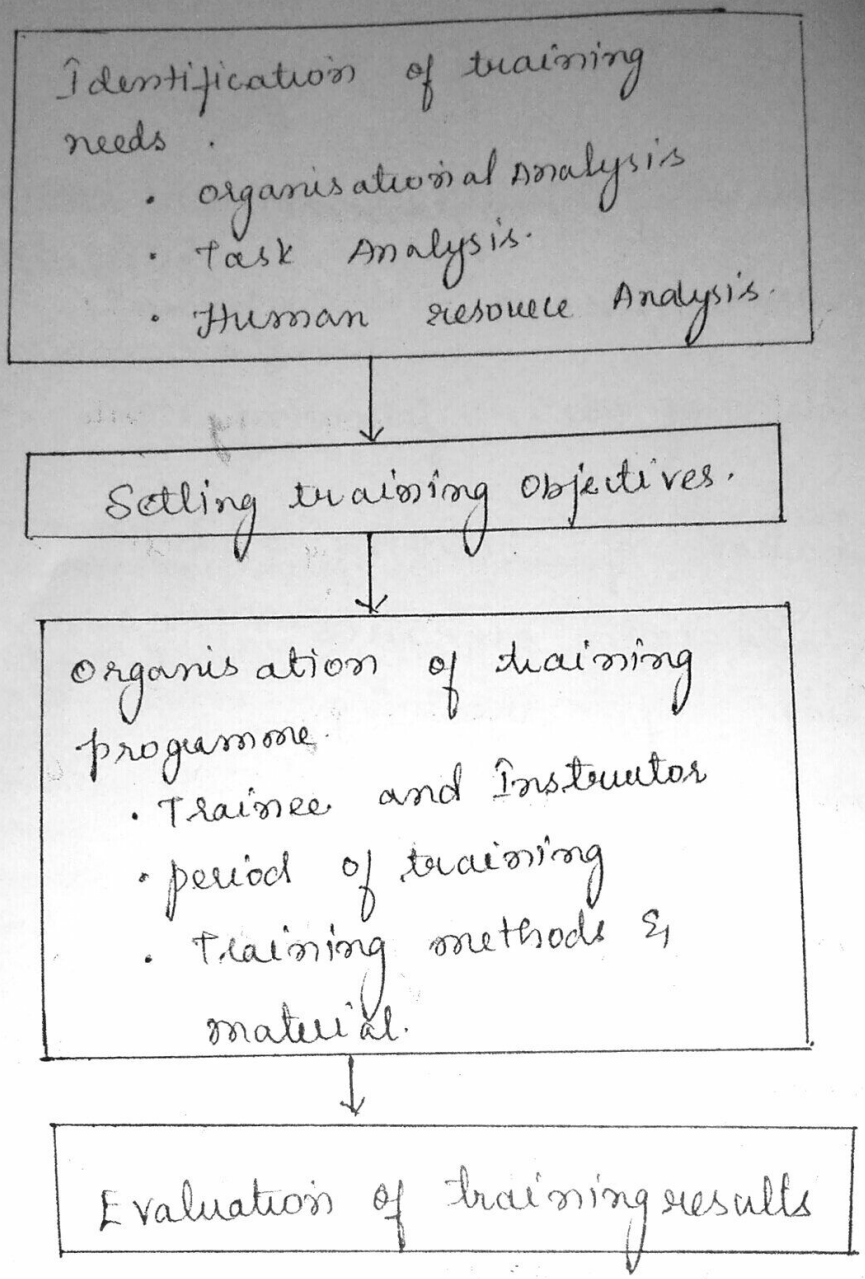
It consists of the following inter-related steps:

1. Identification of training needs.
2. Setting training objectives
3. Organisation of training
4. Evaluation of training outcomes or results.

1. Identification of Training Needs:-

The technological changes taking place is the main cause of identification of the training needs in an organisation

Earlier the people were acquiring training through apprenticeship and vocational courses, which are not sufficient in the modern era of industrialisation.



Design of a training programme.

a) Adoption of new techniques in an organisation and introduction of modern working methods.

b) Poor performance by the workers are reflected by low output, lack of initiative, incompetence bad decisions.

wide gaps between what workers should be doing and what they are doing.

d) Analysis of the strengths and weakness of an organisation.

More information could be obtained from the organisation's human resource plan. While preparing plans, the current skills with the expected needs for future should be kept in mind. and the deficiencies be highlighted.

Some organisations prepare skills - inventories classifying employees according to their qualification technical knowledge, experience, and various skills.

Training needs can be identified through the following types of analysis.

i) Organisational analysis

ii) Task analysis.

iii) Manpower or human resource analysis.

1) Organisational Analysis:-

Its pupose is to determine where training emphasis should be placed in the organisation for increasing organisational effectiveness. Organisational analysis involves the following elements.

a) Analysis of objectives:-

The long term and short term objectives and their relative priorities should be properly analysed. Specific goals for various departments should be stated which will serve as means for achieving the overall organisational objectives.

b) Resource utilization Analysis:-

This allocation of human and physical resources and their efficient utilization in meaning the operational targets should be analysed.

The trainer needs professional expertise in ades to fulfill his responsibility.

An effective instructor or trainer can present the operations involved in doing a particular job by various ways.

In most of the cases, method of explanation is favoured. In addition an instructor may illustrate various points through the use of pictures and other training aids.

i) Determination of Training Period:-

The length of the training period depends upon the skill to be acquired, the trainee's learning capacity and the training methodology used.

The use of effebive and visual material usually helps to reduce the training time.

Now the question arises whether the training should be given during working hours

If the training is given during working hours, the productivity will suffer and

Organisation of training Programme:-

a) Selection of the Trainee:-

* Evaluating the knowledge of the employee by interviewing him.
* Evaluating the quality of training by judging him/her by group discussions and giving a problem in real life situations and asking the appropriate solution for it.
* Testing his/her leadership skills and efficiency.

) Preparation of the instructor:-

The instructor or trainer is a key figure in an effective training programme.

He can contribute immeasurably to its success. Qualified instructor may be obtained from inside or outside the organisation.

However many insiders are not good instructors because they may not possess the ability to teach the skill. Trainee needs many qualifications, beside knowing how to do the work

whether adequate number of personnel are available to ensure the fulfillment of the goals?

Whether the personnel performance is up to the required standards?

ii) Task Analysis:-

It is a systematic analysis of jobs to identify job contents, knowledge, skills and aptitudes required to perform the job.

In task analysis, the main focus is on the job or task. Task analysis, the main focus is on the job or task. Task analysis requires the study of various types of skills and training required to perform the job effectively

iii) Manpower Analysis:-

The quality of manpower required by the organisation has to be carefully analysed. It has to be done in the light of both internal and external environment of the organisation.

To achieve these quality standards, specific training needs should be determined on the following lines.

a) Specific areas where individuals need training.

b) the capability of present workforce to learn new skills and behaviour

Setting Training Objectives:

Once the training needs are identified, the next step is to set training objectives in ~~concrete terms~~ concrete terms and to decide the methods to be adopted to achieve these objectives.

The overall aim of any training programme is increase organisational effectiveness.

Specific objectives of Training
1. Increased productivity 2. Improved quality 3. Better human resource planning 4. Higher morale 5. Better health and safety 6. Prevention of obsolescence 7. Enhanced personal growth.

⟹

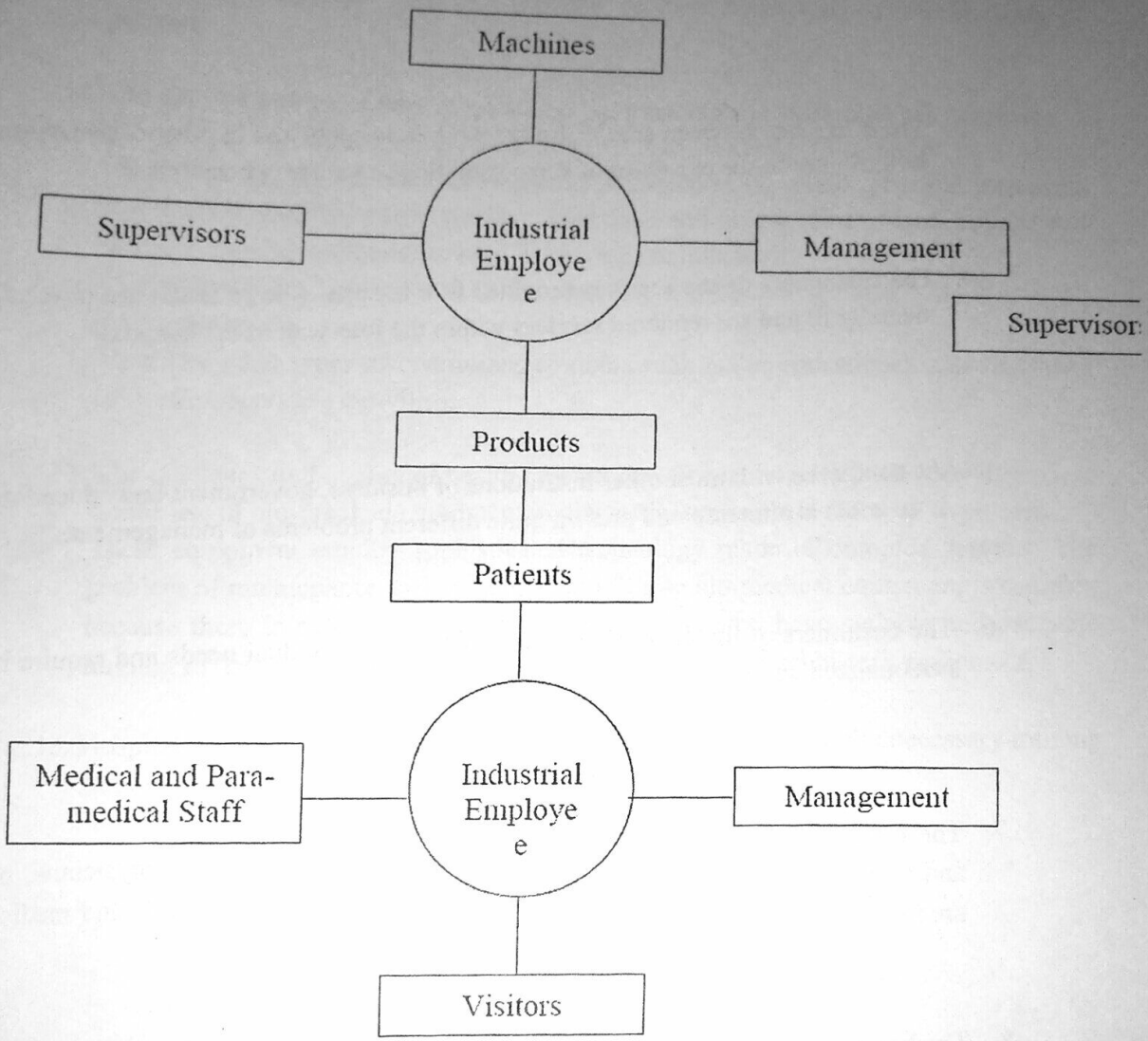
Overall purpose of training
Increased organisational effectiveness

2. The no. of positions commonly carried on the payroll in each job classification
3. work performed
4. The level of difficulty involved in the job such as;
   * degree of responsibility
   * degree of knowledge
   * value of judgement affecting the welfare of patients
5. Hours and shifts
6. Standard of performance
7. Job combinations.

UNIT - II

HSM

DRAW THIS DIAGRAM FOR DIFFERENCE BETWWEN INDUSTRY AND HOSPITAL



ELABORATE THESE POINTS

1. Hospital administration is a complex task and can causes headaches and one is likelihood of developing high blood pressure or ulcers if it is not handled properly.

2. It involves planning, organizing, controlling and evaluating and this can be done better by knowing the principles of management and administration.

3. The difference between administrative work in hospital and in other organizations can be attributes to the existence of some conditions peculiar to hospitals.

4. The consumers of the services provided in a hospital (the patients) are physically or mentally ill and are rendered services within the four wall of the hospital.

5. As compared with most other institutions of business, government and education, this is an unusual situation and present quite different problems of management.

6. The customers of the hospital (the patients) have individual needs and require highly personalized and custom-made services.

7. The diagnostic, therapeutic and preventive services provided by physicians, nurses and technicians, and the aid of expensive and specialized equipments and medication are tailored to the need of each individual consumer.

8. The hospital provides a wide range of scientific and technical services such as:
   Nursing, diet therapy, anesthesiology, pharmacy, radiology, clinical laboratory, physical therapy and medical social work. Many of its services are provided continuously, round the clock, every day of the year.

9. Nurses and certain other personnel must accept direction from both the matron and the physicians under whom they work closely every day.
   They also have to fulfill the emotional, physical, mental and medical needs of the patients.
   The human relations problems in such situations of dual authority are much more frequent, delicate, varies and complex than in organization where this situation does not exist.

10. Handicapped by low wages, rigid discipline and some apprehension of exposure to disease, hospital personnel are expected to:
    Maintain a very high level of efficiency, as their functioning affects the lives of patients.

11. The amount and the variety of training programmers that the hospital has to provide.
    Training is provided for medical interns and residents (6 months to 1 year), technicians (2 years), medical laboratory technicians (2 years), physical therapists, pharmacists, medical social workers, dieticians and nurses. Classrooms, clinical and different training methods are used in varying combinations.
    The administrator is responsible for planning and operating these various training programmers.
    Very few other types of institutions combine such major educational responsibilities with other operating activities.

12. The efficiency and quality of health care services in any hospital is directly dependent on the use of bio-medical equipment in diagnosis, surgery and therapeutic process.
    These equipment employ sophisticated technology made of complex systems. The problem of maintenance and management of these bio-medical equipment is complex because there is acute shortage of technical hands who have suitable and adequate training in the maintenance and repairing of these specialized hi-tech equipment.

13. Hospital administration should be entrusted on those who have the necessary training and the right kind of attitude to perform this vital task.

Unit 2

HSM

Distinction between Hospital & Industrial Organization.

- The consumers of the services provided in a hospital (the patients) are physically or mentally ill and are rendered services within the four wall of the hospital.
- As compared with most other institutions of business, government and education, this is an unusual situation and present quite different problems of management.
- The customers of the hospital (the patients) have individual needs and require highly personalized and custom-made services.
- The diagnostic, therapeutic and preventive services provided by physicians, nurses and technicians, and the aid of expensive and specialized equipments and medication are tailored to the need of each individual consumer.
- The hospital provides a wide range of scientific and technical services such as:
- Nursing, diet therapy, anesthesiology, pharmacy, radiology, clinical laboratory, physical therapy and medical social work.
- Many of its services are provided continuously, round the clock, every day of the year.
- Nurses and certain other personnel must accept direction from both the matron and the physicians under whom they work closely every day.
- They also have to fulfill the emotional, physical, mental and medical needs of the patients.
- The human relations problems in such situations of dual authority are much more frequent, delicate, varies and complex than in organization where this situation does not exist.
- Handicapped by low wages, rigid discipline and some apprehension of exposure to disease, hospital personnel are expected to:

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- These equipment employ sophisticated technology made of complex systems. The problem of maintenance and management of these bio-medical equipment is complex because there is acute shortage of technical hands who have suitable and adequate training in the maintenance and repairing of these specialized hi-tech equipment.

Free from pollution
service sector.

What is ICRP?

* The work of the "International Commission on Radiological Protection" (ICRP) helps to prevent cancer and other diseases and effects associated with exposure to ionising radiation, and to protect the environment.

* Since 1928, ICRP has developed, maintained and elaborated the "International System of Radiological Protection" used World wide as the common basis for radiological Protection standards.

* ICRP is an independent, international organisation with more than 200 volunteer members

from approx 30 countries across

continents.

* These members represent the leading scientists and policy makers in the field of radiological protection.

* The International System of Radiological protection has been developed by ICRP based on

(i) The current understanding of the science of radiation exposures and effects.

ii) Value judgements take into account societal expectations, ethics and experience gained

in the application of the system.

ICRP COMMITTEE 3 PROTECTION IN MEDICINE:-

→ Committee 3 of ICRP is concerned with protection of persons and unborn children when ionising radiation is used for medical diagnosis, therapy or biomedical research.

→ According to the 2011-2017 Strategic Plan, Committee 3 develops recommendations and guidance for Protections of patients, staff & Public against radiation exposure in medicine.

ICRP reports cover topics on

* Education and training in Radi-cal protection.
* Preventing accidental exposures in radiation therapy;
* doses to patients from radiopharmaceuticals
* Radiation safety aspects of brachytherapy.
* Release of patients after therapy with unsealed radionuclides.
* Managing radiation dose in interventional radiology, digital radiology, computed tomography,

Paediatrics, cardiology and other medical specialities.

* The committee is also involved in preparation of a document on effective dose (and its use in medicine).

Dose Limits : ICRP

→ The dose limits include :-

The effective dose from external sources in the specified period and the 50 year committed dose for internal sources

→ The 5 year limit is predefined - i.e. can't be defined after the exposure has occured.

→ seperate limits are specified for the skin as it may be subjected to localized exposure.

→ For the pregnant female ICRP recommends a dose limit of 2 mSv.

Type of Limit	occupational	Public
Effective dose	20mSv/year, averaged over defined period of 5 years	1mSv in a year
Annual Equivalent dose limits		
• Lens of the Eye	150	15
• Skin	500	50
• Hands / feet	500	–
• Pregnant women	1mSv to the embryo	–

UNIT -3

Joint Commission

The **Joint Commission** is a United States-based nonprofit tax-exempt 501(c) organization[1] that accredits more than 21,000 health care organizations and programs in the United States.[2] There is also an international branch that accredits medical services around the world. A majority of state governments recognize Joint Commission accreditation as a condition of licensure and the receipt of Medicaid and Medicare reimbursements.[3]

History

The Joint Commission was formerly the **Joint Commission on Accreditation of Healthcare Organizations (JCAHO)** and previous to that the **Joint Commission on Accreditation of Hospitals (JCAH)**.[5]

The Joint Commission was renamed Joint Commission on Accreditation of Hospitals in 1951, but it was not until 1965 that accreditation had any official impact. In 1965 the federal government decided that a hospital that met Joint Commission accreditation met the Medicare Conditions of Participation. Section 125 of the Medicare Improvements for Patients and Providers Act of 2008 (MIPPA) removed The Joint Commission's statutorily-guaranteed accreditation authority for hospitals, effective July 15, 2010. At that time, The Joint Commission's hospital accreditation program would be subject to Centers for Medicare and Medicaid Services (CMS) requirements for organizations seeking accrediting authority. To avoid a lapse in accrediting authority, The Joint Commission would have to submit an application for hospital accrediting authority consistent with these requirements and within a time frame that would enable CMS to review and evaluate their submission.[6] CMS would make the decision to grant deeming authority and determine the term.

The Joint Commission's predecessor organization was an outgrowth of the efforts of Ernest Codman to promote hospital reform based on outcomes management in patient care. Codman's efforts led to the founding of the American College of Surgeons Hospital Standardization Program. In 1951, a new entity, the **Joint Commission on Accreditation of Hospitals** was created by merging the Hospital Standardization Program with similar programs run by the American College of Physicians, the American Hospital Association, the American Medical Association, and the Canadian Medical Association. In 1987, the company was renamed the **Joint Commission on Accreditation of Healthcare Organizations** (JCAHO, pronounced "Jay-co").[7] In 2007, the Joint Commission on Accreditation of Healthcare Organizations underwent a major rebranding and simplified its name to **The Joint Commission**. The rebranding included the name, logo, and tag line change to "Helping Health Care Organizations Help Patients."

The name change was part of an overall effort to make the name easier to remember and to position the commission to continue to be responsive to the needs of organizations seeking fee-based accreditation. The Joint Commission advocates the use of patient safety measures, the

spread of information, the measurement of performance, and the introduction of public policy recommendations.[8]

Joint Commission International (JCI) was established in 1998 as a division of Joint Commission Resources, Inc. (JCR), a private, not-for-profit affiliate of The Joint Commission. Through international accreditation, consultation, publications and education programs, JCI extends The Joint Commission's mission worldwide by helping to improve the quality of patient care by assisting international health care organizations, public health agencies, health ministries and others evaluate, improve and demonstrate the quality of patient care and enhance patient safety in more than 60 countries.[9] International hospitals may seek accreditation to demonstrate quality, and JCI accreditation may be considered a seal of approval by medical travelers from the U.S.[10]

Operation

All member health care organizations are subject to a three-year accreditation cycle, while laboratories are surveyed every two years. With respect to hospital surveys, the organization does not make its findings public.[11] However, it does provide the organization's accreditation decision, the date that accreditation was awarded, and any standards that were cited for improvement. Organizations deemed to be in compliance with all or most of the applicable standards are awarded the decision of Accreditation.

The unannounced full survey is a key component of The Joint Commission accreditation process. "Unannounced" means the organization does not receive an advance notice of its survey date. The Joint Commission began conducting unannounced surveys on January 1, 2006. Surveys will occur 18 to 39 months after the organization's previous unannounced survey.[12]

There has been criticism in the past from within the U.S. of the way the Joint Commission operates. The Commission's practice had been to notify hospitals in advance of the timing of inspections.[13] A 2007 article in the *Washington Post* noted that about 99% of inspected hospitals are accredited, and serious problems in the delivery of care are sometimes overlooked or missed.[14] Similar concerns have been expressed by the *Boston Globe*, stating that "The Joint Commission, whose governing board has long been dominated by representatives of the industries it inspects, has been the target of criticism about the validity of its evaluations."[11] The Joint Commission over time has responded to these criticisms. However, when it comes to the international dimension, surveys undertaken by JCI still take place at a time known in advance by the hospitals being surveyed, and often after considerable preparation by those hospitals.

Preparing for a Joint Commission survey can be a challenging process for any healthcare provider. At a minimum, a hospital must be completely familiar with the current standards, examine current processes, policies and procedures relative to the standards, and prepare to improve any areas that are not currently in compliance. The hospital must be in compliance with the standards for at least four months prior to the initial survey. The hospital should also be in compliance with applicable standards during the entire period of accreditation, which means that surveyors will look for a full three years of implementation for several standards-related issues.[15]

As for the surveyors, the Joint Commission and JCI employ salaried individuals, people who generally work or have worked within health care services but who may devote half or less of their time for the accrediting organization. The surveyors travel to health care organizations to evaluate their operational practices and facilities (i.e., structure/input and process metrics) against established Joint Commission standards and elements of performance.

Substantial time and resources are devoted by health care organizations ranging from medical equipment suppliers and staffing firms to tertiary care academic medical centers to prepare for and undergo Joint Commission surveys. There is growing concern, however, over the lack of verifiable progress towards meeting the organization's stated goals. Although the Joint Commission increasingly cites and demands "evidence-based medicine" in its regulatory requirements, there is a relative paucity of evidence demonstrating any significant quality improvement due to its efforts, while there is a growing body of literature showing no improvement or actual deterioration in quality despite the increasingly stringent and expensive requirements.[*citation needed*] Indeed, a facility requesting accreditation pays a substantial fee to the Joint Commission (the "accrediting" agency) and, upon receiving a "passing" grade is able to purchase associated mementos of accomplishment to display to the public. No other entity certifies the Joint Commission.

Alternatives in the United States

The Joint Commission is not a complete monopoly and while many states in the U.S. make use of their services, not all do. Some states have set up their own alternative assessment procedures; the Joint Commission is not recognized for state licensure in the states of Oklahoma (except for hospital-based outpatient mental health services), Pennsylvania, and Wisconsin. In California, The Joint Commission is part of a joint survey process with state authorities.[16]

There are also other healthcare accreditation organizations in the U.S. unrelated to the Joint Commission.[17] These include the Accreditation Commission for Health Care, Inc. (ACHC),[18] the American Osteopathic Association (AOA), the Commission on Accreditation of Rehabilitation Facilities(CARF),[19] the Community Health Accreditation Program (CHAP),[20] the "Exemplary Provider Program" of The Compliance Team,[21] Healthcare Facilities Accreditation Program (HFAP),[22] HFAP is older than the Joint Commission, having been in operation since 1945.[23] the National Commission on Correctional Health Care,[24] and the Healthcare Quality Association on Accreditation (HQAA), who are recognised in the state of Ohio.[25] and Utilization Review Accreditation Commission (URAC).[26] Due to increases in state insurance reform initiatives led by national nonprofit advocacy group, Autism Speaks, the need to develop quality benchmarks and recognize quality in behavioral health service providers include accrediting organizations such as [http://www.bhcoe.org The Behavioral Health Center of Excellence[24] and the [25][26] and Credentialing Of Ethical Behavioral Organizations.

On September 26, 2008 the Centers for Medicare and Medicaid Services (CMS) granted deeming authority for hospitals to DNV Healthcare Inc. (DNVHC), an operating company of Det Norske Veritas (DNV), a Norwegian international company that has been operating in the U.S. since 1898.[27]

The Center for Improvement in Healthcare Quality (CIHQ), based in Round Rock, Texas, was granted deeming authority for hospitals by the CMS In July 2013.[28]

Goals and initiatives

The stated mission of The Joint Commission is: "To continuously improve health care for the public, in collaboration with other stakeholders, by evaluating health care organizations and inspiring them to excel in providing safe and effective care of the highest quality and value"

The company updates its accreditation standards and expands patient safety goals on a yearly basis, and posts them on its Web site for all interested persons to review, making this information and process transparent to all stakeholders ranging from institutions, to practitioners, to patients and their advocates.

The purpose of The Joint Commission's National Patient Safety Goals is to promote specific improvements in patient safety. The Goals highlight problematic areas in health care and describe evidence and expert-based solutions to these problems. Recognizing that sound system design is intrinsic to the delivery of safe, high quality health care, the Goals focus on system-wide solutions, wherever possible.[29] The NPSGs have become a critical method by which The Joint Commission promotes and enforces major changes in patient safety in thousands of participating health care organizations in the United States and around the world. The 2009 NPSGs include new regulations targeting the spread of infection due to multidrug-resistant organisms, catheter-related bloodstream infections (CRBSI), and surgical site infections (SSI). The new regulations for CRBSI and SSI prevention apply not only to hospitals, but also to ambulatory care and ambulatory surgery centers. Engaging patients in patient safety efforts is also a major new component of the NPSGs. The Universal Protocol to reduce surgical errors and existing regulations on medication reconciliation have also been modified for 2009, based on feedback received by The Joint Commission.[30]

International healthcare accreditation

Gold Seal of Accreditation

Joint Commission International, or **JCI**, is one of the groups providing international healthcare accreditation services to hospitals around the world and brings income into the U.S.-based parent organization. This not-for-profit tax-exempt private corporation (a 501(c) organization) currently accredits hospitals in Asia, Europe, the Middle East, Africa and South America, and is seeking to expand its business further.[31]

The JCI has a small staff which includes principal consultants [32] and a number of other consultants from around the world such as John Wocher of the Kameda Medical Center in Japan ,Dr.Mahboob ali khan from India,.[33]

Cost of accreditation

JCI publishes an average fee of $46,000 for a full hospital survey.[34] Reimbursement for surveyors' travel, living expenses and accommodations is required in addition to the fee.

There may be additional costs related to consultancy work etc. directed towards assisting a hospital to be successful in the accreditation process.

Other international accreditors incur different levels of costs, some costing less than JCI.

- Health in the United States
- Medicare and Medicaid (United States)
- Non-profit organizations based in Illinois
- Quality assurance
- Healthcare quality
- Organizations established in 1951

STRATEGIC MANAGEMENT

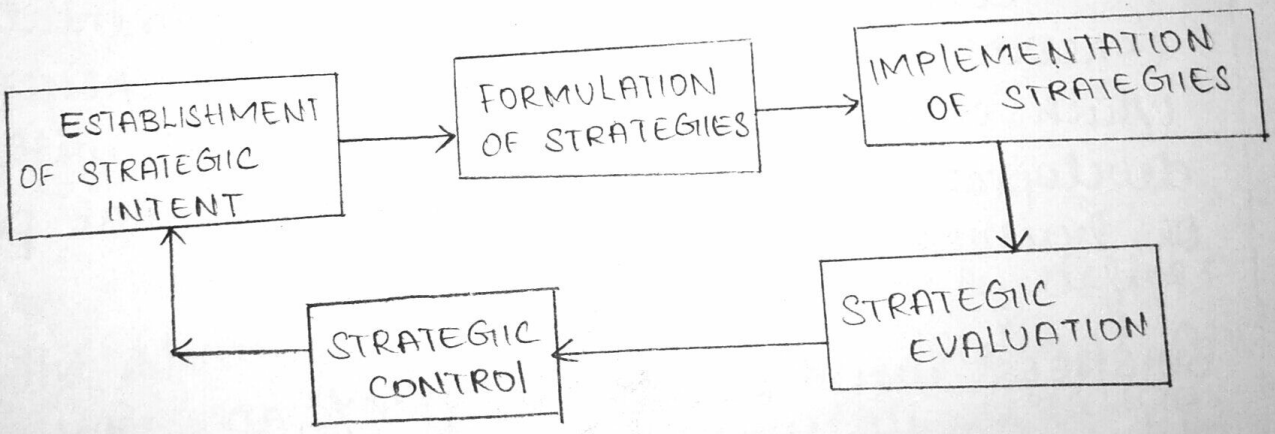
Strategic management involves the development of strategies and the formulation of policies to acheive organisational ~~tools~~ goals and objectives. In this process, attention must be given to both external strategies and internal strategies

Basic mission : "Every organisation must first determine its fundamental purpose and guiding principles for program activities."

SCOPE AND NATURE :

The strategic management process does not end when the firm decides what strategy or strategies to persue.

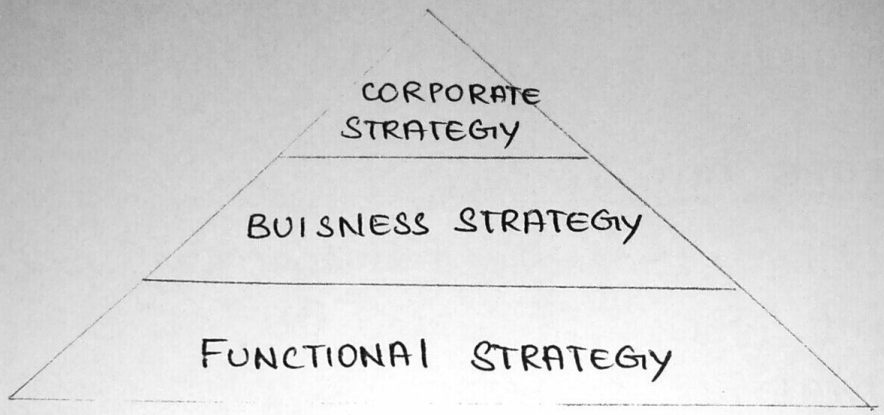
There must be a translation of strategic thought into strategic actions.



TYPES OF STRATEGY

Strategy can be formulated on three different levels :

- Corporate level
- Buisness unit level
- Functional or departmental level



CORPORATE LEVEL :

Corporate level strategy fundamentally is concerned with the selection of buisnesses in which company should compete and with the development and co-ordination of that portfolio of buisnesses.

BUISNESS UNIT LEVEL STRATEGY

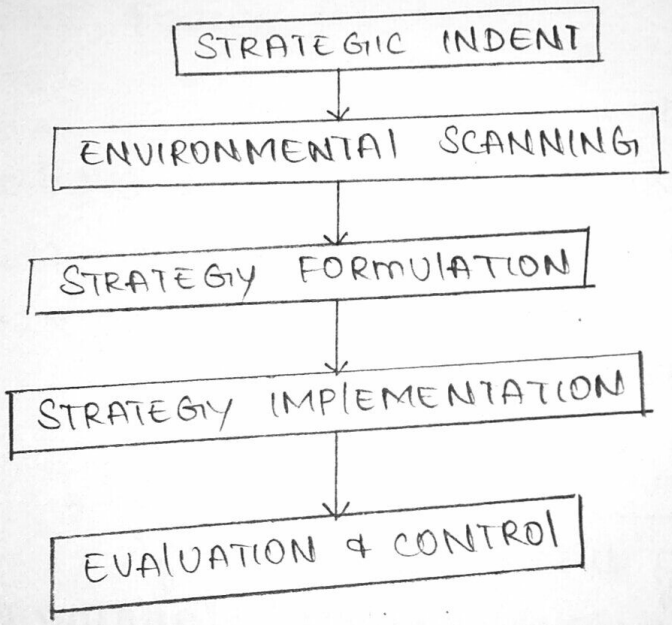
It may be a division, product line or other profit center that can be planned independently from the other buisness units of the firm.

At this levels, the strategic issues are less a... the coordination of operating units and more abou... developing and sustaining a competitive advantage for goods and services that are produced.

FUNCTIONAL LEVEL STRATEGY

Functional level of the organisation is the level of operating divisions and departments. The strategic issues at the functional level are related to business processes and the value chain.

STRATEGIC PLANNING PROCESS



The strategic planning test clearly defines objectives and assess both the internal and external situation to formulate strategy.

STRATEGIC MANAGEMENT Tools

- SWOT Analysis
- GAP Analysis
- PEST Analysis
- PORTER'S FIVE FORCES Analysis

SWOT ANALYSIS

S - Strength
W - Weaknesses
O - Opportunities
T - Threats

STRENGTH :

→ Low salary and Benefits overhead
→ Quick to respond to market changes
→ Light weight, flat hierarchy resulting quicker desision making.

WEAKNESS :

→ Existing workload too high
→ No previous project planning experiences
→ missing expertise in some areas.

OPPORTUNITIES

→ Need to increase market share
→ could convert existing products for few new markets.

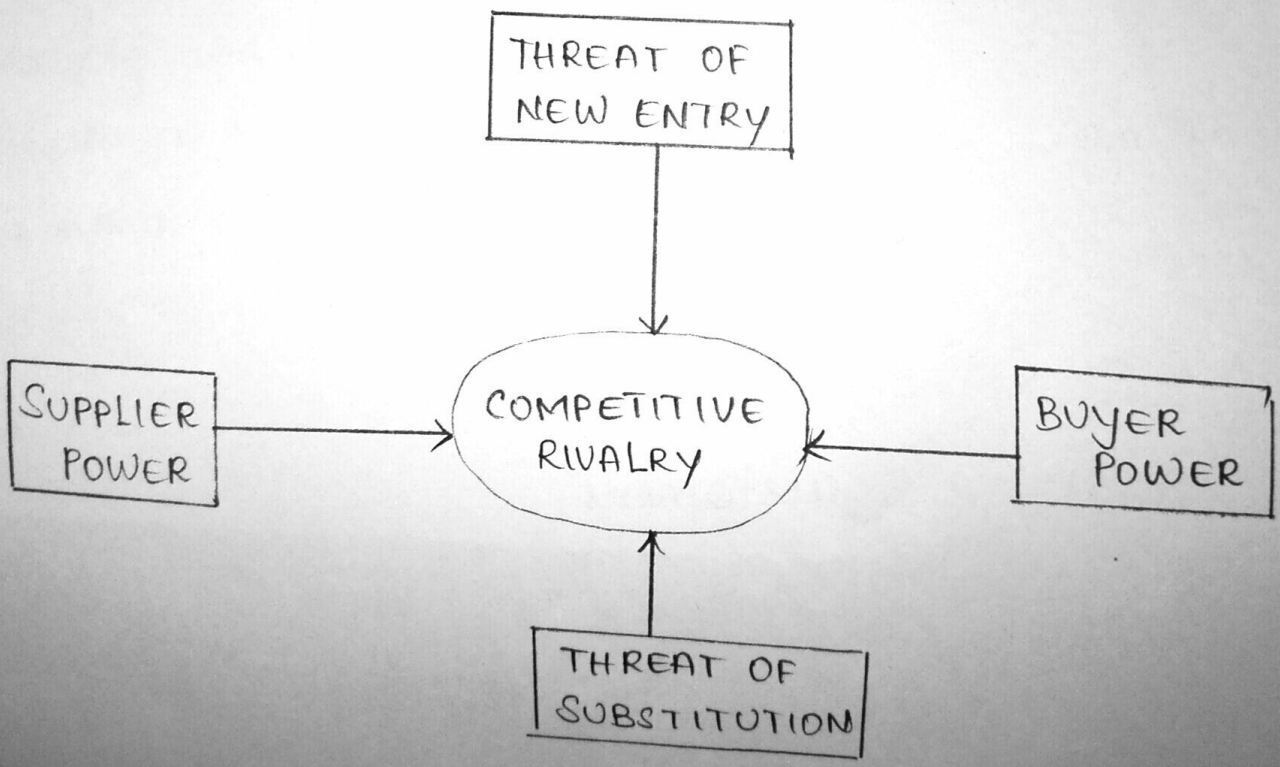
THREATS :

→ Business partners has little loyalty.
→ Larger competitors get majority of market share and more famous brand name.
Cost of technology investment.

PEST ANALYSIS

→ Examining the external environment and global factors that affect any business.
→ Political, Economic, social and technological

PORTERS FIVE FORCES ANALYSIS



Competitive Rivalry

→ Number of competitions.
→ Quality difference
→ other difference
→ Switching cost

Threat of New Entry

→ Time and cost of entry.
→ Barriers to entry
→ Specialist knowledge
→ cost details.

Supplier power

→ Number of supplier
→ Size supplier
→ Uniqueness service.

Buyer Power

→ Number of customers
→ Size of customers
→ Price.

Threat of Substitution

→ Substitute performance
→ cost of change.

LAUNDRY SERVICES IN HOSPITALS

1. The laundry services can be in house or outsourced. As a rule, only following items may be cleaned in the laundry:

→ Hospital patient linen
→ Hospital curtains
→ Hospital kitchen linen
→ Hospital staff uniforms
→ Other authorized items like blankets, Mattresses and pillows. Staff personal clothing is not cleaned in the Hospital laundry.

2. Segregation and collection of soiled linen.

3. All linen after use will be collected in each department / ward and segregated into potentially infective and not potentially infected. The former will include all linen which has been soiled with body fluids and will be kept seperately.

4. personnel working in the receiving and sorting area are required to wear a long gown, mask and gloves. He should keep his hands away from his or her mouth and eyes and thoroughly wash his or her hands when leaving the

receiving and sorting area. No eating and drinking is allowed in this area.

5. Sluicing / Treatment of soiled / infected linen

→ All infected linen / linen soiled with body fluids will be soaked in 0.5% bleaching solution for 30 mins then washed with water and detergent to remove bleach before handling over for washing.

→ Handling taking over of linen with the laundry staff. The soiled linen is tied into bundles and an entry made. The infected linen is accounted and handed over seperately. If possible all linen is inspected for tears and damage at this point to avoid dispute.

6. The linen is washed, dried and ironed by the laundry staff. Infected linen is washed seperately. The linen is returned to the health facility where it is properly taken over and a record made of the same.
Repairs will be carried out on torn linen.

7. Clean linen should be stored in a dry place on racks.
Clean linen is transported on a clean trolley.

8. Laundered linen is issued to the patient at the time of admission and taken back at the time of discharge.
Linen if soiled by body fluids is frequently changed.

1. Blankets can be dry cleaned or hand washed. Hand washing can be done by first soaking for 15 minutes in lukewarm water. The soap suds are squeezed through the blanket should not be twisted or wrung. It should be dried by spreading it on a clean surface.

10. pillows and mattresses can be washed with soap and water and left to dry in the sun.

11. Blankets pillows and mattresses can be fumigated if required by keeping them in a closed room and the room is then fumigated.

12. Linen soiled with faeces pus and Blood should be sluiced in 0.5%. Bleaching solution in the ward or central room and the room is then ~~from~~ storage area for 30 mins followed washing with clean water and detergent before handling in the laundry it should be washed seperately then subjected to boiling with frequent stirring. The addition of 0.3%. Washing soda enhances the effect of Boiling.

UNIT-5

HSM

Laboratory safety

Many laboratories contain significant risks, and the prevention of **laboratory accidents** requires great care and constant vigilance. Examples of risk factors include high voltages, high and low pressures and temperatures, corrosive and toxic chemicals, and biohazards including infective organisms and their toxins.

Measures to protect against laboratory accidents include safety training and enforcement of laboratory safety policies, safety review of experimental designs, the use of personal protective equipment, and the use of the buddy system for particularly risky operations.

In most countries, laboratory work is subject by health and safety legislation. In some cases, laboratory activities can also present environmental health risks, for example, the accidental or deliberate discharge of toxic or infective material from the laboratory into the environment.

Chemical hazards

Hazardous chemicals present physical and/or health threats to workers in clinical, industrial, and academic laboratories. Laboratory chemicals include cancer-causing agents (carcinogens), toxins (e.g., those affecting the liver, kidney, and nervous system), irritants, corrosives, sensitizers, as well as agents that act on the blood system or damage the lungs, skin, eyes, or mucous membranes.[1]

Biological hazards

Biohazard symbol (black and yellow)

Biological agents and biological toxins

Many laboratory workers encounter daily exposure to biological hazards. These hazards are present in various sources throughout the laboratory such as blood and body fluids, culture specimens, body tissue and cadavers, and laboratory animals, as well as other workers.

These are federally regulated biological agents (e.g., viruses, bacteria, fungi, and prions) and toxins that have the potential to pose a severe threat to public health and safety, to animal or plant health, or to animal or plant products.[2][3]

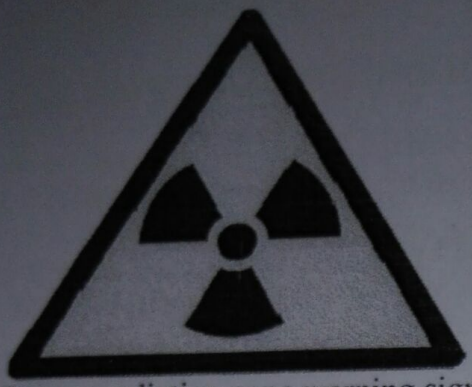
1. **Anthrax** - Anthrax is an acute infectious disease caused by a spore-forming bacterium called *Bacillus anthracis*.
2. **Avian Flu** - Avian influenza is caused by *Influenza A viruses*.
3. **Botulism** - Cases of botulism are usually associated with consumption of preserved foods.
4. **Foodborne Disease** - Foodborne illnesses are caused by viruses, bacteria, parasites, toxins, metals, and prions (microscopic protein particles). Symptoms range from mild gastroenteritis to life-threatening neurologic, hepatic and renal syndromes.
5. **Hantavirus** - Hantaviruses are transmitted to humans from the dried droppings, urine, or saliva of mice and rats.
6. **Legionnaires' Disease** - Legionnaires' disease is a bacterial disease commonly associated with water-based aerosols.
7. **Molds and Fungi** - Molds and fungi produce and release millions of spores small enough to be air, water , or insect-borne which may have negative effects on human health including, allergic reactions, asthma, and other respiratory problems.
8. **Plague** - The World Health Organization reports 1,000 to 3,000 cases of plague every year. A bioterrorist release of plague could result in a rapid spread of the pneumonic form of the disease, which could have devastating consequences.
9. **Ricin** - Ricin is one of the most toxic and easily produced plant toxins. It has been used in the past as a bioterrorist weapon and remains a serious threat.
10. **Smallpox** - Smallpox is a highly contagious disease unique to humans. It is estimated that no more than 20 percent of the population has any immunity from previous vaccination.
11. **Tularemia** - Tularemia is also known as "rabbit fever" or "deer fly fever" and is extremely infectious. Relatively few bacteria are required to cause the disease, which is why it is an attractive weapon for use in bioterrorism.

Physical hazards and others

Besides exposure to chemicals and biological agents, laboratory workers can also be exposed to a number of physical hazards. Some of the common physical hazards that they may encounter include the following: ergonomic, ionizing radiation, non-ionizing radiation and noise hazards.

Ergonomic Hazards

Laboratory workers are at risk for repetitive motion injuries during routine laboratory procedures such as pipetting, working at microscopes, operating microtomes, using cell counters and keyboarding at computer workstations. Repetitive motion injuries develop over time and occur when muscles and joints are stressed, tendons are inflamed, nerves are pinched and the flow of blood is restricted. Standing and working in awkward positions in front of laboratory hoods/biological safety cabinets can also present ergonomic problems.



Danger radiation zone warning sign

Ionizing radiation sources are found in a wide range of occupational settings, including laboratories. These radiation sources can pose a considerable health risk to affected workers if not properly controlled. Any laboratory possessing or using radioactive isotopes must be licensed by the Nuclear Regulatory Commission (NRC) and/or by a state agency that has been approved by the NRC, 10 CFR 31.11 and 10 CFR 35.12.[6]

The fundamental objectives of radiation protection measures are:

1. to limit entry of radionuclides into the human body (via ingestion, inhalation, absorption, or through open wounds) to quantities as low as reasonably achievable (ALARA) and always within the established limits;

1. to limit exposure to external radiation to levels that are within established dose limits and as far below these limits as is reasonably achievable.

Safety hazards

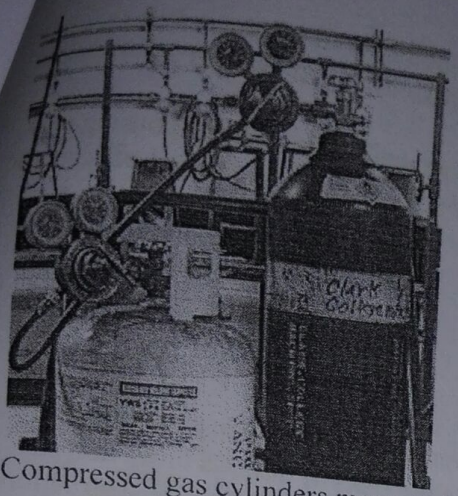
Autoclaves and sterilizers

Workers should be trained to recognize the potential for exposure to burns or cuts that can occur from handling or sorting hot sterilized items or sharp instruments when removing them from **autoclaves/sterilizers** or from steam lines that service the autoclaves.[7]

Centrifuges

Centrifuges, due to the high speed at which they operate, have great potential for injuring users if not operated properly. Unbalanced centrifuge rotors can result in injury, even death. Sample container breakage can generate aerosols that may be harmful if inhaled. The majority of all centrifuge accidents are the result of user error.

Compressed gases



Compressed gas cylinders.mapp and oxygen.triddle

Laboratory standard for **compressed gas**

1. Is a gas or mixture of gases in a container having an absolute pressure exceeding 40 pounds per square inch (psi) at 70 °F (21.1 °C); or[8]
2. Is a gas or mixture of gases having an absolute pressure exceeding 104 psi at 130 °F (54.4 °C) regardless of the pressure at 70 °F (21.1 °C); or[8]
3. Is a liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °C) as determined by ASTM (American Society for Testing and Materials)

Within laboratories, compressed gases are usually supplied either through fixed piped gas systems or individual cylinders of gases. Compressed gases can be toxic, flammable, oxidizing, corrosive, or inert. Leakage of any of these gases can be hazardous.[9]

Store, handle, and use compressed gases

- All cylinders whether empty or full must be stored upright.[10]
- Secure cylinders of compressed gases. Cylinders should never be dropped or allowed to strike each other with force.[10]
- Transport compressed gas cylinders with protective caps in place and do not roll or drag the cylinders.[10]

Cryogens and dry ice

Cryogens, substances used to produce very low temperatures [below -153 °C (-243 °F)], such as liquid nitrogen (LN_2) which has a boiling point of -196 °C (-321 °F), are commonly used in laboratories.[11]

Although not a cryogen, solid carbon dioxide or dry ice which converts directly to carbon dioxide gas at -78 °C (-109 °F) is also often used in laboratories. Shipments packed with dry ice, samples preserved with liquid nitrogen, and in some cases, techniques that use cryogenic liquids, such as cryogenic grinding of samples, present potential hazards in the laboratory.[11]

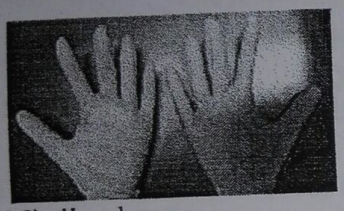
Hand protection is required to guard against the hazard of touching cold surfaces. It is recommended that Cryogen Safety Gloves be used by the worker.[12][13]

Eye protection is required at all times when working with cryogenic fluids. When pouring a cryogen, working with a wide-mouth Dewar flask or around the exhaust of cold boil-off gas, use of a full face shield is recommended.[14]

Personal protective equipments

Main article: Personal protective equipment

Personal protective equipment or PPE are equipments worn to prevent against exposure of hazardous substances.[15] Although, PPE does not eliminate the risks of hazards but it helps protect the user from the exposure.[16] To make a workplace safer, it should provide instructions and training of how to use and choose proper PPE in different situations.[15]



Nitrile gloves

PPE includes:

- Long-sleeved shirts, lab coats, aprons.[14]
- goggles[14]
- Safety gloves;[14]
    - There are 2 common types of safety gloves that are widely used in high school or university laboratory, Latex and Nitrile gloves. Latex gloves have a high sensitivity when it comes to contact and fine control which is very suitable for surgery.[17] On the other hands, Nitrile gloves are the gloves that do not have latex protein which cost twice. It was known as the most durable, resisted to tear and many chemicals. Beside all the benefits, Nitrile gloves also have drawbacks since it can oxidize silver and high reactive metals as these metals can react with sulfur.[17] Therefore, wearer should have an extra care while wearing this type of protective gloves.
- Face shield or safety

Electrical

In the laboratory, there is the potential for workers to be exposed to electrical hazards including electric shock, electrocutions, fires and explosions. Damaged electrical cords can lead to possible shocks or electrocutions. A flexible electrical cord may be damaged by door or window edges, by staples and fastenings, by equipment rolling over it, or simply by aging.[18]

The potential for possible electrocution or electric shock or contact with electrical hazards can result from a number of factors, including the following:

- Faulty electrical equipment/instrumentation or wiring;[19]
- Damaged receptacles and connectors;[19] and
- Unsafe work practices.[19]

Fire

Fire

Fire is the most common serious hazard that one faces in a typical laboratory. While proper procedures and training can minimize the chances of an accidental fire, laboratory workers should still be prepared to deal with a fire emergency should it occur. In dealing with a laboratory fire, all containers of infectious materials should be placed into autoclaves, incubators, refrigerators, or freezers for containment.[20]

Small bench-top fires in laboratory spaces are not uncommon. Large laboratory fires are rare. However, the risk of severe injury or death is significant because fuel load and hazard levels in labs are typically very high. Laboratories, especially those using solvents in any quantity, have the potential for flash fires, explosion, rapid spread of fire, and high toxicity of products of combustion (heat, smoke, and flame)

Fire blanket

HSM <UNIT-5> Human factors

ERGONOMICS → ~~Natural field of Bu~~

↓ ↓

Work Natural ways (or) laws.

It is the science of refining the DESIGN of PRODUCTS to optimize them by human use.

w.r.t Height, weight, etc.

[Combination of ANATOMY, PHYSIOLOGY & PSYCHOLOGY]

[HUMAN FACTORS]

example :-

* Design of Smart WHEEL CHAIR
* Smart BED.
* Smart CHAIR. etc.

broad types of ERGONOMICS. (2)

ERGONOMICS

(ENGINEERS)

↓

* Engineering field.
* DESIGN & solving Ergonomic issues.

BENEFITS :-

* well suited for large scale ERGONOMIC Projects.
* Better design & user friendly concept.

(HEALTHCARE PROFESSIONAL)

↓

athletic Trainer
Physical Therpist
&
occupational Therpist

↓

Applying to human Benefits :-

* Capable of Performing ERGONOMIC evaluations & makin
Practical & Cost-effecti
workplace improvem

(HSM)

PBL limits → given as a TWA (Time weighted Average) *

↳ PERMISSIBLE EXPOSURE LIMIT.

↓

Established by (OSHA).

(Occupational Safety & Health Administration)

* For chemicals, the chemical regulation is usually expressed in parts per million (or) sometimes milligrams per cubic meter (mg/m^3) units of measure of physical agents such as noise are specific to the agent.

HSM UNIT 5 (1)

Radiation Hazards

* Radiation injury causes changes in the living tissues causing radiation Sickness.

* SOMATIC effects – harmful to the Person.
* GENETIC effects – reflected in the offspring.

Radiation decomposition.

Splitting of water into H+ & OH− and also splitting of the other solvents of the body.

Types :- ionizing radiation

α & β & γ particles ., X-rays.

↓ ↓

Radioisotopes X-ray m/c.

HSM

Indirect effects :-

* Cell damage.
* diarrhea.
* Fall of hair.
* loss of appetite.
* shortening of life span.
* Leukemia. → More WBC ↑

Types of Radiation.

* Sours :-
* Health effects.
* UV radiation → Sun-burn
* IR radiation → IR Treament.
* Lasers → eye damage.
* US treatment.

UNIT-5 (ISM)

Elements of Safety (14).

* HAZARD Recognition, Evaluation & Contr
* Workplace Design & Engineering.
* Safety Performance Management
* Regulatory Compliance Management
  ↳ NABH, NABL etc
* Occupational Health.
* Information collection
* Employee Involvement.
* Motivation, Behaviour & Attitudes.
* Training & Orientation.
* Organizational Communications.
* Management & Control of External Exposu
* Environmental Mangement.
* Workplace Planning & staffing.
* Assesments, Audits & Evalnations.