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DEPARTMENT OF BIO MEDICAL ENGINEERING

CBM351: HOSPITAL PLANNING AND MANAGEMENT

NOTES

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UNIT V

QUALITY AND SAFETY ASPECTS IN HOSPITAL

Quality system – Elements, implementation of quality system, Documentation, Quality auditing, International Standards ISO 000 -004 – Features of IS O001 – ISO 14000 – ISO 13485, Environment Management Systems. NABA, JCI, NABL, NABH. Security – Loss Prevention – Fire Safety – Alarm System – Safety Rules. Health Insurance & Managing Health Care – Medical Audit – Hazard and Safety in a hospital Setup.

1. Quality System

Elements of a Quality System

A quality system is a structured framework of processes, procedures, and responsibilities for achieving quality policies and objectives. Key elements include:

- Quality Policy: The organization's intentions and direction concerning quality.
- Quality Objectives: Specific goals derived from the quality policy.
- Organizational Structure: Defining roles and responsibilities for quality management.
- Document Control: Procedures for managing documentation to ensure consistency.
- Process Management: Ensuring that all processes are efficient and effective.
- Continuous Improvement: Regular assessment and improvement of processes and products.
- Customer Focus: Ensuring that customer needs and expectations are met or exceeded.
- Risk Management: Identifying and mitigating risks to quality.

Implementation of a Quality System

- **Gap Analysis:** Assessing current practices against quality standards to identify gaps.
- **Planning:** Developing a plan that outlines the steps, timeline, and resources needed to implement the quality system.
- **Training:** Educating employees on the quality system's principles and their roles within it.
- **Process Documentation:** Documenting all processes, procedures, and work instructions.
- **Monitoring and Measurement:** Implementing metrics to monitor process performance**.**
- **Internal Audits:** Regularly reviewing the quality system to ensure compliance and identify areas for improvement.
- **Management Review:** Senior management should periodically review the quality system's performance to ensure it remains effective.

Documentation

- **Quality Manual:** An overview of the quality system, including policies, objectives, and processes.
- **Standard Operating Procedures (SOPs):** Detailed instructions on how to perform specific tasks to ensure consistency and compliance.
- **Work Instructions:** Specific steps for carrying out a process or task.
- **Records:** Evidence of conformity to requirements and effective operation of the quality system.

Quality Auditing

- **Internal Audits:** Conducted by the organization's own staff to ensure compliance with internal processes and procedures**.**
- **External Audits:** Conducted by independent auditors to assess compliance with external standards (e.g., ISO standards).
- **Audit Process:** Planning, execution, reporting, and follow-up to ensure corrective actions are taken.

ISO 9000 – 9004 (Quality Management Systems)

- ISO 9001: Specifies requirements for a quality management system (QMS) where an organization needs to demonstrate its ability to consistently provide products and services that meet customer and regulatory requirements.
- ISO 9004: Focuses on improving the quality management system to enhance overall performance.

ISO 14000 (Environmental Management Systems)

- ISO 14001: Specifies the requirements for an environmental management system (EMS) to help organizations improve their environmental performance.
- Features: Focuses on sustainable development, reducing environmental impact, and ensuring legal compliance with environmental regulations.

ISO 13485 (Medical Devices – Quality Management Systems)

- ISO 13485: Specifies requirements for a QMS specific to the medical device industry, ensuring consistent design, development, production, and delivery of medical devices that meet regulatory requirements.

Environmental Management Systems (EMS)

Environmental Management Systems (EMS) are structured frameworks that help organizations manage their environmental responsibilities in a systematic manner, contributing to sustainability and regulatory compliance. An EMS enables organizations to identify, monitor, and control their environmental impacts, improve environmental performance, and meet legal and regulatory requirements.

1. Definition and Purpose of EMS

- **Environmental Management System (EMS)**: A set of processes and practices that enable an organization to reduce its environmental impact and increase its operating efficiency. The EMS provides a structured approach to planning and implementing environmental protection measures.
- **Purpose**: To improve environmental performance by managing the environmental impacts of an organization's activities, products, or services. It helps organizations comply with environmental laws and regulations, reduce waste and resource consumption, and engage stakeholders in sustainability efforts.

2. Key Elements of EMS

The EMS framework is typically based on the **Plan-Do-Check-Act (PDCA)** cycle, which promotes continuous improvement. The key elements include:

Planning

- **Environmental Policy**: A statement by the organization of its commitment to environmental management, which guides its actions and decisions.
- **Environmental Aspects and Impacts Assessment**: Identifying the environmental aspects (elements of the organization's activities, products, or services that can interact with the environment) and their associated impacts (changes to the environment resulting from these aspects).
- **Legal and Other Requirements**: Identifying and ensuring compliance with relevant environmental laws, regulations, and other obligations.
- **Objectives and Targets**: Setting measurable environmental goals that align with the organization's policy and significant environmental aspects.
- **Environmental Management Programs**: Developing action plans to achieve the objectives and targets.

Implementation and Operation

- **Resources, Roles, and Responsibility**: Allocating resources and defining roles and responsibilities for implementing the EMS.
- **Competence, Training, and Awareness**: Ensuring that employees are trained and aware of their roles in the EMS.

- **Communication**: Establishing processes for internal and external communication regarding environmental issues and the EMS.
- **Documentation and Control**: Documenting the EMS processes and maintaining control over these documents to ensure they are up-to-date and accessible.
- **Operational Control**: Implementing controls to manage significant environmental aspects, such as emissions, waste, and resource use.
- **Emergency Preparedness and Response**: Planning for potential environmental emergencies and establishing response procedures.

Checking and Corrective Action

- **Monitoring and Measurement**: Regularly tracking the performance of the EMS and the organization's environmental performance.
- **Non-conformance, Corrective, and Preventive Action**: Identifying and addressing any deviations from the EMS or environmental performance standards.
- **Internal Audits**: Conducting periodic audits to assess the effectiveness of the EMS and identify opportunities for improvement.
- **Management Review**: Senior management reviews the EMS to ensure its continuing suitability, adequacy, and effectiveness.

Act (Improvement)

- **Continuous Improvement**: Using the results of monitoring, audits, and management reviews to identify areas for improvement and make necessary changes to the EMS.

3. Benefits of Implementing an EMS

- **Regulatory Compliance**: Helps organizations comply with environmental regulations, reducing the risk of fines and legal issues.
- **Improved Environmental Performance**: Systematic management of environmental impacts leads to reduced pollution, waste, and resource consumption.
- **Cost Savings**: Efficient use of resources and waste reduction can lead to significant cost savings.
- **Enhanced Corporate Image**: Demonstrating environmental responsibility can improve relationships with customers, investors, and the community.
- **Risk Management**: An EMS helps identify and mitigate environmental risks, protecting the organization from potential liabilities.
- **Employee Engagement**: Involving employees in environmental management can increase their awareness and motivation to contribute to sustainability efforts.

4. ISO 14001: Environmental Management Systems

- **ISO 14001** is the most widely recognized international standard for EMS. It provides a framework that organizations can follow to set up an effective environmental management system.
    - **Key Features**:
        - **Risk-based Thinking**: ISO 14001 emphasizes the identification and management of environmental risks and opportunities.
        - **Life-Cycle Perspective**: Encourages consideration of environmental impacts across the entire lifecycle of products and services.
        - **Leadership and Commitment**: Requires top management to demonstrate leadership and commitment to the EMS.
        - **Compliance Obligations**: Focuses on understanding and fulfilling legal and other compliance obligations.
        - **Performance Evaluation**: Emphasizes monitoring, measurement, analysis, and evaluation of environmental performance.

5. Challenges in Implementing EMS

- **Initial Costs and Resources**: Setting up an EMS requires investment in resources, training, and possibly new technologies.
- **Complexity**: Managing multiple environmental aspects and ensuring compliance across different regulations can be complex, especially for large organizations.

- **Change Management**: Encouraging an organization-wide cultural shift towards environmental responsibility can be challenging.
- **Continuous Improvement**: Maintaining momentum for continuous improvement requires ongoing commitment and resources.

6. Future Trends in EMS

- **Integration with Corporate Sustainability**: EMSs are increasingly being integrated with broader corporate sustainability initiatives, including social and economic dimensions.
- **Digital Transformation**: The use of digital tools and technologies, such as IoT, big data, and AI, is enhancing the monitoring and management of environmental impacts.
- **Focus on Climate Change**: EMSs are increasingly focusing on mitigating climate change through the reduction of carbon emissions and promoting energy efficiency.
- **Supply Chain Management**: Organizations are extending their EMS efforts to include environmental performance across the supply chain.
- **Circular Economy**: EMS is evolving to support the transition to a circular economy, where waste is minimized, and resources are reused or recycled.

In summary, an Environmental Management System is a critical tool for organizations seeking to improve their environmental performance, comply with regulations, and demonstrate their commitment to sustainability. By implementing an EMS, organizations can systematically manage their environmental impacts, Accreditation bodies and standards play a critical role in ensuring the quality, safety, and efficiency of various organizations, particularly in healthcare, laboratories, and other service industries. Accreditation is a formal recognition that an organization meets specific standards and operates according to best practices. Below is an overview of key accreditation bodies and standards:

1. Accreditation Bodies

NABH (National Accreditation Board for Hospitals & Healthcare Providers)

- **Purpose**: NABH is a constituent board of the Quality Council of India (QCI) and is responsible for establishing and operating accreditation programs for healthcare organizations in India. It aims to ensure high-quality patient care and safety.
- **Scope**: Hospitals, healthcare organizations, primary healthcare centers, and blood banks.
- **Standards**:
    - Focus on patient safety and quality of care.
    - Cover various aspects such as patient rights, infection control, continuous quality improvement, and facility management.
- **Certification Levels**: Full accreditation, entry-level certification, and progressive accreditation.

NABL (National Accreditation Board for Testing and Calibration Laboratories)

- **Purpose**: NABL is an autonomous body under the Department of Science & Technology, Government of India, that provides accreditation to testing and calibration laboratories. It ensures that laboratories operate according to international standards.
- **Scope**: Testing laboratories, calibration laboratories, medical laboratories, and proficiency testing providers.
- **Standards**:
    - Based on ISO/IEC 17025 for testing and calibration laboratories.
    - Based on ISO 15189 for medical laboratories.
    - Ensures reliability and accuracy of test results and calibration services.

JCI (Joint Commission International)

- **Purpose**: JCI is an international accreditation body that provides accreditation and certification to healthcare organizations around the world. It is a part of The Joint Commission, which accredits healthcare organizations in the United States.
- **Scope**: Hospitals, ambulatory care, long-term care, medical transport organizations, and clinical laboratories.
- **Standards**:
    - Focus on improving patient safety and quality of care.
    - Include standards for patient care, organization management, and facility safety.
    - Emphasize evidence-based practices, patient-centered care, and continuous improvement.

NABH International (National Accreditation Board for Hospitals International)

- **Purpose**: An international extension of NABH, offering accreditation services to healthcare organizations outside India, aiming to promote high standards of healthcare globally.
- **Scope**: International hospitals and healthcare organizations.
- **Standards**: Similar to NABH but tailored for global applicability, ensuring compliance with international healthcare standards.

NABA (National Accreditation Board of Auditors and Lead Assessors)

- **Purpose**: Though less commonly referenced, NABA typically deals with the accreditation of auditors and lead assessors, particularly those involved in ISO audits.
- **Scope**: Auditors, lead assessors, and certification bodies.
- **Standards**:
    - Focus on the competence of auditors and assessors.
    - Ensure that audits and certifications are conducted according to internationally recognized standards.

2. International Standards

ISO 9001 (Quality Management Systems)

- **Purpose**: ISO 9001 is the most widely recognized quality management standard. It provides a framework for organizations to ensure they meet customer and regulatory requirements while continuously improving.
- **Scope**: Applicable to any organization, regardless of size or industry.
- **Key Features**:
    - Focuses on customer satisfaction, process improvement, and effective management practices.
    - Emphasizes a process-oriented approach, risk-based thinking, and leadership commitment.

ISO 14001 (Environmental Management Systems)

- **Purpose**: ISO 14001 is an international standard for environmental management systems (EMS). It helps organizations minimize their environmental impact and comply with applicable laws and regulations.
- **Scope**: Applicable to organizations of any size or type, seeking to improve environmental performance.
- **Key Features**:
    - Promotes sustainable resource use and pollution prevention.
    - Requires the organization to consider environmental impacts throughout the lifecycle of products and services.

ISO 13485 (Medical Devices – Quality Management Systems)

- **Purpose**: ISO 13485 is a standard for quality management systems specific to the medical device industry. It ensures that medical devices consistently meet customer and regulatory requirements.
- **Scope**: Manufacturers and suppliers of medical devices and related services.
- **Key Features**:
    - Focuses on risk management, product safety, and compliance with regulatory requirements.
    - Aligns with other quality management systems like ISO 9001 but with additional requirements for the medical device industry.

ISO 15189 (Medical Laboratories – Requirements for Quality and Competence)

- **Purpose**: ISO 15189 specifies the quality management system requirements for medical laboratories. It ensures that laboratories provide reliable and accurate results that meet the needs of patients and healthcare providers.
- **Scope**: Medical laboratories, including those involved in clinical testing.
- **Key Features**:
    - Focuses on technical competence, laboratory management, and continuous improvement.
    - Aligns with patient safety and quality care in healthcare settings.

3. Environment Management Systems (EMS)

- **ISO 14001**: As mentioned earlier, this standard provides a framework for setting up an EMS that helps organizations improve their environmental performance. It focuses on sustainability, legal compliance, and continual improvement.

- **Implementation**: Organizations implement ISO 14001 by setting environmental objectives, developing a policy, and establishing processes for monitoring, measuring, and improving environmental impacts.

4. Security – Loss Prevention

- **Definition**: Loss prevention refers to strategies and measures implemented to prevent the loss of an organization's assets, including property, data, and resources, through theft, fraud, accidents, or other threats.
- **Elements**:
    - **Risk Assessment**: Identifying potential risks and vulnerabilities that could lead to losses.
    - **Security Policies**: Developing comprehensive policies to safeguard assets and ensure compliance with regulations.
    - **Access Control**: Restricting access to sensitive areas and information to authorized personnel only.
    - **Surveillance and Monitoring**: Using CCTV, alarms, and other monitoring tools to detect and prevent unauthorized activities.
    - **Incident Response**: Establishing procedures for responding to security breaches, theft, or loss incidents.
    - **Employee Training**: Educating employees about security protocols and their role in loss prevention.

5. NABL (National Accreditation Board for Testing and Calibration Laboratories)

- **Purpose**: NABL accredits laboratories that perform testing and calibration according to international standards, ensuring the accuracy and reliability of results.
- **Standards**: Laboratories accredited by NABL must comply with ISO/IEC 17025 (for testing and calibration) or ISO 15189 (for medical laboratories).
- **Importance**: Accreditation provides confidence in the competence of laboratories and is often required for regulatory compliance and recognition in global markets.

6. NABH (National Accreditation Board for Hospitals & Healthcare Providers)

- **Purpose**: NABH accreditation ensures that hospitals and healthcare providers in India meet established quality and patient safety standards. It promotes continuous improvement in healthcare delivery.
- **Standards**: NABH standards cover patient rights, care of patients, infection control, management of medication, patient safety, and facility management.
- **Impact**: Hospitals with NABH accreditation are recognized for their commitment to quality care, patient safety, and operational excellence.

In summary, accreditation bodies and standards play a crucial role in maintaining and enhancing the quality, safety, and efficiency of organizations, particularly in healthcare, laboratories, and environmental management. These frameworks help organizations comply with regulations, improve processes, and gain recognition for their commitment to excellence.

1. FIRE SAFETY

1.1 Overview

Fire safety and protection are matters of vital importance concerning everyone in the hospital.

The best form of protection from fire is its prevention.

Although every possible measure may have been taken to make the hospital buildings as safe as possible, no place can be completely free from fire hazards.

A careless employee, a thoughtless visitor, a confused or disoriented patient can inadvertently set off a fire.

Initially, it may appear to be insignificant but it is important to remember that every big fire starts from a small one.

An effective fire safety programme calls for an understanding of the hospital fire plan and the active participation of every employee at all times.

There is no better protection against fire than constant visit to detect fire hazards, prompt action to eliminate unsafe conditions and a high degree of preparedness to fight fire.

Panic and confusion are the greatest hazards of fire. They can be countered only by sufficient preparedness.

1.1.1 General Fire Information

- Every employee should know how a fire is caused how it can be prevented, and where the alarm boxes and extinguishers are located.
- He or she should also learn the fire-fighting procedure before a fire actually occurs.
- For a dire to sustain itself, three elements – heat, fuel and oxygen – should be present.
- Fire is a chemical reaction, which occurs when a material (fuel) rapidly combines itself with oxygen in the presence of heat to produce a flame.
- If any of these elements is taken away, the fire will fizzle out. This principle is the basis for fire extinguishing.
- Most fires can be classified into 3 general types. Let we call them Class A, B and C. Class A fire occurs in ordinary combustible materials such as wood, paper, cloth, etc.
- The best way to put out such a fire is by dousing it with water and thereby reducing the temperature of the burning material below its ignition point.
- Class B fire occurs in flammable liquids and greases like oil, petrol, alcohol, etc.
- It is best handled by the blanketing technique, which tends to keep oxygen from the fire and thereby suppress contribution.
- Water should never be used. It will only spread this type of fire.
- Class C fire occurs in electrical equipment such as motor, wiring, switches, panels, etc. This is a combination of the previous two types.
- Because of the hazards of electrical short circuit, a non-conducting extinguishing agent should be used to put out this type of fire.
- Again, water should never be used on an electrical fire.
- The person using water on an electric fire may receive an electric shock.
- The fire protection system in hospitals basically consists of a static water supply source within the building.
- Connected to this are first aid hose reels and landing or hydrant values with hoses at every floor levels, preferably housed in an M.S. hose cabinet with glazed door and strategically placed.
- If the building is a high-rise one, there should be a wet riser serving 1000 sq. meters of the floor area to which the hose reels and hydrant values are connected.
- The required pressure in the line should be provided with suitable capacity pump.
- It is necessary to have one working pump and another as standby in case of power failure while fire-fighting.
- In addition to wet riser system, some unmanned areas require sprinklers.
- Portable fire-fighting extinguishers of the type and capacity suitable for specific areas of application should also be provided in strategic location.
- The fire-detection system consists mainly of smoke and heat detectors that sense fire at an early stage and give off an alarm so that the fire can be controlled at an initial stage itself.
- Smoke and heat-detection devices are wired in series and terminated in control panels located in areas manned 24 hours of the day.
- Apart from these detectors, break-glass units and hooters are also provided at strategic points.
- When there is a fire, the nearest break-glass unit should be activated by breaking the
- glass.
- This automatically sets off the alarm so that precautionary methods such as evacuation

of the area can be undertaken.

1.1.2 Basic Responsibilities of Every Employee

1. Be completely familiar with the hospital fire safety programme and the departmental fire plan.
2. Be alert and observe the hospital with a critical eye, and report all dire hazards to the authorities concerned.
3. Not smoke in prohibited areas or anywhere if the entire hospital is declared a non- smoking area.
4. Know the location of fire alarm boxes and be familiar with the operating with its operating instructions, use and signals.
5. Know the location of fire-fighting equipment and be acquainted with its operating instructions and use.
6. Know the location of fire exits and assist the supervisor or head of the department in keeping them clear at all times.
7. Report to the supervisor if he (she) notices any defect in stairway doors, which should remain closed and in operational condition at all times.
8. Participate in all fire drills and other training or practice sessions as well as know his (her) assigned duties in the hospital's fire plan and evacuation.

1.2 What to do in case of Fire

If you discover a fire in your area, observe the following points:

i) Use code: do not panic, run, yell or use the word "Fire". Use the code: Doctor Red or Code Red.

ii) Evacuate: Remove persons from immediate danger of smoke and fire. Only parents in immediate danger need be relocated in areas on the same floor but away from the fire. If the fire is in the patient room(s), remove the patient(s) and close the door behind you.

iii) Sound Alarm: Sound the fire alarm from the nearest fire alarm box. This will notify the telephone operator and fellow hospital employees of the situation. The alarm box will set off a series off a series of sounds or hoots.

iv) Dial Telephone Operator: Give the location – the floor, wing, area, etc. – and the extent of fire.

- This is important because the telephone operator should be very sure of these details before calling up the fire department.
- The telephone operator will immediately write the location down.
- The telephone operator will announce Doctor Red on the public address system followed by the location of the fire three times.
- This announcement will be repeated every 30 seconds for a period of two minutes.
- To avoid panic among patients and visitors, emergencies in the hospital are announced using codes, for example, "Doctor Red" for fire.
- The operator will also notify important officials like the CEO, or the person in charge at that time, the telephone operator will notify the fire department and summon help.

v) Shut off Ventilating Fans, etc.: On notification, the engineering department will shut off all ventilating fans, oxygen, gas, electric power to the affected area and if necessary, to any adjoining area threatened by fire.

vi) Prevent Smoke or Fire Gases from Spreading to Other Floors: There is a great danger of people dying of suffocation even on the floors for removed from where the fire has broken out. Smoke and fire gases spread to other floors through air-conditioning ducts, pipe tunnels, etc.

vii) This can be avoided by closing all the dampers in the air-conditioning ducts.

viii) Avoid Using the Elevators: walk down the stairs.

ix) **Establish a Control Centre:** The CEO or a senior officer will take charge.

1.2.1 At the Scene of Fire

1. Seal off the area of fire. Close windows and all patient room doors. Place wet blankets or towels along the door edges to prevent leakage of smoke. This is an effective fire- fighting technique.
2. Fight the fire with appropriate fire extinguishers. Use carbon dioxide liquid fires. Use fire extinguishers if the fire is small and fire hose if it is large.
3. Supervisor of the area will take charge.
4. He Doctor Red Alert Team will go to the scene of fire. The team leader will direct operations as they pertain to the actual fire situation.
5. When the fire department personnel arrive, they will be in complete charge.
6. Personnel on the general floor and other patient care areas will remain with their patients at all times until properly relieved.
7. There should be written procedures for evacuation of patients and on who can make that decision.
8. In case you are trapped and are unable to leave your room do the following:
   - Feel the door. If warm, do not open.
   - Place wet towels, bedding or blankets under the door(s).
   - Stay low on the floor where smoke and heat are the least and the air clearer.
   - Go to the window and open it.
   - Attract the attention of fire fighters by hanging a sheet or blanket outside the window.
   - Stay at the window for rescue.
9. All clear signal should be given by a responsible person, and Code Green announced after the fire is controlled.

1.2.2 The Time to know what to do is Before a Fire Occurs, Not After

Regardless of whether it comes under the purview of fire regulations or not, every hospital should be provided with a fire protection system considering the damage fire can cause to life and properly.

In addition, provision must be made for the following:

1. There should be an effective fire safety programme for the hospital.
2. There should be written policies as well as a procedure manual covering all contingencies arising from fire.
3. Every department should have a departmental fire plan and a fire procedure manual outlining every employee's role in the plan.
4. There should be a pre-appointed standing Doctor Red Alert Team to direct all fire- fighting operations.
5. There should be written procedures to evacuate patients in case the fire becomes widespread. The procedure should specify who should decide on evacuation as well as procedures, methods and the order of precedence to be followed for evacuation.
6. Simulated fire drills, which are an essential part of an effective fire prevention programme, should be conducted periodically. These drills help ensure that all personnel understand their roles in the fire safety programme and perform their assigned tasks well. Fire drills should be conducted in a realistic manner.

1.2.3 Summary

If the fire is in your area:

1. Remove persons from immediate danger.

2. Activate fire alarm.
3. Alert personnel calmly. Never use the word Fire. Use the code Doctor Red or Code Red.
4. Dial the telephone operator. Give exact location and extent of fire.
5. Seal off the affected area. Close all windows and room doors in the area. Use wet blankets to confine smoke.
6. Unless lives are at stake, do not attempt to re-enter if the fire has gone out of control. Wait for help to arrive.
7. Shut off all equipment, gas, etc. which may compound the risk.
8. Fight the fire. Use a proper extinguisher.
9. Follow your department's specific fire plan and procedures.
10. Set up a fire control area.
11. Take a head count of patients and staff.
12. Post staff at the elevator.
13. Prepare for evacuation of patients or other duties as prescribed in the department fire rules.
14. Establish contact with the engineering, security, etc.
15. Establish and maintain communication with the control centre, and inform it about staffing needs.
16. Relinquish control when the fire department personnel arrive at the scene.
17. When the fire is completely put off, send an All Clear message to the control centre. This should be agreed to by the dire department personnel if they are present.

If the fire is not in your area:

1. Stop what you are doing.
2. Report to your department head or supervisor.
3. Continue your duties within your department if instructed by your supervisor.
4. Take a head count of patients and staff.
5. Shut off equipment, gas, etc. which might aggravate the risk. Check with the supervisor before shutting off oxygen.
6. If you are in the patient care area, communicate with the patients and reassure them.
7. Send staff to the control centre or the assignment are, if required.
8. Be prepared to assist in evacuating patient, if necessary.
9. Post staff at the elevator.
10. Maintain a stand by alert for any eventuality.

Do not:

1. Panic.
2. Run or shout in the corridors.
3. Use the word Fire: refer to it as Doctor Red.
4. Use elevators unless you are already on your way down.
5. Leave your department unless permitted or directed by your supervisor.

Within a reasonable time after the fire in extinguished, head(s) of department(s) where the fire had broken out should write a fire incident report and send it to the administration.

The engineer should assess the damage caused by the fire, make an estimate of the loss suffered by the hospital and send a report to the CEO.

2. ALARM SYSTEM

A hospital, more than any other institution, is exposed to emergencies and life- threatening situations – from medical emergencies like cardiac arrest, accidents, casualties and disasters to dangers arising from fire and bomb threat.

It has to be all the more alert to these situations because nowhere else are such a large number of helpless people concentrated in one place and are so utterly dependent on other people for their safety and health.

Build-in safeguards and preparedness are the essence of all safety programmes. The alarm system is one such programme.

1) Fire alarm

- Every hospital must have a fire alarm system, which should be a part of the hospital's electrical system.
- Wherever possible, it should be designed to transmit an alarm signal directly to the telephone operator so that she can contact the fire department and notify the hospital personnel without any loss of time.
- The fire alarm system can be automatic or it can be operated manually.
- Smoke and fire detection devices are installed in the patient rooms and other high-risk areas in the heating and ventilating ducks between the floors.
- These actuate the fire alarm system.
- On activation, the system sounds alarms throughout the premises or zones, including distinctive visual and audible alarm signals at the respective nurses' station.
- To indicate the location of fire, there is an indicator light outside every room. This is activated when there is a fire in the room.
- In the automatic system, smoke detectors not only activate the fire alarm signals, but also close smoke doors and simultaneously shut off fans in the central air handling system.
- If the fire alarm system is not automatic, then anyone noticing or hearing the fire signal should immediately inform the telephone operator who, in turn, will call the fire department, and notify the hospital personnel.

2) Medical Gas Alarm

- In the centralized medical gas system, oxygen and nitrogen oxide which are stored in bulk in the manifold room are distributed to other areas of the hospital such as the operating rooms, ICUs and patient rooms through pipelines.
- Compressed air and vacuum (suction) are supplied through pipes to certain areas. Two kinds of alarm are incorporated into the medical gas system.
- One monitors the pressure of various gases at different areas of the distribution system.
- If abnormal pressure is sensed, the system sets off an alarm – the green signal goes off and the red warning signal glows with audible alarm until the line pressure returns to normal.
- The second alarm is called the remote signal lamp which is generally only visible.
- The lamp lights up when either of the banks of cylinders becomes empty. The remote signal lamp is only a warning signal.
- No immediate action is necessary because when one bank is empty, the other takes over and supplies the gas without interruption.
- The alarm should be located in the medical gas user areas such as the operating rooms and patient floors as well as

the main working area where the medical gas system is maintained.

- However, these areas especially the maintenance area, may not be manned all the time.
- Secondary signals should therefore be installed in places like the telephone operator's room, security office and the like where a 24-hour attendance is assured.

3) Blood Bank Alarm

- Most hospitals use specially crafted refrigerators – a cold room or walk-in cooler is ideal- to store whole blood in the blood bank.
- These refrigerator are set to a particular temperature to maintain blood in good condition and are provided with an alarm.
- The alarm, which is both audible and visual goes off whenever it senses high temperature or a drop in voltage.
- If the blood bank or the laboratory of which it is a part is not manned round the clock, the alarm signals should be located both in the blood bank and in a place that has 24-hour attendance.

4) Narcotics Alarm

- Narcotics are stored in locked and be in the cabinets in nurses' stations as well as in the pharmacy.
- There are restricted drugs, which are constantly stolen by persons addicted to them.
- Some hospitals install a signal system that illuminates a light bulb that is visible from the nurses' station and the corridors whenever the narcotics cabinet door is opened.

5) Cold Room and Walk-in Cooler Alarm

- Many hospitals have walk-in coolers or cold rooms in their food service department and laboratory.
- They have been instances of the staff of the food service department getting accidently locked up overnight inside the walk-in coders.
- There should be an alarm button that can be used in such an emergency with a distinguishable audible and visual alarm indicator in a prominent area where there is a 24-hour personnel coverage.

6) Voltage Fluctuation Alarm

- In any hospital where sensitive and expressive equipment worth crores of rupees is used, stabilized voltage is essential.
- Motors are usually designed to withstand only a 10% fluctuation in voltage supply. Beyond this limit, the motor will get damaged unless it is disconnected.
- Low voltage poses the biggest threat to electrical system and equipment. Diagnostic equipment often gives erroneous readings in low voltage conditions.
- There are certain areas and sensitive equipment that do not tolerate excessive low or high voltage.
- Such areas or equipment may be fitted with a simple voltage-sensitive alarm along with a voltmeter. The alarm can be set at any desired point.

7) Elevator Alarm

- Many hospitals have more than one passenger and bed-cum-passenger elevators, which are in continuous operation.
- Whenever there is an electric power failure, elevators with their passengers get stranded, often in between floors.
- In order to rescue the stranded passengers, a panic or emergency push button is provided in each elevator.
- When it is pressed, a battery-operated alarm installed in the electric room or the security room, which is manned round the clock, is actuated to alert people about the rescue operation.
- Elevator operators or maintenance crew then manually which down the elevator car from the machine room to the next floor to rescue the stranded passengers.

- Modern elevators have a levelling feature that automatically taxes the elevator car to the next floor level in case of power failure.

8) Security Alarm

- Certain sensitive areas of the hospital like the cashier's office, the psychiatric ward, bank extension counter and pharmacy which are prone to theft and burglary or where patients suddenly become violent need to summon immediate help from security personnel.
- Some hospitals provide alarm systems in these areas. The alarm may be of two kinds.
- One is an automatic alarm like the one used in strong rooms of banks or jewellery shops which goes off when someone tries to break in.
- The other is similar to the one used by bank tellers.
- The device is activated by the employee to summon security or police help.

9) Patient Emergency Alarm

- Various new features are now available that can be incorporated into the conventional nurse call system to meet emergency situations in the patient rooms.
- If the nurse does not respond to the patient's call immediately, the system makes the light outside the patient's room and on the nurse call panel in the nurse station blink.
- If there is still no response, the blinking of lights and the beep signals from the bleeper on the panel gradually keep increasing in frequency.
- An additional feature that can also be fitted into the nurse call system is the panic button in the patient toilet that the patient can activate by suing a pull cord in case of emergency.

10) Code Blue Alarm

- Code blue is a term used in hospitals to announce or signal an emergency of a serious nature such as a cardiac arrest.
- In some hospitals, in all patient rooms and other strategic location, there are independent buttons – not a part of the nurse call system – named Code Blue which when activated emit distinguishable emergency alarm signals both at nurse's station and at the telephone operator's room.
- While the nurse attends to the patient instantly, the telephone operator goes on the public address instantly, the telephone operator goes on the public address system announcing Code Blue three times giving the location of the emergency.
- In such hospitals, there is a written procedure to deal with such situations and pre- appointed Code Blue team which respond to the call instantly.
- The members of the team are trained to deal with medical emergencies including cardiac
- arrest.

3. SAFETY IN HOSPITAL

3.1 Overview

The word safety in its purest sense means freedom from injury, risk or harm. The management of any hospital has a twofold responsibilities regarding safety.

1. To make the workplace and the environment safe by creating safe conditions.
2. To establish, communicate to all concerned and enforce safety rules.

- Everyone has to work as a team and share the responsibilities of safeguarding the patients, visitors and the

hospital personnel.

- Safety awareness is of paramount importance for the success of hospital's safety programme.
- Every task that we perform, whether at workplace or at home, entails some risk of personnel injury.
- Our ability to work safety is directly related to our knowledge of the hazards associated with the work.
- Therefore, knowledge of work-related risks is essential.
- Some departments of the hospital are more risk-prone and hazardous than others.
- The laboratories, nursing floors, laundry and kitchen call for special instructions and elaborate safety rules.
- Ignorance about the risks associated with the workspace and negligence may endanger the lives of employees and turn them into a liability to the hospital and their families.
- Accidents do not happen by themselves; they are caused. These causative factors are more human than environmental.
- Merely controlling environmental factors does not prevent accidents. The hidden causes of accidents should also be taken into account.

3.2 Hospital Safety Rules

General Safety Rules

1. The only correct way to do a job in the hospital is the safe way. Urgency is not a justifiable excuse for neglecting safety.
2. Know your job thoroughly. When in doubt, do not indulge in guess work; ask your supervisor.
3. Do not handle or observe machinery, tools and equipment without authorization.
4. Be alert and observe keenly. Report immediately any fault equipment, unsafe conditions or acts, and defective or broken equipment. Do not try amateur repairs.
5. Stay physically and emotionally fit for your work by maintaining good health and a proper diet. Abstain from alcoholic drinks. Take sufficient rest and practise cleanliness.
6. Personnel hygiene is important. Wash your hands often. In many areas of the hospital, this is necessary.
7. Prevent the spread of infection and contagious disease. Cooperate with the hospital infection control committee by observing established procedures. When you are ill with an infectious disease, report to the doctor immediately and stay at home.
8. Wear proper uniforms or clothing for your job. Neither too tight nor too loose. Jewellery and high-heeled footwear may be hazardous.
9. Walk, not run, particularly when you are carrying delicate, breakable articles or instruments. Be extra cautions at the corridor intersections, in front of swinging doors, at blind corners and in congested areas.
10. If you are some foreign material, loose wire, oil spill, etc. on the floor that may cause an accident, make sure it is removed at once.
11. Never indulge in horseplay or practical jokes involving fire, acid, water, compressed air and other potentially dangerous things.
12. Pay attention to all warning boards. For example, smoking in an area where oxygen is being administered or oxygen cylinders are stored.
13. Be familiar with your work procedure. All departments have written work procedures that include safety

practices at work and handling equipments.

14. Always remember to use handrails on stairways or ramps.
15. When you want to reach overhead objects, always use a good ladder. Do not climb on chairs or boxes.