UNIT 3  HOSPITAL AND HEALTH CENTRE HAZARDS

Structure

3.0  Introduction
3.1  Objectives
3.2  Hazards Faced by Healthcare Workers
   3.2.1  Definition of Hospital Hazard
   3.2.2  Types of Hazards
3.3  Physical Hazards
   3.3.1  Causes of Physical Hazards
   3.3.2  Prevention of Physical Hazards
3.4  Biological Hazards
3.5  Radiological Hazards
3.6  Chemical Hazards
3.7  Ergonomic Hazards
3.8  Psychological Hazards
   3.8.1  Health Hazards of Stress
   3.8.2  Ways of Controlling Stress
3.9  Prevention of Healthcare Hazards
3.10 Standard Precautions
3.11 Disposal of Hazardous Waste
3.12 Let Us Sum Up
3.13 Key Words
3.14 References and Suggested Further Readings
3.15 Answers to Check Your Progress

3.0  INTRODUCTION

Hospitals are institutions where sick individuals go for treatment to become healthy again. However they can also expose the health care personnel and other employees to considerable amounts of occupational and environmental hazards thus endangering their health, if they do not operate under safe environments. Many of these hazards are dangerous and fatal.

In a hospital, there are different categories of staff and they are all exposed to varying degrees of the risk. Individuals involved in direct care of patients like doctors and nurses are at the highest risk of contracting biological hazards. Similarly, laboratory workers who handle biological samples and human tissues are at risk of getting infected from the samples they handle, if they do not follow the standard operating procedures and/or standard precautions.
Health care workers and waste handlers workers involved in collecting, transporting, storing and disposal of healthcare waste is also at high risk of getting infectious diseases and physical injuries in the form of cuts, pricks, bruises etc. Many of these accidents are avoidable if proper precautions are taken well in advance making the hospitals a safe place to work in.

Another type of hazards commonly encountered when dealing with the health care scenarios are the psychosocial hazards. There are typical signs of stress and effective means of dealing with it.

In this unit you will learn about the various hazards faced by a person working in a hospital or any place where sick individuals are admitted for treatment. You will learn about the effects of these hazards on the physical and mental health of the healthcare professionals. Lastly, we will discuss the ways of preventing exposure to these hazards and a note on the standard precautions.

### 3.1 OBJECTIVES

After studying this unit, you should be able to:

- list the hazards faced by a health care professional while working in hospital;
- differentiate the various hazards in hospitals;
- describe the ill effects of hospital and health centre hazards on the health of the staff; and
- discuss the prevention of exposure to hazards in hospital setting.

### 3.2 HAZARDS FACED BY HEALTHCARE WORKERS

There are three pieces in a hospital puzzle. These are: infrastructure including equipment, patients and hospital staff. Healthcare workers can be affected by patients, from faulty or from the careless use of equipment present in hospital.

#### 3.2.1 Definition of Hospital Hazard

A hazard is defined as ‘something with the potential to cause harm’. Harm is usually considered in the context of pain and suffering to individuals. Hospital hazard is defined as any substance or activity that directly or indirectly causes hazards to those working in a healthcare setting.

#### 3.2.2 Types of Hazards

A healthcare worker can be affected through various means in his workplace. All hazards in a hospital setting can be classified under the following categories:

- Physical hazards
- Biological Hazards
- Radiological hazards
- Chemical Hazards
- Ergonomic Hazards
- Psychological Hazards
This classification may sound familiar to you, as we classify all hazards in any occupation similarly.

**Check Your Progress 1**

**Note:**

a) Write your answer in about 50 words.

b) Check your progress with possible answers given at the end of the unit.

1. Is hospital a safe place to work? Elaborate your answer.

   ............................................................................................................
   ............................................................................................................
   ............................................................................................................

2. List the common hazards faced by a healthcare worker.

   ............................................................................................................
   ............................................................................................................
   ............................................................................................................

**3.3 PHYSICAL HAZARDS**

Like any office or workplace there are physical hazards associated with a hospital. The physical hazards are mostly due to mishandling of equipment and instruments. The most common types of accidents in hospitals are fires, explosions, electrocution, and gas leaks; cuts, bruises, and fractures; asphyxia and burns; and the auditory/non-auditory effects of noise and vibration.

**3.3.1 Causes of Physical Hazards**

Main physical hazards include:

- **Fires:** Toxic, reactive, corrosive, or flammable compressed gases and chemicals causes fire in hospitals. Majority of fires in hospitals occur due to electrical faults, cigarettes and match sticks, incorrect use of anesthetics, oxygen, and inflammable fluids and non-electrical heating. Human error is ultimately responsible in almost all cases. Fire in hospital is disastrous. As the first response in case of fire is to run away, patients admitted in hospital being sick and bed-ridden cannot just get out of the bed and run towards safety, in case of fire breaking out in a hospital. Modern day hospitals are air-conditioned and are tinder box for spread of fire. Hospital fire can cause death due to asphyxia by smoke and fumes.

**CASE STUDY 1**

In December 2011, a fire broke out in the early hours in a private and prominent hospital in Kolkata. The fire began in the basement, allegedly due to a cigarette stub, where highly inflammable material was stored. Around 90 people, mostly immobile patients died due to suffocation and burn injuries (detail news available at: http://www.ndtv.com/india-news/kolkata-89-killed-in-amri-hospital-fire-six-board-members-arrested-566913, accessed on 22nd May 2017).
CASE STUDY 2


THINK AND REFLECT

You may like to learn more about these accidents, how they were caused, how they were managed and what lessons were learnt. Did the hospital bring about any changes to prevent such occurrences in the future? What do you think are the measures which could have been adopted to prevent such occurrences in the future?

- **Mechanical hazards that may cause lacerations, punctures, or abrasions**: Needle sticks injuries and injuries from other sharp objects, exposes healthcare workers to biological germs. It is a significant hazard for hospital employees. Injuries from sharps occur because of reuse of the needles, unsafe needle devices or improper handling and disposal of needles and other sharps. Any health care professional or worker handling sharp devices or equipment such as scalpels, sutures, hypodermic needles, blood collection devices, or phlebotomy devices are at risk. Nursing staff and doctors are at the highest risk of being frequently injured. Needle stick injuries occur most frequently in the operating room and in-patient rooms. Workers who help in cleaning the hospital waste are also at high risk of getting injured from sharp objects if the waste generated in the hospital is not segregated at source.

- **Electrical hazards**: Just like any office or home where there are electricity connections, employees in hospitals are exposed to electrical hazards like electric shock, electrocutions fires, and explosions. Damaged electrical wires can lead to possible shocks or electrocutions. A flexible electrical cord may be damaged by door or window edges, by equipment rolling over it, or simply by ageing if not maintained or inspected at regular intervals. A hospital employee can get electric shock from either faulty electrical equipment, wiring or damaged receptacles and connectors. Wear and tear on electrical equipment can result in insulation breaks, short-circuits and exposed wires. If there is no ground-fault protection, it can cause a ground-fault, sending current through the worker’s body, resulting in electrical burns, explosions, fire, or death.

- **Noise**: It is mandatory to maintain silence around hospital area. The law prohibits making too much noise in areas surrounding hospital. Paradoxically there are areas like laundry, engine and generator rooms inside the hospital which produces too much noise. Workers working in these designated areas for considerable long duration of time are at risk to the ill effects of constant high level of noise. Those employees who are exposed to noisy machinery, or equipment while running it may suffer from hearing loss, hearing impairment, in addition to non-auditory effects like hypertension, elevated blood pressure etc. Noise can also have
psychological effects. Too much noise of either high intensity or prolonged exposure can cause stress in human beings and impair health.

- **Vibration:** Vibrations can be of two types: Hand-arm vibration (HAV) or Whole-Body vibration (WBV). Many times staff of the hospitals have to hold a device which vibrates continuously. Dentists are more prone to hand-arm vibration as they are involved in high speed drilling. Physiotherapists who give ultrasound therapy are also at risk of HAV. HAV can cause Vibration-Induced White Finger (VWF), Hand-Arm Vibration Syndrome (HAVS), Carpal Tunnel Syndrome (CTS), tennis elbow, decreased tactile sensitivity, carpal bones cysts, and sensory nerve damage. Whole body vibration can lead to headaches, chronic back pain, numbness, equilibrium loss, motion sickness, Spinal cord disorientation, sleep and visual disturbances, circulatory disorders and gastrointestinal disturbances.

- **Slips and falls:** Slip and fall hazards can occur at almost any workplace, but a hospital environment, in which the atmosphere is unpredictable and often fast-paced, can be especially dangerous. Common causes of employees tripping in hospitals are: wet floors, including floors contaminated with water, grease or food; cords, tubing, and hoses lying unattended, insufficient lighting, floor mats that are improperly used or maintained.

- **Physical violence:** Hospital violence such as physical assaults, threatening or violent behavior, are a growing problem in the hospitals. Recently there has been upsurge in cases of violence by aggrieved family, friends and neighbors of patients against the hospital, nurses, doctors and other staff of the hospital. Patient care is an emotional and sensitive issue. Healthcare workers particularly doctors are seldom trained in the soft skills like counselling or conveying the bad news to patients’ relative, which turns out to be prime reason of public anger against hospitals and their staff. Healthcare workers involved in caring patients of psychiatric disorders are exposed to violence by confused or mentally unstable patients. The employees need to comprehend about the moveable furniture like chairs, items on countertops, which can be used as weapons, or to entrap them.

**CASE STUDY 3**

In December 2017, a patient was brought to a well-known private hospital in Kolkata. The patient was critically injured during a fight with someone. When the patient was brought to the emergency room of the hospital in the wee hours by his relatives his condition was critical. According to the hospital sources, the patient was promptly attended by the doctor on duty in the emergency room. The patient was shifted to the critical care unit of the hospital. As time passed visitors of the patient grew in number. When the hospital announced that the patient could not be saved, the persons present in the hospital called other persons from the neighborhood. When a sizeable crowd was present in the lobby of the hospital, they started abusing the hospital staff. They picked up the chairs and threw them towards the staff. The lobby of the hospital was damaged. Many staff of the hospital present in the reception got injured.
3.3.2 Prevention of Physical Hazards

Hospital staff members can be saved from suffering physical hazards during their working hours if following things are considered:

A. Prevention of fires:
   - Storing cylinders upright
   - Storing flammables in approved, closed containers in designated locations only
   - Putting up proper layout of the hospital, particularly evacuation pathways

B. Prevention of slips and falls:
   - Properly cleaning and maintaining floors
   - Reporting leaks and spills

C. Prevention of electrical hazards:
   - Maintaining electrical equipment according to manufacturer and company standards
   - Regularly inspecting tools, cords, grounds and accessories
   - Locking and tagging out power sources and switches when servicing or repairing mechanical equipment
   - Ensuring that all electrical service near sources of water is properly grounded
   - Sufficient access and working space should be provided and maintained around all electric equipment to permit ready and safe operation and maintenance of such equipment
   - Regular training and surveillance where employees are trained not to plug or unplug electric equipment when their hands are wet

D. Preventing needle injuries or mechanical hazards:
   - Not bending, recapping, or removing contaminated needles and other sharps, unless such an act is required by a specific procedure or has no feasible alternative
   - Keep hazardous agents labeled properly and dispose them in proper containers
   - Wearing proper personal protective equipment, including hearing protection like ear plugs, ear phones to eliminate or reduce noise exposure and right shoes
   - Acoustic shields, enclosures and barriers should be established around machines which generate high intensity noise
   - Follow principles of standard precaution
E. Preventing violence in hospitals:

- Use of security devices such as panic buttons, beepers, surveillance cameras, alarm systems, card-key access systems, and security guards in hospitals to prevent violence against staff
- Controlling access to work areas for lay persons
- Treating and interviewing aggressive patients in relatively open areas
- Providing training for staff in recognizing and managing hostile and assaultive behavior
- Ensuring accurate reporting of all violent behavior
- Establishing liaison with police authorities and contact them when necessary
- Providing adequate staffing even during night shifts. Increase staffing in areas where assaults by patients are likely as in emergency department
- Regular periodic training to staff regarding the evacuation strategy and protocols during emergency, and regular drills among the staff

Check Your Progress 2

Complete the following crossword

Across

1. Result of a lack of communication between patient and hospital staff

Down

1. a viral disease caused by needle prick
2. Happens when the floor is wet
3. ..................... precaution
4. Should be kept upright
3.4 BIOLOGICAL HAZARDS

Healthcare workers may come in contact with a number of sources of infection either through direct contact with patients or through indirect contact with contaminated materials, including body fluids, tissues, waste, laundry, contaminated surfaces etc.

Biological agents are widely found in the natural environment. Infectious patients add to this biological load. It is therefore no surprise that hospitals are full of hazardous pathogenic germs. These include bacteria, viruses, fungi and parasites. As they are usually micro particles and invisible, it is often difficult to apprehend the risks they pose. Biological agents can replicate rapidly, require minimal resources to survive and can be infective even at very small doses. In a hospital setting, exposure to biological agents can be unintentional, whereby the staff works directly with them, for example, in a laboratory or research facility, the employees are exposed to biological agents due to the work they do. Even a laundry worker can receive a needle stick injury from a needle hidden in clothes.

Blood borne germs are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and others. Contact with blood, whether through needle sticks or other accidental exposure, can put a hospital staff at risk for HIV and other infectious diseases.

Another major route of infection among healthcare professionals is air borne. Many pathogens contaminate the air during coughing or sneezing. The small particles remain floated in air for some time. Large organisms precipitate in ground and get deposited as droplet nuclei. These can enter a health care workers’ body through inhalation and/or ingestion. The major pathogens which enter the body thorough respiratory tracts in hospitals are the germs causing tuberculosis, influenza, severe acute respiratory syndrome (SARS) and pneumonia. In addition to this, in hospital settings, the droplets can also be artificially generated during suction of respiratory tract. Many pathogens are transmitted through close contacts and spread by skin to skin contact or contact with other surfaces e.g herpes simplex virus. These are called fomite borne pathogens.

Some of the common germs transmitted to healthcare workers while taking care of patients in hospitals are described below.

1. Human Immunodeficiency Virus (HIV)

The HIV epidemic has forced us to recognize the potential dangers being faced by healthcare workers on the job and has forced us to reassess the type of procedures undertaken by them. It has highlighted the basic lack of precautions taken in the past regarding personal safety and its role in halting the transmission of many potential pathogens. This dreaded modern-day pandemic caused by HIV can be transmitted through inoculation injuries from contaminated needles or exposure of abraded skin or mucous membrane to blood or body fluids infected by the HIV. The risk of transmission of HIV from an HIV positive individual to an HIV negative individual through needle prick injury depends upon many factors.
2. **Hepatitis virus**

Hepatitis is inflammation of the liver that can lead to liver damage and death. It can be caused by a virus which is transmitted through needle stick injuries. Hepatitis B is a recognized occupational hazard among hospital personnel. According to the World Health Organization, the prevalence rate of HBV is three to six times higher in hospital staff than those in general population. The most common mode of transmission of HBV is blood. With the advent of effective and safe hepatitis B vaccines, the occupational risk of acquiring this infection is now greatly diminished in health facilities where healthcare personnel like nurses and doctors are given the complete course of vaccination. However, the risk does not get completely eradicated. There are concerns of vaccine failures and lack of knowledge about the duration of immunity in those who have sero-converted. The likelihood of contracting Hepatitis B is much higher than the likelihood of getting HIV. Since almost half of the infected patients are asymptomatic and disease develops later at a later stage, the hepatitis caused by HBV is almost always fatal.

Another hepatitis virus (HCV) is now a major cause of blood borne hepatitis. Hepatitis C infection is caused most commonly by needle stick injuries. HCV infection often presents no symptoms; however, the infection can become chronic which may lead to active liver disease.

3. **Tuberculosis (TB)**

Tuberculosis (TB) is a serious public health problem in many developing countries. According to the World TB report 2018 released by the World health Organization (WHO), India accounts for nearly a fourth of all new TB cases detected worldwide. Mode of transmission of the bacteria is through droplet nuclei. The bacteria exit through nose when TB patient coughs, sneezes or shouts. Healthcare workers working in chest OPD and concealed indoor workplaces inside hospitals are at highest risk of getting TB infection. Ideally active pulmonary tuberculosis cases should be kept in isolation. The room should be well ventilated. But in overcrowded public health facilities this is not possible all the times. As a result, healthcare workers readily get infected with TB. With the rising number of multi drug resistant TB (MDR – TB) cases, the situation is more complex nowadays.

<table>
<thead>
<tr>
<th>Route</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin, mucous membranes</td>
<td>Blood borne viruses (Hepatitis B virus, Hepatitis C virus, Human immunodeficiency Virus, Hepatitis D virus, viral hemorrhagic fever)</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Tuberculosis, SARS, Influenza</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Enteroviruses, typhoid</td>
</tr>
</tbody>
</table>
Check Your Progress 3

Note:  

a) Write your answer in about 50 words.  
b) Check your progress with possible answers given at the end of the unit.

(Match the following)

Match the disease with their mode of transmission

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mode of transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tuberculosis</td>
<td>a. Ingestion</td>
</tr>
<tr>
<td>2. Dysentery</td>
<td>b. Close contact</td>
</tr>
<tr>
<td>3. Hepatitis C</td>
<td>c. Inhalation</td>
</tr>
<tr>
<td>4. Scabie</td>
<td>d. Needle prick</td>
</tr>
</tbody>
</table>

3.5 RADIOLOGICAL HAZARDS

Almost all hospitals and health centres have x-ray machines and other high-end machines which emit ionizing radiation. These diagnostic and therapeutic equipment produce both photonic radiation (x rays and gamma rays) and charged particle radiation (β and γ rays). The effects of exposure to ionizing radiation appear later after a latency period. Healthcare workers working in properly constructed centres should not be exposed to large doses of radiation so long as they observe the necessary precautions. But due to various reasons many health workers expose themselves knowingly or unknowingly to chronic low intensity radiation and consequently healthcare workers particularly those employed in radiology and radiotherapy departments of hospital suffer from harmful effects of radiation. Radiation has direct effect on production of blood cells inside the body. Both red and white blood cell numbers are decreased. Therefore, periodic total and differential blood count of healthcare workers working in radiation departments is mandatory to diagnose this dreadful condition at early stage. Radiation has deleterious effects on skin, nails and hairs. Dermatological effects may include brittle, cracked, or grooved nails, disappearance of body hair and fingerprints, and chronic radio-dermatitis. Chronic exposure may lead to development of cataract at a very early age. Special care should be taken to prevent the pregnant employees to come near to machines emitting harmful radiation waves. Since the number of female employees is increasing in healthcare setting, there have been instances of abortion, intrauterine growth retardation, foetal death and serious malformations in the unborn and born babies of the pregnant women who continued working in such departments. Other harmful effects include shortening of life, induction of cancer and leukaemia, and genetic effects due to increase in frequency of mutations. Nowadays radiation hazards are not limited to radiology or related departments of hospital. Operation theatres require using machines emitting radiations, where healthcare workers are unlikely to follow preventive strategies, due to emergency and nature of activities.

Non-ionising radiation like ultraviolet light, laser beams, magnetic fields, and radiofrequencies are widely used nowadays in-patient care in hospitals. Lasers are now preferred way of treating multitudes of health problems. It is rapidly replacing many surgeries. Ophthalmologists who work many hours a week
Occupational Hazards

with lasers have been reported to suffer from reduced central visual acuity, abnormal colour perception, and other defects indicative of possible macular damage. Healthcare workers who have pacemaker implanted in their body should not go near to nuclear magnetic resonance equipment as magnetic waves generated by the equipment may disrupt the timing of pulses generated by pacemakers.

For preventing radiological hazards following steps are recommended:

- According to Radiation Protection Rules, the radiation exposure limit for a radiation worker is 20mSv (milliSievert) per year
- Protective gloves (lead=0.3mm) should be worn by health professionals
- Lead apron (lead=2.5mm) is a recommended apparel
- The equipment generating radiation should have a screen with control panel
- All personnel employed in radiation department should wear certified thermoluminescent dosimeter(TLD) badges
- Blood tests (Hb, TLC, DLC) should be performed once in 3- 6 months

Check Your Progress 4

Note:  
a) Write your answer in about 50 words.
b) Check your progress with possible answers given at the end of the unit.

(Fill in the blank)

1. A pregnant worker can continue working in an X-ray department as long as there is reasonable assurance that the fetal dose can be kept below ......................... during the pregnancy.

3.6 CHEMICAL HAZARDS

A variety of chemicals are used in healthcare setting. All the chemicals used in hospital can be categorized in one of these groups:

- Disinfecting and sterilizing agents
- Medical gases
- Anesthetic agents
- Laboratory chemicals
- Cytotoxic drugs and pharmaceutical substances

However, not all the chemicals used in hospital during usual patient care are hazardous. At the same time, it must be recognized that, a chemical may benefit someone who is sick whereas it may harm one who is handling it. Healthcare workers may suffer health effects when dangerous chemicals enter the body. A chemical mainly enters the body through any of these routes:

- Inhalation: breathing in the chemical like anesthetic gases
Ingestion: via contaminated food or hands

Inoculation: when a sharp object such as a needle punctures the skin

Absorption: through skin contact or a splash in the eye

Hazardous chemicals can cause many health problems mainly depending upon the site of introduction in the body. Skin problems may be either irritations (caused by chemical disinfectants and detergents) or allergies (caused by antibiotics, rubber, nickel, disinfectants, aldehydes). Occupational allergic eczema is more common among nurses, surgical assistants, and other paramedical staff because of their continual contacts with drugs, anaesthetics, and antiseptics. Moreover, natural resistance to ward off infectious agents is reduced by repeated washing with soap and, especially, by scrubbing the hands and forearms, which destroys the skin’s protective layer of fatty acids. Those involved in plastering the limb injuries may suffer from ‘dry hand syndrome’. Dentists and dental technicians deal with lots of prosthesis. They are often affected by contact eczema caused by handling acrylic monomers, local anaesthetics, essential oils, dental mould paste, epoxy resins, and amalgams. Laboratory personnel are likewise put at risk by many of the chemicals they handle. Many chemicals used in hospital have mutagenic or carcinogenic effects.

Table 3.1 lists some common chemicals which are used in hospitals and the health hazards they cause to hospital employees.

**Table 3.1: Hazardous chemicals used in hospitals**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Used in/ as</th>
<th>Health hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-propiolactone</td>
<td>Sterilant of blood plasma, water, milk, and nutrient broth, and as a vapor-phase disinfectant in enclosed spaces</td>
<td>Carcinogenic</td>
</tr>
<tr>
<td>Hexachlorophene</td>
<td>Disinfectant</td>
<td>Neuro-toxic</td>
</tr>
<tr>
<td>Sodium orthophenylphenate</td>
<td>Disinfectant</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>Glycols</td>
<td>Disinfectant</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>Benzol</td>
<td>Drug, disinfectant</td>
<td>Leukaemia and chromosomic aberrations</td>
</tr>
<tr>
<td>Formaldehide</td>
<td>Disinfection</td>
<td>Skin and respiratory tract irritation</td>
</tr>
<tr>
<td>Glutaraldehyde</td>
<td>Sterilizing agent</td>
<td>Respiratory and skin sensitization, severe irritation of eyes, skin and respiratory tracts</td>
</tr>
<tr>
<td>Ethylene oxide</td>
<td>Sterilizing medical equipment</td>
<td>Irritant cutaneous lesions, conjunctivitis and corneal burns, cataracts</td>
</tr>
</tbody>
</table>
The hazardous chemicals may also pose a physical hazard, for example a flammable, explosive or oxidizing chemical. Some chemicals can cause environmental hazard if they are used, stored or disposed of incorrectly. Hospitals should have a written document mentioning the standard operating procedures to be followed in the event of an uncontrolled release, leak or spillage of any dangerous chemicals. The hospital authority should make employee aware of the hazardous chemicals they are exposed to in the workplace. They should also be given instructions for handling, disposal and clean-up of these chemicals. The employees should have immediate access to water facilities that can be used to flush their eyes and other exposed areas. Healthcare workers who are allergic to latex should wear non-latex gloves. Health professionals need to use various tools available to apply or handle hazardous agents.

Check Your Progress 5

Note:  
   a) Write your answer in about 50 words.
   b) Check your progress with possible answers given at the end of the unit.

1. Name a condition from which a person involves in plastering the limbs of patients may suffer?

   ........................................................................................................................................
   ........................................................................................................................................
   ........................................................................................................................................

Fig.3.1: Chemical burn of upper limb
2. Which disinfectant used in hospital can cause watery eyes, burning sensations in the eyes, nose, and throat, and skin irritation?

3.7 ERGONOMIC HAZARDS

Ergonomics is the science of fitting the job to the worker. It is the practice of designing equipment and work tasks to conform to the capability of the worker. Whenever a worker does a job which is beyond his physical capacity, he develops many bodily problems, musculoskeletal disorders (MSDs) being the most important. Most of the indoor patients in the hospital, mainly in the intensive care unit wards, cannot move by their own. These patients are dependent upon hospital staff for getting their activities of daily routine, such as dressing, bathing, feeding, and toileting done. Each of these activities involve multiple handling or transferring of patients and could result in strains, sprains, injuries to those who handles them. In many studies, it has been found that more than one third of hospital workers work in inconvenient awkward postures. A majority of them remain in this position for more than a half of work time. Inconvenient work position significantly increases risk for hand numbness, sleep disorders and joint pain.

Patient handling tasks pose increased ergonomic risk if they are repetitive, done in awkward postures or done using a great deal of force. Lifting heavy objects including manually lifting immobile patients can cause serious musculoskeletal injuries. Similarly, overexertion, multiple lifts in one shift, lifting alone without anyone’s help, lifting un-cooperative, confused patients can cause dislocation of vertebra in vertebral column that has predisposing factors. Considering the ergonomic hazards, lifting obese patients has become a norm in bariatric clinics and wards.

Low back pain (LBP) is quite common among hospital workers, primarily among nurses. According to a study it affects more than half of the working nurse sat some time during their careers. The prevalence of low back pain is most in nurses amongst all the healthcare providers.

Employee exposure to ergonomic stressors in hospitals occurs not only during patient handling tasks but while performing other tasks in the kitchen, laundry, engineering, and housekeeping areas of hospital, for example during transporting of equipment, moving food carts or other heavy carts, pouring liquids out of heavy pots or containers, reaching into deep sinks or containers, using hand tools, and during housekeeping tasks.

As most of the injuries occurred during lifting or transferring patients, following precautionary measures can be taken to avoid serious musculoskeletal injuries to healthcare workers:

- Never transfer patients when off balance
- Limit the number of allowed lifts per worker per day
- Lift loads close to the body, with knees bent
Occupational Hazards

- Avoid heavy lifting especially with spine rotated
- Never lift alone, particularly fallen patients, use team lifts or use mechanical assistance
- Training in when and how to use mechanical assistance
- Equipment solutions for lifting of patients and repositioning should be made available

![Incorrect way of picking up a heavy object from ground](image)

Fig. 3.2: Incorrect way of picking up a heavy object from ground

Here are links of few videos depicting correct ways of lifting heavy objects:

https://www.youtube.com/watch?v=zDUg7zHYXxE
https://www.youtube.com/watch?v=_YoOL3HpvwA
https://www.youtube.com/watch?v=okyLBZz3SFw

3.8 PSYCHOLOGICAL HAZARDS

Hospital work often requires coping with some of the most stressful situations found in any workplace. Hospital workers must deal with life-threatening injuries and illnesses complicated by overwork, understaffing, tight schedules, paperwork, intricate or malfunctioning equipment, complex hierarchies of authority and skills, dependent and demanding patients, and patient deaths. All these contribute to stress and take a toll on the healthcare worker’s health. Stress, fatigue, anger, frustration, job autonomy and the feeling of being isolated and powerless, odd hours of duty, impromptu leave availing instead of preferred leaves, financial benefits and promotions leads to burnouts among healthcare professionals. In addition to above issues, balancing work and home life, causes tremendous psychosocial stress, mostly resulting in errors at work.
### Burnout Among Doctors

Burnout is a work-related hazard mostly associated with professions where someone has to deal with some other individuals, like health care. Many times care givers get so much involved with their patients that they become emotionally involved with them. They start neglecting their own physiological needs. Positive results give them satisfaction, but bad news drain them emotionally. They feel exhausted and professionally inefficient. Burnout is usually high among the doctors. The doctors can become patients when the burnout reaches dangerous level. They must learn to have balance in their personal and professional life. They should take regular breaks from the work schedule and accept the limitations of medicine.

### 3.8.1 Health Hazards of Stress

Stress has been associated with loss of appetite, gastric ulcers, mental disorder, migraines, difficulty in sleeping, emotional instability, disruption of social and family life, and the increased use of cigarettes, alcohol, and drugs. Stress can also affect worker attitudes and behavior. Some frequently reported consequences of stress among hospital workers are difficulties in communicating with very ill patients, maintaining pleasant relations with coworkers, and judging the seriousness of a potential emergency. Most important reason for stress in healthcare workers is inadequate staff which can lead to clinical errors and sickness absence.

### 3.8.2 Ways of Controlling Stress

There are various ways for controlling stress. Some of these are mentioned below. We should remember that none of these measures are effective if performed in isolation. The individual should adopt whichever method is feasible and suitable for him.

- Adequate staffing
- Alternative job arrangements
- More flexibility and worker participation in scheduling
- Reasonable shift schedules and scheduled rotation of duty
- Sabbatical leaves
- Opportunities to improve skills
- Regular staff meetings to share feelings and ideas
- Grievance redressal
- Organized and efficient work functions and environment
- Regular relaxation exercises, stress management programs and counseling
- Group therapy for staff dealing with chronically ill or deceased patients
- Recognition of legitimate complaints and suitable action
Check Your Progress 6
Answer the following question in about 100 words each

1. How empathy is different from sympathy?

2. How can a health care provider prevent himself from burnout?

3.9 PREVENTION OF HEALTHCARE HAZARDS

In addition to specific measures taken to prevent various types of hazards associated with working in a healthcare set up which are described above, following steps should also be taken to keep hospital a safe place to work.

- **Pre-placement medical examinations:** The goal of the pre-employment examination is to determine whether an individual is fit to perform his or her job without risk to himself or others. Color blind and TB patients are not suitable to work in the specific areas of the hospital. Those whose immunity is low should not be exposed to infectious patients. Similarly, persons with back problem should not be given intensive physical work.

- **Periodic health maintenance:** Periodic health evaluation consists of one or more visits with a healthcare provider to assess individual’s overall health and risk factors for preventable disease. Workers working with radiation should have their blood examined for cell counts at regular interval.

- **Personal protective equipment:** The hospital should provide appropriate protective equipment like personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers to healthcare workers whenever there are possibilities of physical, chemical, or radiological hazards.

- **Employee immunizations:** Persons working in a healthcare setting must be given the appropriate vaccination before joining work. One of them is vaccination against Hepatitis B. The number of occupational infections of hepatitis B has decreased by more than 95% since hepatitis B vaccine became available in later part of last century. The blood should be tested for antibody to hepatitis B surface antigen one to two months after the completion of the three-dose vaccination schedule.

- **Post exposure Prophylaxis:** A healthcare worker who is supposed to have been infected with HBV should be offered a timely post-exposure follow-up with hepatitis B immune globulin and initiation of hepatitis B vaccine. The staff who inadvertently prick themselves while withdrawing blood of a known HIV infected person should be offered antiretroviral
therapy. According to the WHO, post-exposure prophylaxis (PEP) is short-term antiretroviral treatment to reduce the likelihood of HIV infection after potential exposure, either occupationally or through sexual intercourse. PEP should be initiated as early as possible, for all individuals with an exposure that has the potential for HIV transmission, and ideally within 72 hours. If started soon after exposure, PEP can reduce the risk of HIV infection by over 80%.

- **Provisions for care of illness and injury at work:** There should be a room or cabin reserved for hospital employees to be admitted whenever he becomes sick. The hospital should have emergency department wherein any injured staff can get first-aid treatment.

- **Environmental control and surveillance services:** All the equipment should undergo preventive check-ups at regular intervals. The chemicals should always be labeled. The waste should be segregated at the site of generation. Disposal dustbins should be labeled, adequately placed and emptied at regular intervals. The sharp instruments should be handled very carefully and disposed of appropriately as per laid down guidelines.

- **Employee health and safety records:** The hospital should maintain the health and safety records of its employees. The log book of injury should be maintained by all the high-risk healthcare workers.

- **Coordinated planning:** To prevent the hazards faced by healthcare workers in the hospitals all the stakeholders should work in tandem. The hospital should be designed in such a way that the chances of fire are minimal. The floor should be of anti-skid property. The equipment and furniture should be worker-friendly. Machines or tools should be utilized whenever necessary to prevent physical injury to worker. Guidelines for post exposure prophylaxis should be kept in place. Adequate staff and optimal duty roster would increase the efficiency of the hospital.

### 3.10 STANDARD PRECAUTIONS

Standard precaution is an approach to infection control to treat all human blood and certain human body fluids as if they were known to be infectious for HIV, HBV and other blood borne pathogens. Under standard precautions all patients are possible carriers of blood-borne pathogens. All healthcare workers should wear gloves when collecting or handling blood and body fluids contaminated with blood. They should also wear face shields when there is danger of blood splashing on mucous membranes. Standard precautions are designed for any healthcare workers and patients who come in direct contact with patients or their bodily fluids. For airborne pathogens, face shields and masks should be made adequately available. Not only HIV but other other infections can be prevented through standard precautions. The appropriate application of standard precautions will prevent workers from being exposed to all infectious agents borne by blood and other body fluids, including HIV, hepatitis B, C and delta viruses and cytomegalovirus. Any worker dealing with blood, semen, vaginal secretions, body tissues, cerebrospinal fluid, synovial fluid, pleural fluids, peritoneal fluid, pericardial fluid, and amniotic fluid should follow standard precautions. These fluids have either been proved to transmit HIV or their risk of transmission is unknown.
3.11 DISPOSAL OF HAZARDOUS WASTE

The hospital is the storehouse of hazardous waste. They affect the ecosystem and ultimately health of animals and human beings. Many of them are non-biodegradable and can be lethal at very low concentrations. Disposal of hazardous waste should ideally be started at its point of generation only. The waste should be appropriately segregated, properly transported, processed and ultimately disposed. Regardless of their form most hazardous waste is disposed of either near the surface or by deep burial. Some waste can be incinerated. Site and design for disposal of hazardous waste should be selected carefully. Government has formed some rules for proper generation, storage and disposal of biomedical waste which is amended time to time. Those are out of scope of this chapter. Students who are interested in knowing about the rules and regulation of biomedical waste can follow the link:

http://cpcb.nic.in/bio-medical-waste-rules/

3.12 LET US SUM UP

Working in a hospital can be greatly satisfying. Doctors, nurses and laboratory workers feel proud when patients treated by them get cured and return home. But the flip side of working in hospitals is too many to be ignored. A big hospital is perhaps the only place on earth where there is ample mix of various type of health hazards found under one roof. There are heavy instruments, sharp scalpels, hazardous chemicals, inflammable gases, and people teeming with germs. All these can cause various health hazards in persons working in a hospital. The real situation is not so scary though. There are various personal protective equipment available which protects the healthcare professionals from being exposed to many hazards in hospital. A hospital with good administration, having adequate number of staff, and written policies regarding working hours has happy employees. They are not stressed and can do their work productively resulting in better outcomes.

3.13 KEY WORDS

Carpal tunnel syndrome: A medical condition due to compression of the median nerve at the wrist

Contaminated sharps: Any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires

Droplet nuclei: Dried-out residual of droplets possibly containing infectious pathogens

Ergonomics: Study of man-machine-environment to increase productivity and reduce accidents

Fomites: Objects or materials which are likely to carry infection, such as clothes, utensils, and furniture
Seroconversion: The period of time during which HIV antibodies develop and become detectable.

Tennis elbow: A condition in which the outer part of the elbow becomes painful.

Standard precautions: Practice of avoiding contact with patients’ bodily fluids, by means of the wearing of nonporous personal protective equipment like gloves, goggles, and face shields.

3.14 REFERENCES AND SUGGESTED FURTHER READINGS


Useful websites

Protection against infection with blood-borne viruses: http://www.dh.gov.uk

Guidance on risk controls in hospitals and laboratory environments:


Human remains: http://www.dh.gov.uk/pubns/web01.pdf

European Agency for Safety and Health at work: http://www.europe.osha.eu.int/OSHA

World Health organization (WHO): http://www.who.int/en
International Research on Cancer (IARC): http://www.iarc.fr Standard precaution:
YouTube video on standard precaution: Designed for healthcare providers, but is an excellent safety video program for engineering, custodial, security, administration and other personnel who provide services in the healthcare environment. Good refresher for nursing, laboratory technicians and other providers who normally receive additional standard precaution training: https://www.youtube.com/watch?v=zHipFSCnaVM
YouTube video on Infection Control: Basic Infection Prevention Techniques: https://www.youtube.com/watch?v=QgqTW0FjN08

3.15  ANSWERS TO CHECK YOUR PROGRESS

Answers to Check Your Progress 1

Your answers should include the following points:

1. Contrary to popular belief, hospital is not at all a safe place to work. A hospital has all the hazardous substances from which a healthcare worker is constantly exposed. Hospitals are full of germs and if the staff does not follow precautions while examining patients or their body fluids or tissues, they can get infected with the same germ. They are exposed to harmful chemicals in Operation Theater and wards. Radiation hazard is always there for radiographers and radiologists.

2. The various health hazards faced by a person working in healthcare setting can be categorized in either of these categories: Physical, chemical, biological, radiological, ergonomic, or psychological hazards.

Answers to Check Your Progress 2
(Crossword)
Across: 1. aggression
Down: 1. aids, 2. slip, 3. standard, 4. cylinder

Answers to Check Your Progress 3
(Match the following)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Mode of transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tuberculosis</td>
<td>c. Inhalation</td>
</tr>
<tr>
<td>2. Dysentery</td>
<td>a. Ingestion</td>
</tr>
<tr>
<td>3. Hepatitis C</td>
<td>d. Needle prick</td>
</tr>
<tr>
<td>4. Scabies</td>
<td>b. Close contact</td>
</tr>
</tbody>
</table>
Answers to Check Your Progress 4

(Fill in the blank)

1 mGy

Answers to Check Your Progress 5

(One-word answer)

1. Dry hand syndrome
2. Formaldehyde

Answers to Check Your Progress 6

Your answers should include the following points:

1. Empathy is the ability to experience the feelings of another person. Sympathy means caring and understanding the suffering of others. Empathy and sympathy means different thing but people erroneously treat them as same.

2. Health care providers should treat patient empathetically but at the same time should detach themselves from patients once they are off duty. They should take frequent breaks and get involve in activities which gives them pleasure or pursue their hobbies.