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Indira Gandhi National Open University
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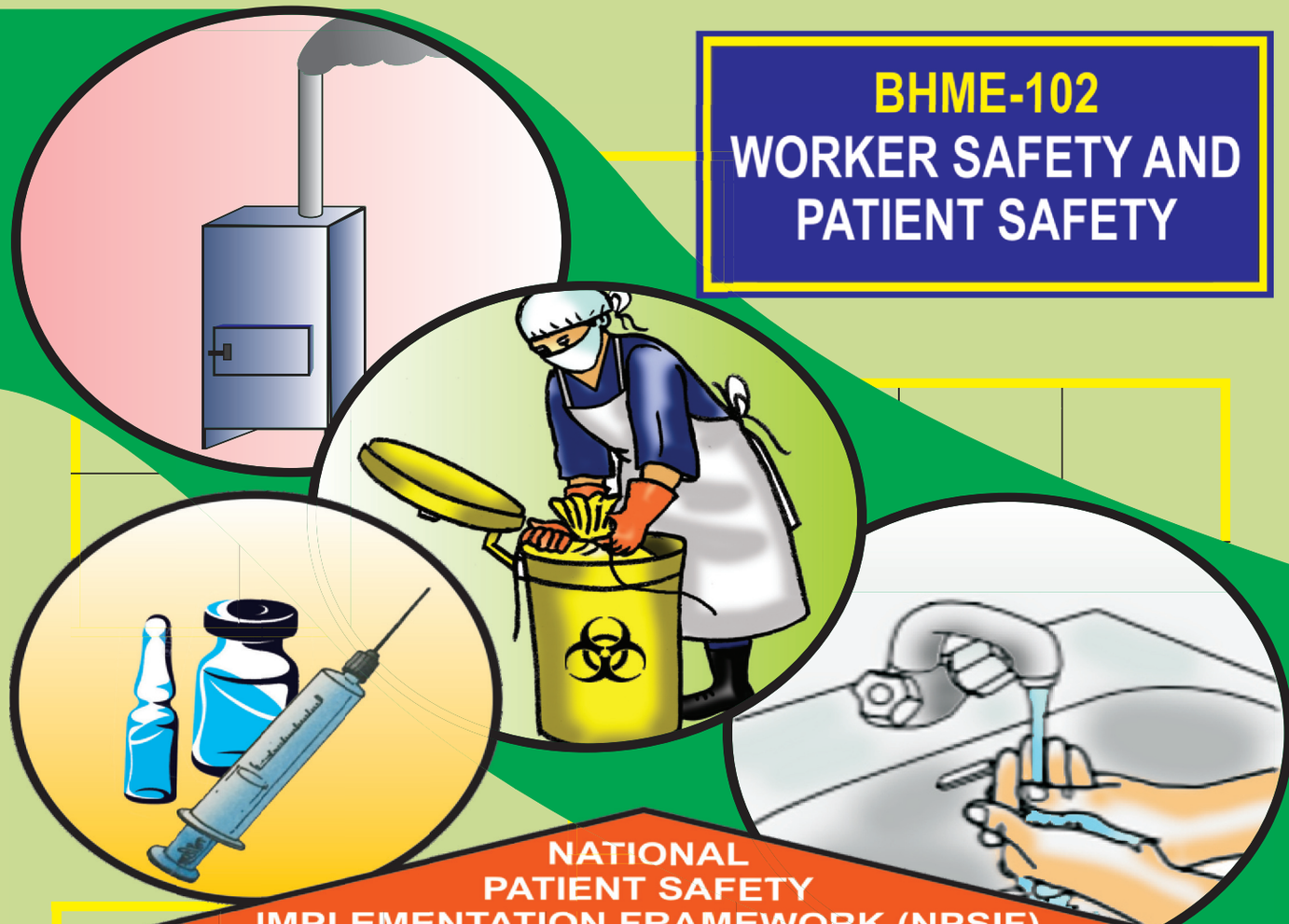
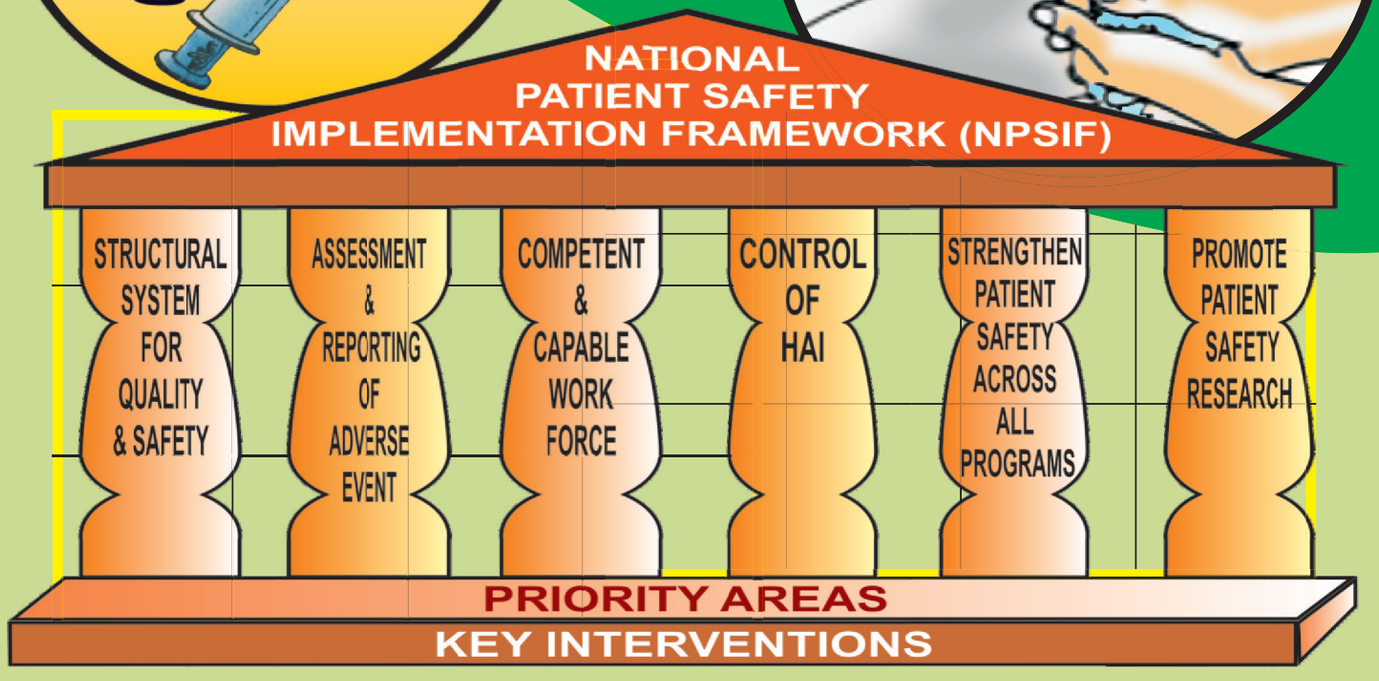
REGIONAL OFFICE FOR South-East Asia

BHME-102
WORKER SAFETY AND PATIENT SAFETY





"Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances."

—Indira Gandhi

''शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।''

–इन्दिरा गांधी

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BHME-102
Worker Safety and Patient Safety

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WORKER SAFETY AND PATIENT SAFETY

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BLOCK INTRODUCTION

You have already read about the occupational safety of the health care workers in the Unit 28 of Block 3 of BHM-102. In this course, you will be looking at worker safety and patient safety.

The **Unit 1** on occupational hazards for health care workers discusses the hazards and risks a health care worker is exposed to, while handling health care waste. These range from the physical hazards and risks to biological, chemical and psychological ones. The health care workers working with the different treatment technologies are also exposed to certain risks which have separately been elaborated. The various responsibilities of the occupier with respect to the occupational safety have also been covered in this unit. The occupier must ensure the immunisation of all the workers, their regular health checkups and training. All accidents must be managed and reported. Provisions for preventing the same must be made. Protecting the health care workers from the occupational hazards also entails the decisions at the policy level. Instituting the hierarchy of controls is an integral component of the same.

Unit 2 deals with the various component of patient safety, with special emphasis on those that relate to health care waste. This unit has been developed in line with the Government of India guidelines on patient safety and aligned with the WHO principles for the same.

UNIT 1 OCCUPATIONAL HAZARDS FOR HEALTH CARE WORKERS

Structure

1.0 OBJECTIVES

After studying this unit, you should be able to:

- describe occupational hazards to health care workers
- discuss the risks to health care workers from different types of hazards
- enumerate the preventive measures to reduce the risks from the hazards
- outline the procedure for dealing with spills and exposure to infectious waste
- discuss the hierarchy of controls
- developing an organisational safety culture through policy, training, education, ensuring reporting and adopting the correct practices
- list the rights of the workers for occupational safety

1.1 INTRODUCTION

Hazard is a situation that poses potential risk or threat to life, health, or environment. Risk is the probability of a negative outcome from exposure to hazard. While hazard has a potential to cause harm, on the other hand, risk has the likelihood of causing harm. You have already read in Unit 10 Block 3, BHM-101, how a substance is defined as hazardous.

Hazards may occur during generation, storage, transportation, treatment or disposal of waste.

In order to prevent and reduce health care workers exposure to work, hazard, the key is risk assessment and effective safety management. The occupational safety of health care personnel of all categories including workers handling waste is often overlooked. You will agree that in any health sector generating health care waste the following as mentioned are true.

a. The production, segregation, transportation, treatment, and disposal of health care wastes involve the handling of potentially hazardous material.

b. Protection against personal injury is essential for all workers.

c. Health care waste management policies should include provision for the continuous monitoring and enhancement of workers' health and safety.

The purpose of this unit is to explain the hazards and infection risks the health care personnel may encounter, and the prevention and control of exposure to them to prevent risk and injuries. Health care waste or Bio-Medical Waste Management (BMWM) Rules should include policies or plans incorporating arrangement for continuous monitoring of workers' health and safety. This is to ensure that correct handling, treatment, storage and disposal procedures are being followed.

1.2 OVERVIEW OF HAZARDS ASSOCIATED WITH HEALTH CARE ACTIVITIES AND RISKS TO THE HEALTH CARE WORKERS

There are an unlimited number of hazards that can be found in almost any workplace. There are obvious unsafe working conditions, such as unguarded machinery, slippery floors or inadequate fire precautions, but there are also a number of categories of insidious hazards.

There are hazards that are dangerous but this may not be obvious. These hazards can be classified into groups as given in **Fig. 1.1**.

Fig.1.1: Classification of hazards that are dangerous

Most workers face combination of these hazards at work. For example, it is not difficult to imagine a workplace where you are exposed to chemicals, unguarded and noisy machines, hot temperatures, slippery floors, etc. all at the same time.

Think about your own workplace. Are there various hazards there that you can think of ?

Various health risks to health care waste workers include chemical exposures such as chemotherapeutic drugs, disinfectants and sterilants; physical risks such as ionising radiation; and ergonomic hazards such as manual lifting and transporting of heavy waste loads. These health risks have been categorised in **Table 1.1**. You have also read this table in Unit 28, Block 3, BHM-101 and the same is being placed here for your recall and understanding of the subsequent sections.

Think and reflect

Do you think the type of hazards are different in different locations of the health care facilities? Compare two or more locations with respect to the type of hazards that the workers may be exposed to in these locations.

Question

What are the potential areas in a health care susceptible to hazards?

Answer

There are a number of locations in the health care establishments and facilities which expose the health care personnel to the various risks and hazards. These are enumerated below:

Laboratories, Operation theatres, Radiology Department, Patient care ward, Outpatient department, laundry, CSSD, Mortuary. Emergency services Department, Labour rooms and Pharmacies. These areas have risk of exposure to hazards.

Did you know?

More workers are injured in the health care and social assistance industry sector than any other. This industry has one of the highest rates of work related injuries and illnesses. Nursing aides, orderlies, and attendants have a high rate of musculoskeletal disorders of all occupations.

Table 1.1: Risks to health care waste workers

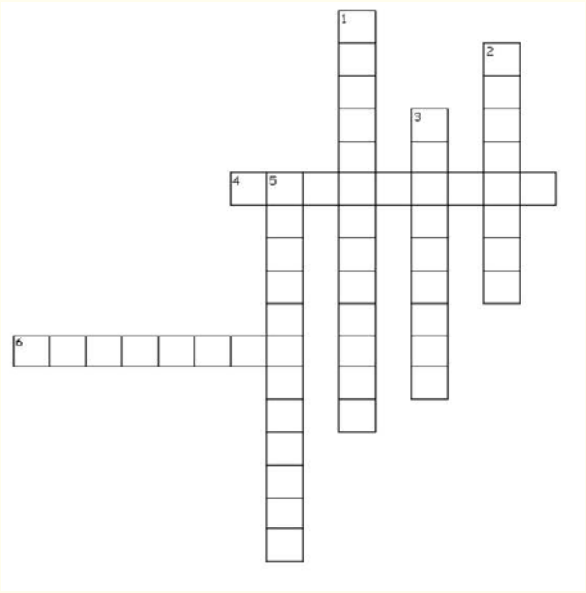
Risk factors	Impact of Risk	Prevention
Sharps injuries and resulting exposure to bloodborne pathogens	Infections with hepatitis B or C, HIV, malaria or other bloodborne infections	Immunisation against hepatitis B virus (WHO, 2009a) Appropriate disposal of sharps at site of use into a puncture-resistant container without recapping. Use of engineered needles that automatically retract, blunt re-sheath, or disable the sharp
Other biological hazards	SARS, Tuberculosis, Influenza	Exhaust ventilation (natural or Respiratory protection with N95, respirators for high-risk cough-inducing procedures. Autoclaving laboratory waste in the laboratory before disposal
Chemicals Chlorine disinfectants (sodium hypochlorite)	Skin and respiratory sensitisation. Eye and skin irritation, weakness, exhaustion, drowsiness, dizziness, numbness and nausea	Substitute soap and detergents. Avoid soaking of sharps in chlorine when they will receive autoclaving or incineration before disposal. Dilute chemicals appropriately according to manufacturer for less toxic exposure
High-level disinfectant glutaraldehyde	Irritation of the eyes, nose and throat. Skin sensitisation. Occupational asthma where the symptoms in affected individuals include chest tightness and difficulty in breathing	Substitute steam sterilisation except for pressure sensitive instruments. Ensure appropriate dilution and use in closed, ventilated system
Sterilants: ethylene oxide	Eye and skin irritation, difficulty breathing, nausea, vomiting, and neurological problems such as headache and dizziness. Reproductive hazard, linked to nerve and genetic damage, spontaneous abortion and muscle weakness Carcinogen	Substitute steam sterilisation for ethylene oxide except for pressure-sensitive instruments. Use only in a closed and ventilated system
Heavy lifting Handling heavy loads over long periods. Back injuries and musculoskeletal disorders	Degenerative diseases of the lumbar spine	Reduce mass of objects or number of loads carried per day. Use waste carts with wheels, automated waste transfer from cart to truck and treatment. Use lifts and pulleys to assist in transferring loads
Ionising radiation	Irreversible damage of cells, anaemia, leukaemia, lung cancer from inhalation	Safe waste management, in full compliance with all relevant regulations, must be considered and planned for at the early stages of any projects involving radioactive materials. It should be established from the outset that the waste can be properly handled, treated and ultimately disposed of. See International Atomic Energy Agency for national regulatory standards and safety guidance.

Check Your Progress 1

1. The categories of hazards have been jumbled. Can you sort them out?

Z	L	P	E	P	P	N	T	B	Q	C	B	P	J	V
W	A	E	C	R	Z	R	D	D	H	Y	L	H	R	R
Z	C	K	P	I	G	E	T	E	C	A	O	Y	N	P
D	I	B	N	P	N	O	M	Y	C	W	O	S	P	T
N	G	V	J	C	T	I	N	I	R	Q	D	I	L	I
O	O	W	Y	Z	C	M	G	O	W	U	A	C	W	I
W	L	U	Q	A	A	O	X	H	M	P	D	A	A	G
H	O	O	L	O	L	O	Z	C	J	I	S	L	V	S
E	I	T	Q	O	T	C	H	J	U	Q	C	W	G	P
W	D	K	I	D	I	Q	I	X	Y	L	G	F	W	E
Q	A	B	E	H	A	V	I	O	R	A	L	Q	D	G
F	R	U	I	B	V	X	F	R	N	S	K	M	X	F
I	S	Q	E	J	L	J	L	H	M	T	X	E	F	U
K	B	Q	K	Z	J	Y	G	L	F	Y	W	C	F	D
V	V	L	T	P	F	M	C	C	F	D	J	Y	X	V

1. Solve the crossword by trying to identify the type of hazard that each statement best refers to



Across

4. Poor posture due to improper seating arrangements
6. Due to extreme temperature of the treatment technology equipment

Down

1. Stress, strain and monotony of work
2. Due to toxic gases and heavy metals
3. Culture plates in the microbiological lab
5. Radioactive material in the lab

1.3 SPECIFIC TYPES OF HAZARDS AND RISKS TO HEALTH CARE WORKERS

Let us learn more about the different categories of risks with special reference to the health care staff involved in the generation, and management of the health care waste. We shall first dwell upon the general risks.

1.3.1 Physical Hazards and Risks

Any health care institution or facility has a number of physical hazards to which the various health care professionals and workers are exposed to. Most of these are of general type which could be fires, falls, noise etc. However there could also be specific hazards with those related to the specific occupations of the health care staff in a hospital like sharp injuries, cuts asphyxia, burns and these related to ergonomics. Let us learn a little more about these hazards.

"Ergonomics." refers to the design of work tasks to best suit the capabilities of workers. In the case of patient handling, it involves the use of mechanical equipment and safety procedures to lift and move patients so that health care workers can avoid using manual exertions and thereby reduce their risk of injury. At the same time, patient handling ergonomics seeks to maximise the safety and comfort of patients during handling.

Handling of patients manually by caregivers puts them to considerable risks which includes Musculoskeletal disorders. This is is explained in **Box 1.1** below.

a. Injuries in health care occur due to manual handling – This may happen during moving a patient or a manual handling of inanimate load. This is one of the commonly reported accidents in the health care sector. These injuries have an impact on resources in terms of costs resulting from absenteeism of the staff.

b. Another possible cause for musculoskeletal disorders is adopting an awkward or a static posture while treating patients for a long time. This results in stresses and strains. Sporting patient limbs and working in positions with very little scope for changing posters or extended periods of time also results in risks and pains.

c. Health care workers handling waste are also exposed to backaches and strains due to bad body mechanics.

Examples of good and bad mechanics are given below

WRONG

RIGHT

Source: http://www.who.int/water_sanitation_health/facilities/waste/module14.pdf

Box 1.1: Musculoskeletal disorders in Health Care

http://www.who.int/water_sanitation_health/facilities/waste/module14.pdf

Prevention of physical hazards

Hospital staff members can be saved from suffering physical hazards during their working hours if they follow the proper mechanics. For this training of the health care workers is required.

1.3.2 Biological Hazards (Biohazards)

The environment of a health care institution is always teaming with potent infectious agents which are a constant threat to all those working in the health care environment. You have already read about the healthcare associated infections in the Unit 18, Block 1, BHM-102. You have read in details about the methods for prevention of these infections. **Box 1.2** gives a list of biohazards.

a.	Health care workers may come into contact with a number of sources of infection either through direct contact with patients or with contaminated materials, including body fluids, tissues, waste, laundry, contaminated surfaces etc.
b.	Aerosolised pathogens (disease-causing microorganisms released as aerosols or tiny droplets suspended in air) during loading, compaction, or break up of untreated waste

Box 1.2: List of biohazards

Hospital Infection Control Guidance Care for Patients with Probable SARS

As you are aware of Severe Acute Respiratory Syndrome (SARS) in SEAR countries, WHO framed a guideline to SARS patient care. Similar guidelines can be adopted for other infectious diseases like Ebola, which culminate into an epidemic. WHO guidelines for SARS has been presented here.

WHO advises strict adherence with the barrier nursing of patients with SARS using precautions for airborne, droplet and contact transmission. Nurses should rapidly divert persons presenting to their health care facility with flu-like symptoms to a separate assessment area to minimise transmission to others in the waiting room. Suspect cases should wear surgical masks until SARS is excluded.

Patients with probable SARS should be isolated and accommodated as follows in descending order of preference:

i. negative pressure rooms with the door closed

ii. single rooms with their own bathroom facilities

iii. Cohort placement in an area with an independent air supply and exhaust system

iv. Turning off air conditioning and opening windows for good ventilation is recommended if an independent air supply is unfeasible. Wherever possible, patients under investigation for SARS should be separated from those diagnosed with the syndrome

Think and reflect

Why do you think the segregation of patients with infectious diseases is required?

Think and reflect

Air conditioning should be turned off in treating SARS patients. Why do you think this is recommended?

Disposable equipment should be used wherever possible in the treatment and care of patients with SARS. If devices are to be reused, they should be sterilised in accordance with manufacturers' instructions. Surfaces should be cleaned with broad spectrum (bactericidal, fungicidal and virucidal) disinfectants of proven efficacy.

Patient movement should be avoided as much as possible. Patients being moved should wear a surgical mask to minimise dispersal of droplets. National

Institute of Occupational Safety and Health, USA (NIOSH) standard masks (N95), often used to protect against other highly transmissible respiratory infections such as tuberculosis, are preferred if tolerated by the patient. All visitors, staff, students and volunteers should wear a N95 mask on entering the room of a patient with confirmed or suspected SARS. Surgical masks are a less effective alternative to N95 masks.

Hand Hygiene is the most important hygiene measure in preventing the spread of infection. Gloves are not a substitute for hand washing. Hands should be washed before and after significant contact with any patient, after activities likely to cause contamination and after removing gloves. Alcohol-based skin disinfectants formulated for use without water may be used. Health care workers are advised to wear gloves for all patient handling. Gloves should be changed between patients and after any contact with items likely to be contaminated with respiratory secretions (masks, oxygen tubing, nasal prongs, tissues). Gowns (waterproof aprons) and head covers should be worn during procedures and patient activities that are likely to generate splashes or sprays of respiratory secretions.

Did you know?

Standard precautions should be applied when handling any clinical wastes.

Health Care Worker's must wear protective eye wear or face-shields during procedures where there is potential for splashing, splattering or spraying of blood or other body substances.

Health Care Worker's are advised to wear masks whenever there is a possibility of splashing or splattering of blood or other body substances or where airborne infection may occur. Particulate filter personal respiratory protection devises capable of filtering 0.3 μm particles (N95) should be worn at all times when attending patients with suspected or confirmed SARS.

All waste should be handled with care to avoid injuries from concealed sharps (which may not have been placed in sharps containers). Gloves and protective clothing should be worn when handling clinical waste bags and containers. Where possible, manual handling of waste should be avoided. Clinical waste must be placed in appropriate leak-resistant biohazard bags or containers labelled and disposed of safely.

Risks from Sharps

Health care waste handlers are at greatest risk from infectious hazards, especially sharps that are not disposed of into puncture-resistant containers. The risk of acquiring a secondary infection following needlestick injury from a contaminated sharp depends on the amount of the contamination and nature of the infection from the source patient. The risk of infection with hepatitis B is more than 10 times greater than for hepatitis C, and up to 100 times greater than for human immunodeficiency virus (HIV) **(Table 1.2)**.

Table 1.2: Risk of transmission of infection following occupational exposure

Bloodborne virus	HIV	Hepatitis B	Hepatitis C
Risk of transmission of infection	0.3%	18-30%	1.8%

Source : Safe management of wastes from health-care activities, WHO, 2014

Box 1.3 explains things to be considered for the prevention of injuries from sharps.

For the prevention of injuries from sharps following things are considered:	
a.	Wearing the proper PPE
b.	Properly cleaning and maintaining floors to avoid slips and falls
c.	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

Box 1.3: Actions for the prevention of injuries from sharps

You have already read about the Do's and Don'ts with the sharps in the Unit 18, Block 1, BHM-102.

Other recommendations for minimisation of risk of infection from needle-stick injury are mentioned in **Box 1.4**.

Other recommendations for minimisation of risk of infection from needlestick injury are:

a.	Reduce any unnecessary injections
b.	Use needleless devices
c.	Use engineered needles that automatically retract, blunt, resheath, or disable the sharp
d.	Destruction of the needles can be done by needle melters or needle cutter

Box 1.4: Other recommendations for minimisation of risk of infection from needlestick injury

Advantages

- ✓ Prevents reuse of syringe either inadvertently or illegally
- ✓ Reduces volume of sharp waste
- ✓ Potential for recycling syringe barrels after disinfection
- ✓ Removes inclination of staff to recap used needles
- ✓ Reduces risk of injury from inappropriately disposed syringes

Disadvantages

- ✓ Cost is an issue, because one will be needed wherever injections are given and will require maintenance. Sharp containers may still be needed for lancets and other sharp waste
- ✓ Some models collect the sharps in containers that need to be capped after filling, potential for spilling of needles and/or NSI during container exchange
- ✓ Potential splash of blood during operation
- ✓ Busy staff may leave syringes to be cut later increasing chances of needle stick injuries SI and infection from discarded syringes
- ✓ Some needle destroyers are electrically operated and so not appropriate where power shortages are common

http://www.who.int/water_sanitation_health/facilities/waste/module17.pdf

Fig. 1.2: Advantages and disadvantages of the needle destroyers
Source: http://www.who.int/water_sanitation_health/facilities/waste/module17.pdf

1.3.3 Chemical Wastes Including Disinfectants Used for Waste Treatment

Did you know?

A substance may also be listed as hazardous by regulation.

A substance is considered to be a health hazard if it produces acute or chronic health effects in an exposed individual.

Chemical agents are widespread in health care and include the daily cleaning agents disinfecting and sterilising agent. Medical gases anaesthetic agent cytotoxic drugs and other pharmaceutical compound. Any chemical has the potential to cause harm. The chemicals may also pose a physical hazard if they are flammable or explosive.

Chemical agents also pose a risk. This may be by causing allergies dermatitis or other reproductive hazards. This can occur by use of disinfectants, rubber, drugs and dealing with a contaminated patient, exposure during drug administration.

Care should be taken when handling these materials, and gloves and eye protection are critical in preventing a splash.

Let us learn about two common disinfectants – glutaraldehyde and formaldehyde as mentioned in **Box 1.5** and **Box 1.6**. In case you have also opted for BHME-101, you must have already read about these details.

Glutaraldehyde

Glutaraldehyde is a colourless oily liquid, commonly available as a clear, colourless aqueous solution. It is a powerful cold disinfectant used widely in hospitals and health care centres for high level of disinfections of medical instruments and supplies and available in market as cidex, totacide and Asep.

Glutaraldehyde is a fixative particularly with nitrogen, ammonia, amines and proteins.

It attacks proteins in the nucleus of microorganisms, DNA and protein sacks of viruses, so that microorganism cannot develop resistance to it. It acts optimally at neutral to alkaline pH.

The exposure limit for glutaraldehyde has been set at 0.20 ppm, which must never be exceeded.

Workers can be exposed to glutaraldehyde through inhalation or skin contact.

Even short term exposure to glutaraldehyde in concentrations of 0.3 ppm results in significant risk of irritation to the eyes, nose and throat.

Glutaraldehyde is toxic and harmful if inhaled or swallowed. It irritates the eyes, respiratory tract and also has a corrosive action on the conjunctiva and skin and may cause permanent injury to the eyes. It is skin sensitive and may cause severe allergic skin reactions, dermatitis and skin irritation, nasal and throat irritation, headaches, cough and asthma like condition.

Box 1.5: Details related to Glutaraldehyde

Did you know?

In the health care industry, glutaraldehyde is most often used to disinfect equipment that cannot be heat sterilised such as dialysis instruments, surgical instruments, suction bottles, bronchoscopes, endoscopes, and ear, nose, and throat instruments.

Sodium hypochlorite

At concentrations greater than 5 per cent it causes skin and mucus membrane irritation. It is not a mutagenic, carcinogenic, teratogenic or skin sensitisor. The potential health hazards are similar to glutaraldehyde and involve eye, respiratory tract and skin. On ingestion it causes nausea and vomiting.

Box 1.6: Details related to Sodium Hypochlorite

Did you know?

Sodium hypochlorite is the most widely used chemical disinfectant in health care settings and household due to its disinfection efficacy and affordability.

Chemotherapy drugs are used to kill cancer cells in humans, and can be very toxic to the healthy cells of other people if they come into contact with waste chemotherapy drugs. Mercury is a chemical that accumulates in the body and poisons the central nervous system. You have read about the hazardous of these chemicals in the Unit 10, Block 3, BHME-101.

Think and reflect

What is biomagnification? What is it's significance?

You may like to go back to the Block 1 of the BHM-101 for some answers.

1.3.4 Radioactive and Cytotoxic Wastes

There may be serious hazards to health care workers by the medical use of ionising radiation which is explained in **Box 1.7**.

Ionising (e.g., x-rays, nuclear medicine)

Ionising radiation has enough energy to remove an electron from an atom (creating an ion). The main types of ionising radiation are alpha particles, beta particles, gamma rays, and x-rays. Sources of ionising radiation in health care include x-ray machines, radioactive isotopes, and radio nucleotides.

Non-ionising (e.g., lasers)

Non-ionising radiation does not have enough energy to remove an electron from an atom, but may cause an atom to vibrate or move around in a molecule. Examples of non-ionising radiation include microwaves, infrared radiation, and visible light. A source of non-ionising radiation in health care is a laser.

Lasers produce an intense, highly directional beam of light. In health care, lasers may be used as scalpels, probes, or in certain imaging techniques. Hazards may be associated with the laser beam (e.g., burns due to absorption of laser energy), the equipment (e.g., high voltage), or products produced during laser use (e.g., laser plume).

Box 1.7: Serious hazards to health care workers by the medical use of ionising radiation

Did you know?

Radioactive materials are sometimes used in the diagnosis or treatment of some diseases. While a short-term exposure to a radioactive material can save a person's life, a long-term exposure can cause serious harm to a person. Capturing and keeping the radioactive materials where they are used, and storing them in a secure place at the health care facility is critical in keeping them from entering into the environment, where they might expose people to harmful doses of radioactivity. Radioactive materials can be stored until the radioactivity decays, or goes away. When no radioactivity is detected, the item can be disposed off as solid waste.

The senior pharmacist at a health care facility should be made responsible for ensuring the safe use of cytotoxic drugs. Large oncological hospitals may appoint a full-time genotoxic safety officer, who should also supervise the safe management of cytotoxic waste. The important measures to minimise exposure are explained in **Box 1.8**.

a.	Written procedures that specify safe working methods for each process;
b.	Data sheets, based on the suppliers' specifications, to provide information on potential hazards and their minimisation;
c.	Established procedure for emergency response in case of spillage or other occupational accident;
d.	Appropriate education and training for all personnel involved in the handling of cytotoxic drugs. These measures are unlikely to be needed in rural or smaller district hospitals that do not typically use

Think and reflect

Why do you think the cytotoxic drugs are a matter of concern when we talk of management and disposal of the waste?

genotoxic products, either cytotoxic or radioactive. In countries where the safe use of cytotoxic and radioactive materials is difficult to ensure, it may be advisable to limit the use of those substances to a small number of specialised (e.g. oncological) hospitals that are better able to implement appropriate safety measures. In hospitals that do use cytotoxic products, specific guidelines on their safe handling should be established for the protection of personnel. These guidelines should include rules on the following waste-handling procedures:

i. separate collection of waste in leak-proof bags or containers and labelling for identification;

ii. return of outdated drugs to suppliers;

iii. safe separate storage of genotoxic waste away from other health care waste;

iv. arrangements for the disposal of contaminated material, the decontamination of reusable equipment and the clean-up of spillages;

v. arrangements for the treatment of infectious waste contaminated with cytotoxic products, including excreta from patients, disposable linen and absorbent material for incontinent patients. Minimal protective measures for all waste workers who handle cytotoxic waste should include protective clothing, gloves (chemical barrier), goggles and face masks. Hospital staff should ensure that the families of patients undergoing chemotherapy at home are aware of the risks and know how they can be minimised or avoided.

Box 1.8: Important measures to minimise exposure to cytotoxic drugs

1.3.5 Hazards and Risks during Treatment and Disposal of Waste

An "operator of a common bio-medical waste treatment facility" means a person who owns or controls a Common Bio-Medical Waste Treatment Facility (CBMWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.

An operator is equally responsible for the safety of his employees.

Incineration causes environmental hazards due to burning of waste. While other technologies may not burn the waste to destroy it, they may use corrosive chemicals or very hot steam to disinfect waste. Disinfecting chemicals such as bleach require safe handling and disposal. Steam needs to be handled with respect as well since a waste handler can receive serious burns from steam under high pressure. Procedures need to be defined to control environment and occupational hazard due to the treatment technologies.

When wastes are treated by disinfection or sterilisation, they can usually be disposed of as solid waste. It is important that the operators of the receiving

landfill or the facility understands the process in which the waste was treated and take adequate precautions. Let us read more about the hazards of the incineration and non-burn technologies.

Hazards of Burn Technologies and Safety Precautions for the Health Care Workers

Incineration of bio-medical waste that is hazardous in nature involves the use of controlled flame combustion to thermally destroy hazardous wastes; this method is one of the most frequently selected technologies for treating bio-medical waste. Incineration has been found to be suitable for the destruction of most organic materials (volatile and non-volatile), inorganic material and liquids having a high organic content.

Exposure to hazardous contaminants can happen to the workers while present in an incinerator site, especially in the incinerator feed area. Potential exposure to site contaminants or to their incomplete combustion products can occur in the vicinity of the incinerator if it is not operating according to design parameters. Deficient operating conditions are mentioned in **Box 1.9**.

Deficient operating conditions may include:

a. Short residence time;

b. Low oxygen to fuel- or waste-ratio;

c. Low-temperature operation;

d. Soil/ash fallout creating steam pressure buildup in the combustion chamber;

e. Incinerator slag buildup;

f. Waste surges;

g. Poor gas mixing in the combustion chamber due to low turbulence within the chamber; and

h. High halogen content of the waste feed.

Box 1.9: Deficient operating conditions

In addition, poorly designed or malfunctioning air pollution control equipment will increase particulate emissions, which often carry incomplete combustion products adsorbed onto the particle's surface which form as hazardous exposures to various pollutants.

Pollutants from incineration include Persistent Organic Pollutants (POPs) such as dioxins and furans, which are especially dangerous because they bio-accumulate, bio-magnify, resist decomposition and are capable of being transported great distances threatening public health and ecosystems around the world. Very low concentrations of dioxins, e.g., have been linked to cancer, immune system disorders, diabetes, birth defects, and other health effects. Medical waste incinerators are also a leading source of mercury in the environment.

Other occupational hazards commonly found on incinerator sites include those associated with thermal stress, the use of heavy construction equipment,

For more research based evidence, you may read the interesting article written by Bakoglu et al by going to link given http://joh.sanei.or.jp/pdf/E46/E46_2_10.pdf

work in confined spaces, storage and handling of infectious materials, walking and working surfaces, noise, hot or cold environments, and/or injuries.

A National Institute of Occupational Safety and Health (NIOSH) study on chemical, biological, and safety hazards associated with non-incineration technologies like steam autoclave, microwave, chemical-mechanical, and pyrolysis systems, found that no volatile organic compounds exceeded existing OSHA permissible exposure limits. All metal samples in the air were minimal, mostly below detection limits. With regards to biological hazards, they found the greatest hazard and potential health risk from blood splatter, as workers emptied waste containers into the treatment system. The next major concern was ergonomics, as the technologies required extensive manual handling of heavy waste containers. Finally, there were general safety issues, such as the need to use personal protective equipment.

Working with Non-burn Technologies

Hazards depend on which treatment technology is used are. These hazards are enumerated in **Box 1.10**.

Hazards of working with non-burn technologies are:

a. Hot surfaces that cause burns

b. Steam from a treatment chamber

c. Elevated temperatures in the work area due to insufficient cooling and ventilation

d. Volatile organic compounds and other chemicals released into the workplace

e. Toxic pollutants from a short exhaust stack

f. Ionising radiation from irradiative processes

g. Non-ionising radiation such as from microwaves

h. Noxious odours

i. Noise pollution

Box 1.12: Hazards of working with non-burn technologies

1.3.6 Psychological Hazards

Psychological hazards include risks to the mental and emotional well-being of workers, such as feelings of job insecurity, long work hours, and poor work-life balance. A recent study using moderate quality evidence-related that the addition of work-directed interventions for depressed workers receiving clinical interventions reduces the number of lost work days as compared to clinical interventions alone. This review also demonstrated that the addition of cognitive behavioural therapy to primary or occupational care and the addition of a "structured telephone outreach and care management programme" to usual care are both effective at reducing sick leave days.

There may be other minor hazards like Work related stress. This may be, because of this stress from doing the job. Like doing a monotonous work too

much work or insufficient time. This may also be from work relationships with the team members hierarchies of authorities working in isolation or bowling or harassment. Stress may also be from working conditions. Like Night Shift. Life threatening injuries. Mission dates types of violence and aggression.

Check Your Progress 2

Give one word answer

a. A disinfectant that is used to disinfect equipment that cannot be heat sterilised such as dialysis instruments.

b. A chemical that accumulates in the body and poisons the central nervous system.

c. Type of radiation from x-ray machines, radioactive isotopes.

1.4 ACCIDENTS AND RISKS TO HEALTH CARE WORKERS

The health care workers are also exposed to risk of accident. Possible types of accidents that are associated with health care sector are, gas leaks electrocution explosions, cuts bruises factors, burns and effects of noise. There may be major injuries such as fractures, concussion or there may be minor injuries such as cuts bruises etc. The possible causes of these injuries could be uneven surfaces, or changes in the level wet are slippery services. cables crossing pathways, obstructed work areas.

Like in any other sector electricity is used in health care on a daily basis. However, if misused or improperly used, it can cause severe burns, electrocution, fires and may have more serious effect. All safety precautions must be followed. Loose wires, extension leads, multiple adapters etc should be avoided. This staff should receive a training on visual inspection of electricity boards, exposed wires and report falls immediately so that appropriate repairs can be initiated.

Another accident common with health care waste are spills.

1.4.1 Dealing with Spillages

Spillages require clean-up of the area contaminated by the spilt waste. For spillages of highly infectious material, it is important to determine the type of infectious agent, because immediate evacuation of the area may be necessary in some cases. In general, the most hazardous spillages occur in laboratories rather than in medical care departments. Procedures for dealing with spillages should specify safe handling operations and appropriate protective clothing. You have already read about mercury spills in the Unit 10, Block 3, BHM-101 and infectious spills in Unit 18, Block 1, BHM-102.

Think and reflect

What do you think are the risks of a spillage? How can we prevent this risk?

1.4.2 Occupational Post-Exposure Prophylaxis

Post-exposure prophylaxis (PEP) is short-term antiretroviral treatment (for HIV) or immunisation (for hepatitis B) to reduce the likelihood of infection

after potential exposure, either occupationally or through sexual intercourse. Within the health sector, PEP should be provided as part of a comprehensive universal precautions package that reduces staff exposure to infectious hazards at work. PEP for HIV comprises a set of services to prevent development of the infection in the exposed person. These include first-aid care; counselling and risk assessment; HIV blood testing; and, depending on the risk assessment, the provision of short-term (28 days) antiretroviral drugs, with follow-up and support. Most incidents linked to occupational exposure to bloodborne pathogens occur in health care facilities. The World Health Organisation (WHO) has published guidelines on PEP to prevent HIV infection. A summary of PEP recommendations from these guidelines are summarised in the **Box 1.11**. You may also like to recall the post exposure prophylaxis as already read in the Unit 28, Block 3, BHM-102.

a. WHO recommends that PEP should be provided as part of a package of prevention measures that reduce staff exposure to infectious hazards.

b. PEP should be available to health care workers and patients.

c. Occupational PEP should also be available to all workers who could be exposed while performing their duties (such as social workers, law enforcement personnel, rescue workers, refuse collectors).

d. Countries should include occupational PEP in national health care plans.

e. Appropriate training to service providers should ensure the effective management and follow-up of PEP.

f. PEP should be initiated as soon as possible within the first few hours and no later than 72 hours after exposure to potentially infected blood or body fluids.

g. PEP should not be prescribed to a person already known to be infected with HIV.

h. In addition, risk evaluation, and counselling on side effects, and benefits of adherence and psychosocial support is needed.

i. Any occupational exposure to HIV should lead to evaluation and, where relevant, strengthening of safety and working conditions.

Box 1.11: Post Exposure Prophylaxis (PEP)

1.4.3 Accidents and Reporting Accidents and Incidents

All waste-management staff should be trained in emergency response and made aware of the correct procedure for prompt reporting. Accidents or incidents, including near misses, spillages, damaged containers, inappropriate segregation and any incidents involving sharps, should be reported to the waste-management officer (if waste is involved) or to another designated person. The report should include details as mentioned in **Box 1.12**.

The report should include details of:

a. The nature of the accident or incident

b. The place and time of the accident or incident

c. The staff who were directly involved

d. Any other relevant circumstances. The cause of the accident or incident should be investigated by the waste-management officer (in case of waste) or other responsible officer, who should also take action to prevent recurrence. The records of the investigation and subsequent remedial measures should be kept.

Box 1.12: Details to be included in the report

1.5 ENVIRONMENTAL HEALTH AND INJURY ISSUES

Some of the more commonly reported environmental health and injury issues in health care waste management are enumerated in **Box 1.13**.

a.	Contaminated leachate and surface runoff from land disposal facilities affecting down gradient ground and surface water quality;
b.	Vector-borne disease abundance and pathogen survival in the waste;
c.	Volatile organic compounds in air emissions inconclusive evidence on altered cancer incidence, birth defects, and infant mortality, as well as psychological stress for those living near hospital waste disposal facilities and inadequately controlled incinerators;
d.	Animals feeding on hospital waste providing a food chain path for transmitting animal and human diseases;
e.	Uncollected wastes retaining water and clogged drains, thus leading to stagnant waters which encourage mosquito vector abundance;
f.	Uncollected wastes providing food and breeding sites for insect, bird and rodent disease vectors.

Box 1.13: Commonly reported environmental health and injury issues in health care waste management

There is a relationship between exposure to hospital waste increased risk of injury and risk to health.

The personal hygiene of workers is often inadequate, even washing facilities may not be available to this category of health care workers. To some extent, this is due to inadequate education on hygiene and health relations. This can complicate their exposure risk. Study by US Agency for International Development indicates that cost-effective investment in sanitation requires hygiene promotion and education to achieve successful mortality and morbidity reductions.

Check Your Progress 3

1. Name one example of each type of risk
   a. Physical
   b. Biological
   c. Incineration
   d. Environmental

1.6 RESPONSIBILITIES OF OCCUPIER

"Occupier" means a person having administrative control over the institution and the premises generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, health care facility and clinical establishment, irrespective of their system of medicine and by whatever name they are called.

The duty of every occupier of an institution generating bio-medical waste is to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

The actions that are required to be taken by an occupier that ensures the protection of his employees are given in the **Box 1.14**.

a. Waste Segregation and Labelling

Health care wastes need to be properly separated at the source where they are generated. Wastes need to be properly segregated in order to Maximise safe handling for waste handlers both in the health care facility or in an off-site facility AND Minimise potential harm to the environment. Avoid the dangers of combining wastes. Contain costs of disposal.

Segregate and Label the sharps in puncture containers immediately after use. Health care waste contaminated with blood and body fluids.

Segregate and Label chemical wastes from laboratories that are corrosive, toxic, reactive or ignitable. These chemical wastes need to be properly stored in secure settings to protect the general public and rag pickers from exposure.

The use of coloured bag systems for collecting the waste helps label the waste. Yellow or red are often used for biohazard waste and green/black/clear bags symbols that can be used to label the waste include Universal biohazard waste symbol Universal radioactive waste symbol.

b. Pre-treatment of health care waste

All infectious waste should be treated to the extent that it no longer poses a threat to the health care personnel.

c. Adequate and Secure Storage for Waste

It is very important that health care wastes be secure to protect the public as well as the health care staff. You have already read about the specifications of the storage area in the Unit 6, Block 2, BHM-101.

Responsibility of the occupier is the storage of infectious waste to a maximum of 24 hours. No untreated bio-medical waste shall be kept stored beyond a period of 48 hours, provided that if for any reason it becomes necessary to store the waste beyond such period, the authorised person must take permission of the prescribed authority and take measures to ensure that the waste does not adversely affect human health and the environment. In case of non compliance with the provision of the laid down guidelines the appropriate legal action must be taken.

d. Transportation

Proper guidelines must be followed to ensure minimal risk to the health care workers.

Medical waste collection practices should be designed to achieve an efficient movement of waste from points of generation to storage or treatment while minimising the risk to personnel. Generally, carts are used to transport waste within a facility. Carts used for infectious waste should not be used for other purposes. They should be kept shut during transport to prevent spillage and avoid offensive sights and odors.

e. Occupational safety

To improve working conditions for Health Care Waste handlers the following should be provided:

i. Vaccinate workers against communicable diseases (e.g., hepatitis B, tetanus)

ii. Increase the number of workers in this department depending on the workload

iii. Provide transportation to/from work

iv. Provide proper personal protective equipment

v. Provide training on hazards of Bio-Medical Waste

Box 1.14: Actions that are required to be taken by an occupier that ensures the protection of his employees

You have already read the details of the occupational safety measures in the Unit 28, Block 3, BHM-102.

Check Your Progress 4

1. Define an occupier.

.....

.....

.....

2. Define an operator.

.....

.....

.....

Did you know?

The IOM committee stated its belief that a safer environment for patients would also be a safer environment for workers and vice versa, because both are tied to many of the same underlying cultural and systemic issues.

1.7 ORGANISATIONAL SAFETY CULTURE – LINKING PATIENT AND WORKER SAFETY

The burden and cost of poor patient safety, a leading cause of death in the United States, has been well-documented and is now a major focus for most health care institutions. Less well-known is the elevated incidence of work-related injury and illness among health care workers that occurs in the work setting, and the impacts these injuries and illnesses have on the workers, their families, health care institutions, and ultimately on patient safety. It is not surprising that patient and worker safety often go hand-in-hand and share organisational safety culture as their foundation.

Hazards to health care workers because of lapses in infection control, fatigue, or faulty equipment may result in injury or illness not only to workers but also to patients and others in the institution. Workers who are concerned for their safety or physical or psychological health in a work environment in which their safety and health is not perceived as a priority, will not be able to provide error-free care to patients. The report emphasised the pivotal role of system failures and the benefits of a strong safety culture in the prevention of such errors. Therefore, efforts to reduce the rate of medical error must be linked with efforts to prevent work-related injury and illness if they are to be successful.

Several studies have found organisational factors to be the most significant predictor of safe work behaviours. Studies have shown compliance with standard precautions was increased when workers felt that their institution had a strong commitment to safety and when institutions targeted interventions at improving organisational support for employee health and safety. Also, safety culture has an important influence on implementation of training skills and knowledge.

The lack of a safety culture as a contributing factor to noncompliance with recommended infection control guidance is not a newly recognised problem. The Centers for Disease Control and Prevention's Healthcare Infection Control Practices Advisory Committee has noted that "several hospital-based studies have linked measures of safety culture with both employee adherence to safe practices and reduced exposures to blood and body fluids." They noted that organisational characteristics, including safety culture, influence health care personnel adherence to recommended infection control practices and, therefore, are important factors in preventing transmission of infectious agents. Some of the factors under the safety culture are given in **Box 1.15**.

a. The actions management takes to improve both patient and worker safety;

b. Worker participation in safety planning;

c. The availability of appropriate protective equipment;

d. The influence of group norms regarding acceptable safety practices; and

e. The organisation's socialisation process for new personnel.

Box 1.15: For creating safety culture as per IOM report, 1993

1.8 HIERARCHY OF CONTROLS (APPLIED TO BLOODBORNE PATHOGENS)

adapted from WHO blue book

Methods to control occupational hazards have traditionally been discussed in terms of hierarchy and presented in order of priority for their effectiveness in preventing exposure to the hazard or preventing injury resulting from exposure to the hazard (**Box 1.16**).

Think and reflect

Could you think of few examples of the four methods of hierarchy of controls?

Elimination of hazard – Complete removal of a hazard from the work area. Elimination is the method preferred in controlling hazards and should be selected whenever possible. Examples include removing sharps and needles and eliminating all unnecessary injections. Jet injectors may substitute for syringes and needles. All unnecessary sharps, such as towel clips, should also be eliminated, and needleless systems should be used.
Engineering controls – Controls that isolate or remove a hazard from a workplace. Examples include sharps disposal containers (also known as safety boxes) and needles that retract, sheathe or blunt immediately after use (also known as safer needle devices or sharps with engineered injury-prevention features).
Administrative controls – Policies to limit exposure to a hazard (e.g. universal precautions). Examples include allocation of resources demonstrating a commitment to staff safety, an infection-control committee, an exposure control plan, replacement of all unsafe devices and consistent training on the use of safe devices. Provide training to ensure that workers are aware of all safety measures and follow correct steps while working.
Work practice controls – Controls that reduce exposure to occupational hazards through the behaviour of workers. Examples include no needle recapping, placing sharps containers at eye level and at arm's reach, emptying sharps containers before they are full, and arranging for the safe handling and disposal of sharps devices before beginning a procedure.
Personal protective equipment (PPE) – Barriers and filters between the worker and the hazard. Examples include eye goggles, gloves, masks and gowns. Encourage early reporting so as to help prevent progress of the hazard. Implement solution timely and evaluate progress periodically by establishing corrective actions to ensure continuous improvement and long term success.

Box 1.16: Hierarchy of controls

See also http://www.who.int/hiv/pub/prev_care/ilowhoguidelines.pdf

Source: ILO & WHO (2005)

1.9 TRAINING AND EDUCATION

Health care waste workers should be trained before starting work handling waste, and then on a routine basis (e.g. annually) to update their knowledge of prevention and control measures. Training should include awareness raising about the potential hazards from waste, the purpose of immunisation, safe waste-handling procedures, reporting of exposures and injuries, preventing infection following an exposure with PEP, and the use of PPE. The best policies and management systems will fail if all staff does not receive proper training of the developed policies and procedures. Waste worker safety depends on the quality of training and education of all staff on medical waste and occupational health policies. Proper training and education should be for all staff. More than one curriculum will be necessary to address the diverse needs and skills of the many staff groups (e.g., waste workers, nurses, doctors, administrators). Other important measures for training are enumerated in **Box 1.17**.

a. Involve waste workers and all other staff groups in development of training programme and to provide feedback in order to modify and improve trainings.

b. Include pictures, posters in the actions of staff and their respective effects on waste workers "downstream".

d. Contain hands on experience and active learning exercises to cement skills through practice and creative thinking. Props and real life examples are effective. Workers can e.g. walk through a ward and be asked to identify the different waste types and to evaluate management practices.

e. Assure that the curriculum and training tools address the needs of staff that are illiterate or speak other languages.

f. Create a system that assures prompt training of new staff members and routine training of all staff with written documentation including staff attendance, outline of material presented, note skills demonstrated, and date of training.

Box 1.17: Points to be kept in mind for training

1.10 SPECIFIC GUIDELINES, POLICY AND STRATEGY

To ensure safety of the health care workers specific guidelines and policies have to be framed by the health care facilities. Prevention is cost effective. Some of the specific guidelines are mentioned in **Box 1.18**.

Think and reflect

Make a list of the points you feel are important for training. What objectives would you like to draw out for each of the points or areas selected?

a. Universal precautions need to be taken by all health care workers while handling and disposing waste. Since medical and other staff does not always know if a patient has a bloodborne disease, all blood and body fluids need to be treated as if they contained these pathogens. This principle of treating all blood and body fluids as potentially infectious is called Universal Precautions.

b. Heavy duty puncture resistant gloves must be worn when handling biohazards and chemical wastes.

c. Hand Washing: It is important to remember that gloves are not a substitute for proper hand washing. Wash hands with soap and water after handling wastes. Water and soap should be available wherever wastes are handled or stored.

d. Masks: Fluid impermeable masks should be worn when there is a possibility of splash from handling wastes. Respirators or masks with protection from bio-aerosols such as tuberculosis should be worn when transporting infectious waste.

e. Properly label all health care wastes to minimise confusion.

f. Establish strict protocols for handling radioactive waste to allow for half life/decay time prior to handling waste.

g. Establish procedures for disposing of pharmaceutical wastes, especially chemotherapy.

Box 1.18: Specific guidelines and strategies for safety of health care workers

Sharps should be segregated at source and placed in a puncture proof container immediately after use. Overall sharps containers are hazardous. Some precautions while handling sharps are given in **Box 1.19**.

a. Replace sharps containers at fill line or when 2/3 full. If the sharps container is at fill point, **do not** place sharps in the container but instead contact management for replacement. If the sharps container is filled to the top or higher, contact management and do not handle the sharps.

b. If you see sharps sticking out of a trash bag, do not pick up the bag. Report to supervision for safe handling.

c. Never put your hand inside any container; either dump the contents of container into a larger container and remove the bag.

d. Never put your hand in area that you cannot see.

e. Use trolley or wheeled carts to transport waste instead of bare hands. Immediately report a sharps prick to management.

f. Never recap needles. Sharps should be placed in containers at the time of use to reduce stick injury. If you are faced with a pile of sharps on a tray or otherwise outside a rigid container, contact management. Extreme care needs to be taken and thongs or other objects should be used in such immediate cases. However, policies need to be implemented that eliminate such practices.

Box 1.19: Precautions while handling sharps

1.11 RIGHTS OF THE WORKERS: ILO AND WORKER SAFETY

Workers are entitled to a safe workplace. The employer must provide a workplace free of known health and safety hazards. The workers have the right to speak up without fear of retaliation. **(Box 1.20)**.

They should have the right to:

a. Get trained in a language they understand

b. Work on machines that are safe

c. Be provided required safety gear, such as gloves or a harness and lifeline for falls

d. Be protected from toxic chemicals

e. Request an inspection by appropriate authorities and speak to the inspector

f. Report an injury or illness, and get copies of your medical records

g. Get copies of test results done to find hazards in the workplace

Box 1.20: Worker's rights

Since 1950, ILO and the WHO have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995. The definition reads:

"The main focus in occupational health is on three different objectives: (i) the maintenance and promotion of workers' health and working capacity; (ii) the improvement of working environment and work to become conducive to safety and health and (iii) development of work organisations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings. The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."

Did you know?

World Day for Safety and Health at Work is celebrated on April 28 each year to raise awareness of safety and Health at workplace since 2003 each year it focuses on a specific area and bases a campaign around the theme.

In India, the Labour Ministry formulates national policies on occupational safety and health in factories and docks with advice and assistance from Directorate General of Factory Advice Service and Labour Institutes (DGFASLI), and enforces its Policies through inspectorates of factories and inspectorates of dock safety DGFASLI is the technical arm of the Ministry of Labour & Employment, Government of India and advises the factories on various problems concerning safety, health, efficiency and well-being of the persons at work places. The DGFASLI provides technical support in formulating rules, conducting occupational safety surveys and also for conducting occupational safety training programmes.

1.12 APPROACHES TO HEALTH AND SAFETY PRACTICES

Box 1.21 mentions the minimum approach to health and safety practices for health care personnel and waste workers.

The minimum approach to health and safety practices for health care personnel and waste workers includes:

a. Implementation of standardised management procedures;

b. Hepatitis B vaccination (in addition to compulsory vaccinations) for all personnel who are at risk of exposure to blood (these personnel include cleaners and waste handlers);

c. Provision of sharps boxes where injections are taking place;

d. Implementation of standard precautions, such as no recapping of needles after use;

e. Promotion of proper hand hygiene;

f. Availability, as a minimum, of gloves to provide personal protection from patients' body fluids;

g. Allocation of an additional role (e.g. for an infection-control nurse) to assume responsibility for promoting better worker safety.

Box 1.21: Minimum approach to health and safety practices for health care personnel and waste workers

Box 1.22 mentions about the desirable improvements or additions to the minimum approach to health and safety practices.

The desirable improvements or additions to the minimum approach to health and safety practices include:

a. Implementation of safer needle devices

b. Establishment of health and safety discussions among staff or committees in the local workplace

c. Establishment of surveillance systems and use of data to prevent further injuries

d. A system for post-exposure prophylaxis

e. Occupational health services formally established at a health care facility.

Box 1.22: Desirable improvements or additions to the minimum approach to health and safety practices

Check Your Progress 5

Match the following

Type of Control	Action Taken
Engineering controls	policies to limit exposure to a hazard
Administrative controls	controls that reduce exposure to occupational hazards through the behaviour of workers
Work practice controls	isolate or remove a hazard from a workplace

1.13 LET US SUM UP

Exposures and injuries are preventable. Most health care waste is not hazardous. However, segregation of the waste is essential so that the small proportion of hazardous waste can be handled safely. Standard safe working precautions are the principal management approach to protect patients and workers from health care-associated infections. The waste generation and segregation activities in medical areas have a significant impact on workers involved in waste handling and treatment. Training of medical staff and other users of sharps should include explaining the impact of incorrect waste practices on cleaners and waste handlers. The intention is to emphasise their responsibility to segregate waste properly to protect not only themselves and their patients, but also other workers and the community as a whole. Preventive measures to protect staff performing injections will also protect waste handlers. Placing used sharps in puncture-proof containers is a major part of eliminating needlestick injuries. Safer needle devices, such as retractables or needles that blunt or automatically resheath after use, offer added protection but also added cost. Take measures to protect health care workers from exposure, injury and occupational disease. Provide all three doses of hepatitis B immunisation to health care and waste workers. Identify a responsible person for occupational health. Allocate sufficient budget to the programme and procure the necessary personal protective equipment. Provide training to health care workers and involve them in the identification and control of hazards. Promote knowledge of the transmission of HIV, hepatitis and tuberculosis through employment or pre-screening for HIV and tuberculosis, and vaccinate against hepatitis B. Prevent exposure to bloodborne pathogens by applying the hierarchy of controls (see Annex 4 of Joint ILO/ WHO guidelines on health services and HIV/AIDS; ILO & WHO, 2005). Maintain a continuous effort to prevent needlestick injuries and occupational exposures to blood.

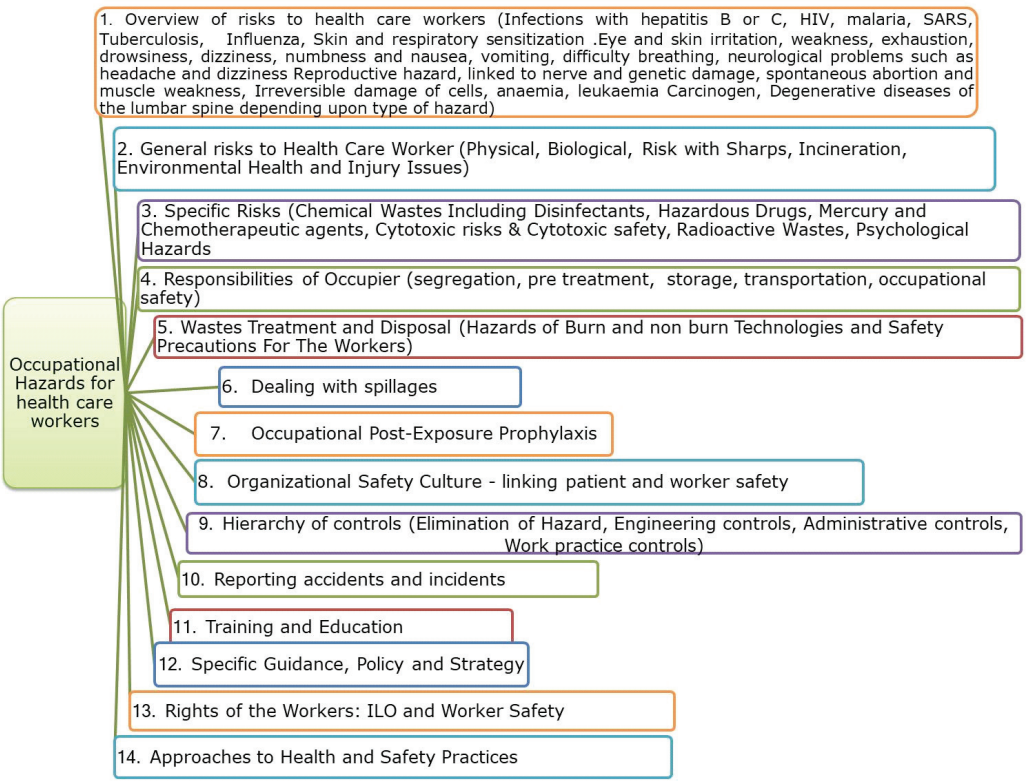


Fig. 1.3: Mind Map

This could include eliminating unnecessary injections and sharps use, and applying standard precautions (e.g. prohibiting the recapping of needles and ensuring safe disposal immediately after use). Provide free access to post-exposure prophylaxis for HIV and tuberculosis following an injury. Promote a "no blame" approach to incident reporting and monitor the quality of services provided. The summary for the concepts have been provided in the **Fig. 1.3**.

1.14 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. Biological, ergonomic, physical, radiological, chemical, behavioural

2. Across 4 ergonomic, 6. Physical

Down 1. Psychological, 2. Chemical, 3. biohazard 5. Radiological

Check Your Progress 2

a. Glutaraldehyde

b. Mercury

c. Ionising

Check Your Progress 3

1. Physical – injury/backaches/strains

b. Biological – infections from contaminated items

c. Incineration – POP's/mercury

d. Environmental – leachate/vector borne

Check Your Progress 4

1. "occupier" means a person having administrative control over the institution and the premises generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank, health care facility and clinical establishment, irrespective of their system of medicine and by whatever name they are called.

2. An "operator of a common bio-medical waste treatment facility" means a person who owns or controls a Common Bio-Medical Waste Treatment Facility (CBMWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste;

http://www.hse.gov.uk/pubns/web01.pdf

Check Your Progress 5

Type of Control	Action Taken
Engineering controls	isolate or remove a hazard from a workplace
Administrative controls	policies to limit exposure to a hazard
Work practice controls	controls that reduce exposure to occupational hazards through the behaviour of workers

1.15 REFERENCES AND FURTHER READINGS

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http://
www.emro.who.int/ceha

UNIT 2 PATIENT SAFETY

Structure

2.0 OBJECTIVES

After studying this unit, you should be able to:

- define patient safety
- discuss the need for patient safety
- describe the various requirements for patient safety
- restate the managerial aspects of patient safety
- recognise the importance of hospital acquired infections and the role of hospital infection control programme in handling patient safety issues

2.1 INTRODUCTION

Today's health care infrastructure is highly complex. Care is often delivered in a stressful and fast-moving environment, involving computerisation at every level of patient as well as health care provider. In such circumstances things can and do go wrong. Sometimes unintentional harm comes to a patient during a clinical procedure or as a result of a clinical decision. Errors in the process of care can result in injury. The harm that patients experience can be serious and occasionally patients are lost due to neglect.

Patient safety is a new health care discipline that lays emphasis on preventing, reducing, reporting and analysing medical errors that often leads to adverse health care events. The frequency and magnitude of avoidable adverse patient events was not well known until the 1990s, when multiple countries reported staggering numbers of patients harmed and killed by medical errors. Recognising that health care errors impact 1 in every 10 patients around the world, the World Health Organisation declared patient safety an endemic concern. Indeed, patient safety has emerged as a distinct health care discipline supported developing scientific framework. There is a significant research literature that discusses the science of patient safety. The resulting patient safety knowledge is utilised in improvement efforts such as: applying lessons learnt from business and industry, adopting innovative technologies, educating providers and consumers, enhancing error reporting systems, and developing new economic incentives.

Bio-medical waste is infectious in nature and it has the potential of transmitting infections to patients as well as health care providers. For example, improperly disposed needles and sharps may transmit infections. Therefore, bio-medical waste management emphasises proper segregation of this waste, its proper transport and disposal. In Oct. 2004, World alliance for Patient safety was formed, which identified certain challenges in relation to safety of patients and the first challenge was "Clean care is Safer Care" (2005).

Subsequently, a formal pledge committing to address healthcare associated infection in the country was signed by Government of India and by most of the states and a dedicated budget has been allocated for the same. Health-care associated infections can be kept under control by formulating stringent hospital infection control guidelines and BMW management is an integral part of the same. Bio-medical waste is waste of infectious nature and it has the potential of transmitting infections to patients as well as health care providers. For example, improperly disposed needles and sharps may transmit infections. Therefore, bio-medical waste management emphasises upon proper segregation of this waste, its proper transport and disposal.

In this unit, you will learn how to define patient safety, its need and the global scenario. It is important to bring about certain changes in the structural system to bring an improvement in health care.

2.2 PRINCIPLES OF PATIENT SAFETY

Patient safety is a fundamental element of health care and can be defined as freedom for a patient from unnecessary harm or potential harm associated with health care. Medical errors can occur during various modalities of

prevention, diagnosis, treatment and follow-up. Health care today is becoming increasingly complex and may include an array of complex procedures and processes, thereby increasing the probability of error.

Worldwide, adverse events occur in around 10% of hospital patients. Individual studies have reported adverse events from 4-17% of hospital admissions and 5-21% of these adverse events result in death. Evidence also suggests that half of these can be prevented. Adverse events in health care can occur due to a number of factors as mentioned in **Box 2.1**.

a. Failures due to unsafe clinical practices such as unsafe surgery, poor hand hygiene practices, unsafe use of injections, blood products, medication, medical devices, and many others;

b. Unsafe processes such as communication failures and ineffective teamwork, not applying the principles of human factor ergonomics in pursuing patient safety, poor patient handovers, misdiagnosis, poor test follow-up; and

c. Poor systems and processes within an organisational culture that do not contribute to safety; a culture of blame, with production pressures, without effective regulation or accountability mechanisms, poor training and education of its health care providers, and lack of organisational knowledge transfer and learning from adverse events.

Box 2.1: Causes of adverse events in health care

Improving patient safety thus requires a system-wide effort involving a wide range of actions in performance improvement, environmental safety and risk management, including infection control, safe use of medicines, equipment safety, safe clinical practice and providing a safe environment of care.

Concept of patient safety is explained in **Box 2.2**.

Patient safety is a discipline in the health care sector that applies safety science methods toward the goal of achieving a trustworthy system of health care delivery. Patient safety is also an attribute of health care systems; it minimises the incidence and impact of, and maximises recovery from, adverse events.

Box 2.2: Concept of Patient Safety

2.2.1 Need for Patient Safety

Let us look at the example of Ram, a 15-year old boy **(Box 2.3)** to understand need of patient safety.

Ram was a 15-year-old boy who arrived at the private clinic with **noisy breathing and itch.**

His father told the doctors, **that he was fine 30 minutes ago and that he just became unwell quite suddenly.**

On examination,

a. Ram looked distressed and nervous.

b. He had a puffy face, his lips were huge, and he could hardly open his eyes as they were so swollen.

c. He had red blotches on his skin and he was scratching his body.

d. Every time he breathed in, he made a noise.

Ram's father told that his son was like this once before after taking a medicine called penicillin and he was told never to have penicillin again because it could kill him.

Ram saw a doctor this morning because of a runny nose, sore throat and fever. The doctor prescribed amoxicillin, which Ram started earlier today.

Now in this case it seems that there has been some lapse at the end of the clinician. Had there been a proper history taken, the doctor could have easily picked up patient's allergic reaction to penicillin group of drugs and an alternative antibiotic could have been prescribed.

Box 2.3: Case history of Ram – lessons in patient safety

Did you know?

Patient safety as a discipline began in response to evidence that adverse medical events are widespread and preventable, and as noted above, that there is "too much harm." The goal of the field of patient safety is to minimize adverse events and eliminate preventable harm in health care.
Depending on one's use of the term "harm," it is possible to aspire to eliminate all harm in health care.

This is what patient safety is all about. It incorporates not only events related to infections acquired in hospital during stay /surgery but also requisite protocol before any drug prescription.

Patient safety is a relatively new discipline within the health care professions. It is a subject within heath care quality. However, its methods come largely from disciplines outside medicine, particularly from cognitive psychology, human factors engineering, and organisational management science. That, however, is also true of the bio-medical sciences that propelled medicine forward to its current extraordinary capacity to cure illnesses. Their methods came from biology, chemistry, physics, and mathematics, among others.

Some important points about patient safety are mentioned in **Box 2.4**.

a. Applying safety sciences to health care requires inclusion of experts with new source disciplines, such as engineering, but without any divergence from the goals or inherent nature of the medical profession.

b. Patient safety must be an attribute of the health care system.

c. It seeks high reliability under conditions of risk.

d. Illness presents the first condition of risk in health care. **Patient safety applies to the second condition: the therapeutic intervention.**

e. Patient safety demands design of systems to make risky interventions reliable.

f. Two tenets of complexity theory apply:

i. First, the greater the complexity of the system, the greater is the propensity for chaos.

ii. Second, in open, interacting systems, unpredictable events will happen.

g. The better the therapeutic design, the more resilient it is in the face of both predictable and unpredictable possible or impending failures, so they can be prevented or rescue can be achieved.

h. Safety systems include:

i. design of materials,

ii. procedures,

iii. environment,

iv. training, and

v. the nature of the culture

among people operating in the system.

Box 2.4: Patient safety – some considerations

The objectives of the patient safety strategy as defined by WHO are mentioned in **Box 2.5**.

The objectives of the patient safety strategy as defined by WHO are to:

a. improve the structural systems to support quality and efficiency of health care and place patient safety at the core of all levels of health care;

b. assess the nature and scale of harm to patients and establish a system of reporting and learning at the national level;

c. ensure a competent and capable workforce that is aware and sensitive to patient safety;

d. prevent and control healthcare associated infection;

e. improve implementation of global patient safety campaigns and strengthen patient safety in all health programmes;

f. strengthen capacity for and promote patient safety research.

Box 2.5: Objectives of patient safety as defined by WHO

2.2.2 Milestones in Development of Patient Safety

Globally although the concepts of patient safety were emerging in different regions, the major chronological events which occurred under the leadership of WHO have been depicted in the **Fig. 2.1**.

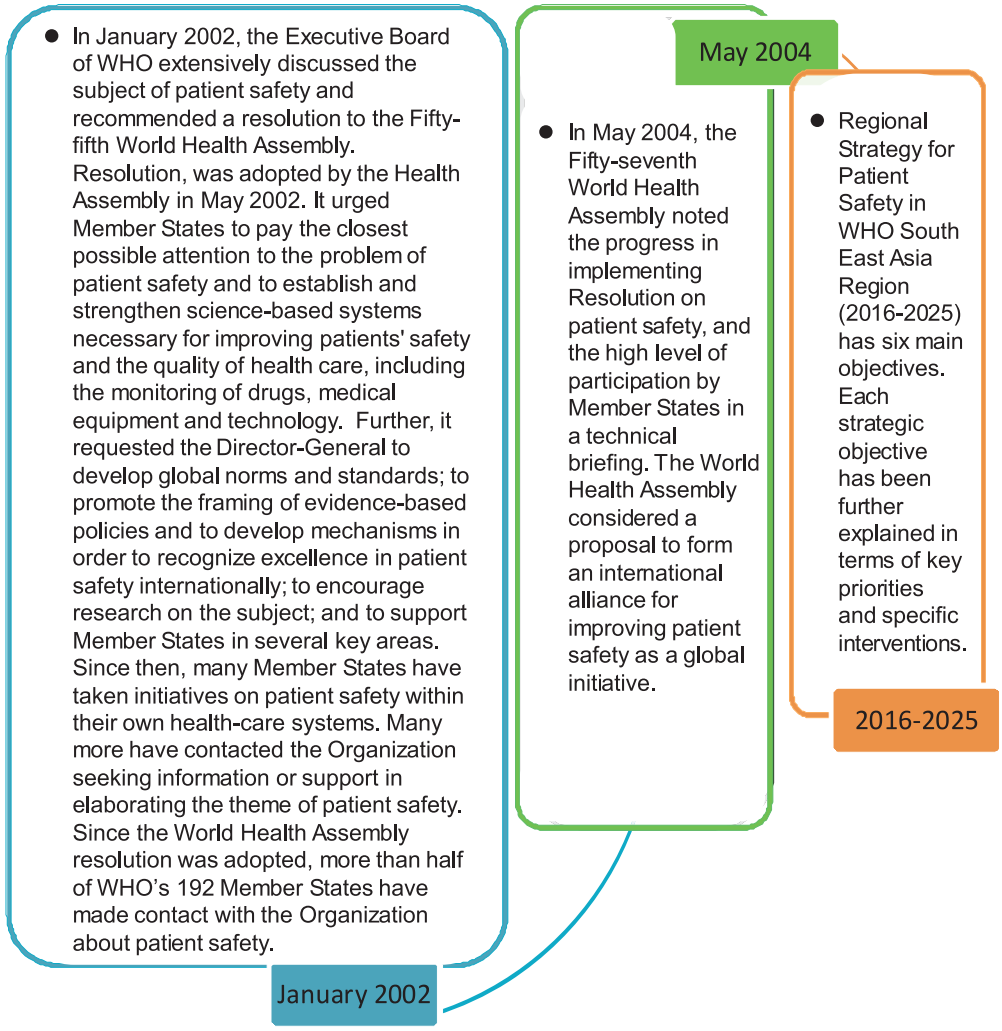

Fig. 2.1: Milestones in development of patient safety

Strategic objectives as defined by WHO are mentioned in **Box 2.6**.

Following are the strategic objectives:

Strategic Objective 1: To improve structural systems to support quality and efficiency of health care and place patient safety at the core at national, sub-national and health care facility levels.

Strategic Objective 2: To assess the nature and scale of adverse events in health care and establish a system of reporting and learning.

Strategic Objective 3: To ensure a competent and capable workforce that is aware and sensitive to patient safety.

Strategic Objective 4: To prevent and control healthcare associated infections.

Strategic Objective 5: To implement global patient safety campaigns and strengthening Patient Safety across all programmes.

Strategic Objective 6: To strengthen capacity for and promote patient safety research.

Box 2.6: Strategic objectives of patient safety as defined by WHO

Check Your Progress 1

1. Define patient safety.

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   .....

   .....

2. List the causes of adverse events in health care.

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Did you know?

In India Clinical Establishment Act (2010) has been enacted by the Central Government to provide for registration and regulation of all clinical establishments in the country with a view to prescribe the minimum standards of facilities and services provided by them. Such legal mechanisms assert the rights of patients to safe care. However, the uptake of this legal tool by states has been inadequate.

2.3 IMPROVE STRUCTURAL SYSTEM TO SUPPORT QUALITY AND EFFICIENCY OF HEALTH CARE

Patient safety should be articulated in the regulations and policies governing the health sector. It should translate and percolate into patient safety components in all programmes as well. Patient safety along with Quality Assurance and Accreditation is cross cutting systems issue and needs to be ensured for patient centric care.

Institute of Medicine (IOM) considers patient safety "indistinguishable from the delivery of quality health care."

Quality assurance means maintaining a high quality of health care by constantly measuring the effectiveness of the organisations that provide it (**Box 2.7**).

Did you know?

Ancient philosophers such as Aristotle and Plato contemplated quality and its attributes.

a. refers to activities and programmes intended to "assure" or promise improvement in quality of care in a defined medical setting or programme.

b. it involves assessing or evaluating quality;

c. identifying problems or issues with care delivery and designing quality improvement activities to overcome them; and

d. follow-up monitoring to make sure the activities did what they were supposed to.

Box 2.7: Quality assurance in reference to patient safety

There should be a hospital quality programme in the health care facilities which should identify problems and help take corrective actions. Some of the solutions could be staff trainings or equipment replacement or maintenance. Many patient safety practices, such as use of simulators, bar coding, computerised physician order entry, and crew resource management, have been considered as possible strategies to avoid patient safety errors and improve health care processes.

Hospital accreditation is an important way to monitor the quality of services available and being offered in the health care institutions **(Box 2.8)**.

> Hospital accreditation has been defined as "A self-assessment and external peer assessment process used by health care organisations to accurately assess their level of performance in relation to established standards and to implement ways to continuously improve."

Box 2.8: Definition of hospital accreditation

Hospital quality assurance systems are operational control systems intended to fulfill specific expectations for treating patients. A comprehensive definition of quality health care is given in **Box 2.9**.

> "The optimal achievable result for each patient, the avoidance of physician-induced (iatrogenic) complications, and attention to patient and family needs in a manner that is both cost effective and reasonably documented."

Box 2.9: Definition of quality health care

Accreditation improves risk management and risk reduction and helps organise and strengthen patient safety efforts and creates a culture of patient safety. Not only does it enhance recruitment and staff education and development, it also assesses all aspects of management and provides education on good practices to improve business operations.

Did you know?

Some of the accreditation bodies are NABH, MCI.

The programmes/standards of NABH, JCL etc. focus on parameters as mentioned in **Box 2.10**.

a. Patient-centered standards – functions related to providing patient care

- Access to care and continuity of care–access, assessment, and continuity of care
- Patient and family rights – patient rights and education
- Patient and family education
- Assessment of patients – management of medication
- Care of patients

b. Health care organisation and management standards

Functions related to providing a safe, effective, and well-managed organisation

- Quality improvement and patient safety – continuous quality improvement
- Prevention and control of infection – hospital infection control
- Governance, leadership, and direction – responsibilities of management
- Facility management and safety
- Staff qualifications and education – human resource management
- Management of information – information management system

Box 2.10: Parameters for programmes/standards

Check Your Progress 2

1. How can the problems be identified and sorted out regarding patient safety in health care facilities?

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   .....

   .....

2.4 ADVERSE EVENT REPORTING AND SURVEILLANCE OF PATIENT SAFETY ERRORS

Errors in health care could be due to the factors as listed in the **Box 2.11**.

Errors in health care could be due to the following factors:
a. medical communication errors
b. management errors
c. errors of judgement

Box 2.11: Causes of adverse events

The errors occur because health care settings are overworked and understaffed. Harvard Medical Practice Study defined an adverse event as (See **Box 2.12**).

> "an injury that was caused by medical management (rather than the underlying disease) and that prolonged the hospitalisation, produced a disability at the time of discharge, or both."

Box 2.12: Definition of adverse event (Medical Practice Study)

The Institute for Health Care Improvement uses a similar definition: (See **Box 2.13**).

> "unintended physical injury resulting from or contributed to by medical care (including the absence of indicated medical treatment), that requires additional monitoring, treatment, or hospitalisation, or that results."

Box 2.13: Definition of adverse event (Institute of Health Care Improvement)

Errors are defined as (See **Box 2.14**).

> "an act of commission (doing something wrong) or omission (failing to do the right thing) leading to an undesirable outcome or significant potential for such an outcome."

Box 2.14: Definition of errors

In a **near miss,** an error was committed, but the patient did not experience clinical harm, either through early detection or sheer luck.

In a system oriented towards patient safety it is essential to capture above adverse events to get aggregate indicators at national level as well as help clinical learning and improvement at local level.

The various ways in which the adverse events could be prevented are enumerated in **Box 2.15**.

a.	**Patient Safety Management in health facilities:**
i.	**Risk Management** is a process by which we identify factors which may prevent provisioning of safe, efficient and effective care. The aim of risk management is to ensure risks are identified early, assessed so as to manage or control them and to reduce their effect.
ii.	**Identifying and reporting safety issues** early ensures that the controls can be put in place to reduce the likelihood of the risks occurring again. When an outcome of care or a process occurs which is not as expected (such as unintended harm) it should be investigated by Root Cause Analysis to identify what happened and why. This improves safety standards in the health care facility.
iii.	**A Risk Management and Patient Safety team** should be formed at every institution/health care facility which should work closely to identify their risks, acting as a resource and providing advice and support on all aspects of risk management. Patient safety teams should also have linkages with patient experience and complaints systems.
b.	**Incident Reporting**
i.	**Incident reporting** is a way by which events are captured which have the potential to cause harm or affect service delivery as well as actual events that occur. The aim of an effective reporting system is to have the number of reports over time increasing, but the severity of the reported risks going down. This indicates that staff are risk aware and are spotting risks before they can cause harm.
ii.	**The Patient Safety Indicators (PSIs)** are a set of indicators providing information on potential in hospital complications and adverse events following surgeries, procedures, and childbirth. The incidents to be reported are as follows:
	• Surgical events - Wrong body part, wrong side, patients, wrong surgery • Accidental Puncture or Laceration • Birth Trauma – Injury to Neonate • Complications of Anaesthesia

- Death in Low - Mortality DRGs
- Decubitus Ulcer
- Failure to Rescue
- Foreign Body Left During Procedure
- Iatrogenic Pneumothorax
- Obstetric Trauma – Vaginal with Instrument
- Obstetric Trauma – Vaginal without Instrument
- Obstetric Trauma – Caesarean Delivery
- Postoperative Hip Fracture
- Postoperative Haemorrhage or Haematoma
- Postoperative Physiologic and Metabolic Derangements
- Postoperative Respiratory Failure
- Postoperative Pulmonary Embolism or Deep Vein Thrombosis
- Postoperative Sepsis
- Postoperative Wound Dehiscence
- Selected Infections Due to Medical Care
- Transfusion Reaction

c. Monitoring Requirements

- There should be both internal monitoring and external monitoring systems.
- Internal monitoring systems are at facility level to improve reporting and learning for local action.
- External monitoring systems can be through accreditation or certification systems.
- There can also be national level reporting systems for health care facilities to enable monitoring of national level aggregates as well as to allow facilities check progress against national standards and to ensure that any changes required to improve compliance are completed.

Box 2.15: Preventing adverse events

Check Your Progress 3

Match the correct options.

Adverse event	An error was committed, but the patient did not experience clinical harm, either through early detection or sheer luck.
Errors	The optimal achievable result for each patient, the avoidance of physician-induced (iatrogenic) complications, and attention to patient and family needs in a manner that is both cost effective and reasonably documented.

Near miss	an injury that was caused by medical management (rather than the underlying disease) and that prolonged the hospitalisation, produced a disability at the time of discharge, or both."
Hospital accreditation	"An act of commission (doing something wrong) or omission (failing to do the right thing) leading to an undesirable outcome or significant potential for such an outcome."
Quality health care	A self-assessment and external peer assessment process used by health care organisations to accurately assess their level of performance in relation to established standards and to implement ways to continuously improve.

2.5 TRAINING OF HEALTH CARE FORCE

With the recognition that to improve safety in health care, system changes are necessary by creating a healthy health care workplace has become the target of major world-wide efforts, autonomy, empowerment, leadership, organisational structure, resources, workload, relationships and professional development are important factors contributing to a healthier health care workplace.

A healthy workplace is defined as (See **Box 2.16**).

> A healthy workplace is defined as one in which HCWs are able to deliver higher quality care, and worker health and safety and patient health and safety are mutually supportive.

Box 2.16: Definition of workplace

An important part of promoting patient safety must therefore focus on how to promote a healthy health care workplace. Both pre-service and in-service training of health care workers like doctors, nurses, paramedics should also include elements of patient safety. The following steps need to be followed for any training programme.

1. **Assessment of training needs**

   It is important to assess the training needs before the training programme can be planned. The training needs assessment should

   a. identify the knowledge, skills experience and the motivational level of the trainees

   b. identify the availability of resources like trained personnel, time, space and other resources technical resources which may be required.

2. **Setting goals objectives and outcomes**

3. **Designing the training programme -** The methodology, the place and the duration are decided, in addition to the characteristics of the target group and the content of the training programme

4. **Conducting the training programme**

5. **Evaluation of the training programme**

2.6 INFECTION PREVENTION AND CONTROL

"Hospital acquired infection" or healthcare acquired infections, can be defined as (See **Box 2.17**).

> An infection acquired in hospital by a patient who was admitted for a reason other than that infection which develops after 48 hrs. of admission.

Box 2.17: Definition of healthcare acquired infection

An infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility Patient care is provided in facilities which range from highly equipped clinics and technologically advanced university hospitals to front-line units with only basic facilities. Despite progress in public health and hospital care, infections continue to develop in hospitalised patients, and may also affect hospital staff.

Factors that promote infection among hospitalised patients are mentioned in **Box 2.18**.

Many factors promote infection among hospitalised patients:

a. Decreased immunity among patients; the increasing variety of medical procedures and invasive techniques creating potential routes of infection; and

b. The transmission of drug-resistant bacteria among crowded hospital populations, where poor infection control practices may facilitate transmission.

Box 2.18: Factors promoting infection among hospitalised patients

Did you know?

Since bio-medical waste is potentially infectious waste it harbours infectious agents and should be handled scientifically as per Bio-Medical Waste Management Rules/ Regulation. Bio-medical waste if mixed with general waste renders it infectious. Therefore, proper segregation, collection, transport of bio-medical waste is must. For safety of health care staff it needs to be vaccinated for Hep B and Tetanus.

You have already read about the healthcare acquired infections in Unit 18, Block 1 of BHME-102. We shall discuss more about these infections from the perspective of patient safety.

Just to recap, the prevention of these infections, requires an integrated, monitored, programme is mentioned in **Box 2.19**.

The prevention of these infections, requires an integrated, monitored, programme which includes the following key components:

a. Limiting transmission of organisms between patients in direct patient care through adequate hand washing and glove use, and appropriate aseptic practice, isolation strategies, sterilisation and disinfection practices, and laundry

b. Controlling environmental risks for infection

c. Protecting patients with appropriate use of prophylactic antimicrobials, nutrition, and vaccinations

d. Limiting the risk of endogenous infections by minimising invasive procedures, and promoting optimal antimicrobial use

e. Surveillance of infections, identifying and controlling outbreaks

f. Prevention of infection in staff members

g. Enhancing staff patient care practices, and continuing staff education.

Box 2.19: Strategies for prevention of healthcare infections

Infection control is the responsibility of all health care professionals– doctors, nurses, therapists, pharmacists, engineers and others.

Infection control precautions "Standard precautions" require that health care workers assume that the blood and body substances of all patients are potential sources of infection, regardless of the diagnosis, or presumed infectious status. Additional precautions are needed for diseases transmitted by air, droplets and contact. These are termed "additional (transmission-based) precautions". The terms "standard precautions" and "additional (transmission-based) precautions" have replaced previous terms such as universal blood and body fluid precautions, universal precautions and barrier nursing.

Treating all patients in the health care facility with the same basic level of "standard" precautions involves work practices that are essential to provide a high level of protection to patients, health care workers and visitors. These include the following (See **Box 2.20**).

a. Hand washing and antisepsis (hand hygiene);

b. Use of personal protective equipment when handling blood, body substances, excretions and secretions;

c. Appropriate handling of patient care equipment and soiled linen;

d. Prevention of needlestick/sharp injuries;

e. Environmental cleaning and spills-management;

f. Appropriate handling of waste.

Box 2.20: Elements of standard precautions

2.7 GLOBAL PATIENT SAFETY CAMPAIGNS

Government of India launched Swatcha Bharath Abhiyan since cleanliness in Public health care facilities are critical in preventing infections and providing patients and visitors with positive experience. As the first principle of health care is "to do no harm" it is essential to have our health care facilities clean and to ensure adherence to infection control practices. To complement this effort, the Health and Family Welfare, Government of India has launched a national initiative – Kayakalp to give awards to public health facilities that demonstrate high levels of cleanliness, hygiene n infection control. Kayakalp aims to promote cleanliness and enhance the quality of public health facilities. For reading more on the Kayakalp programme refer to BHM-102, Block 1, Unit 17.

There are several vertical themes within which patient safety needs to be a key component. These themes are injection safety, blood safety, safe surgeries, child birth safety, transplant safety, medication and medical device safety.

2.7.1 Safe Injections

A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in any waste that is dangerous for other people. Among unsafe practices, the re-use of syringes and/or needles without sterilisation is of particular concern. Injection-associated transmission of bloodborne pathogens can be prevented through the development of a strategy to reduce injection overuse and achieve injection safety and its implementation by a national coalition, with the assistance of a coordinator. Let us understand these with the help of below given cases.

Did you know?

Worldwide, each year, the overuse of injections and unsafe injection practices combine to cause an estimated 8 to 16 million hepatitis B virus infections, 2.3 to 4.7 million hepatitis C virus infections and 80,000 to 160,000 HIV infections.

The elements of a strategy for the safe and appropriate use of injections are described below in **Box 2.21**.

a. Behaviour change among patients and health care workers to decrease injection overuse and achieve injection safety

b. The foundation for the safe and appropriate use of injections is a behaviour change strategy targeting consumers as well as public, private and health care workers. Important activities include:

   i. Development of a national communication and behaviour change strategy on the basis of behaviour and systems analysis

   ii. Definition of national standards for safe injection practices

   iii. Incorporation of injection safety into minimum standards of care

   iv. Promotion of safe technologies including AD(autodisable)/ RUP(reuse prevention)/SIP(sharp injury prevention) syringes

   v. Promotion of the rational use of injections within essential drug programmes

   vi. Addressing issues that may lead to poor injection practices, including attitudes, emotions, incentives, beliefs, power relationship, norms and systems.

c. The availability of necessary equipment and supplies, namely a transition to the exclusive use of WHO prequalified AD/RUP/SIP syringes for therapeutic injections;

d. Eradication of the re-use of syringes and needles without sterilisation requires the continuous, sufficient availability of injection equipment and infection control supplies in all health care facilities. Important activities include:

   i. Introducing AD/RUP/SIP for most medical injections

   ii. Selection of appropriate types of syringes and needles for curative care (sterilisable, disposable or auto-disable)

   iii. Enforcement of international norms and standards by the national regulatory authority

iv. Central bulk procurement of injection equipment and infection control supplies, including safety boxes

e. Central management of storage

f. Efficient distribution system to ensure continuous, sufficient availability in all health care facilities nationally

g. The management of sharps waste – The efficient, safe and environmentally-friendly management of sharps waste is the only means of ensuring that disposable syringes and needles are not re-used and do not lead to accidental needlestick injuries. Important activities include:

i. Formulation of a policy stating that disposal is part of the syringe lifecycle and that health care services have a duty to manage sharps waste

ii. Assessment of the waste management system, including expressed and real needs

iii. Selection of appropriate waste disposal systems for all levels of health-care facilities

iv. Implementation of a regulatory framework

v. Identification of human and financial resources required

vi. Implementation of a waste management system

vii. Training and supervision

Box 2.21: Strategy for safe and appropriate use of injections

2.7.2 Blood Safety

About 112.5 million blood donations are collected worldwide. There is a marked difference in the level of access to blood between low- and high-income countries. WHO recommends that all blood donations should be screened for infections prior to use. Blood screening should be performed according to the quality system requirements. Unnecessary transfusions and unsafe transfusion practices expose patients to the risk of serious adverse transfusion reactions and transfusion-transmissible infections. Unnecessary transfusions also reduce the availability of blood products for patients who are in need. WHO recommends the development of systems, such as hospitals transfusion committees and haemovigilance, to monitor and improve the safety of transfusion processes.

There are great variations between countries in terms of the age distribution of transfused patients. For example, in the high-income countries, the most frequently transfused patient group is over 65 years of age, which accounts for up to 76% of all transfusions. In the low-income countries, up to 65% of transfusions are for children under the age of 5 years.

In high-income countries, transfusion is most commonly used for supportive care in cardiovascular surgery, transplant surgery, massive trauma, and

therapy for solid and haematological malignancies. In low- and middle-income countries it is used more often to manage pregnancy-related complications and severe childhood anaemia.

The risk of transmission of serious infections, including HIV and hepatitis, through unsafe blood and chronic blood shortages brought global attention to the importance of blood safety and availability. With the goal of ensuring universal access to safe blood and blood products and to improve blood safety and availability, WHO recommends the following integrated strategy for blood safety and availability (See **Box 2.22**).

WHO recommends the following integrated strategy for blood safety and availability:

a. **Establishment of a national blood system** with well-organised and coordinated blood transfusion services, effective evidence-based and ethical national blood policies, and legislation and regulation, that can provide sufficient and timely supplies of safe blood and blood products to meet the transfusion needs of all patients.

b. **Collection of blood, plasma and other blood components** from low-risk, regular, voluntary unpaid donors through the strengthening of donation systems, and effective donor management, including care and counselling.

c. **Quality-assured screening** of all donated blood for transfusion-transmissible infections, including HIV, hepatitis B, hepatitis C and syphilis, malaria, confirmatory testing of the results of all donors screen-reactive for infection markers, blood grouping and compatibility testing, and systems for processing blood into blood products (blood components for transfusion and plasma derived-medicinal products), as appropriate, to meet health care needs.

d. **Rational use of blood and blood products** to reduce unnecessary transfusions and minimise the risks associated with transfusion, the use of alternatives to transfusion where possible, and safe and good clinical transfusion practices, including patient blood management.

e. **Step-wise implementation of effective quality systems**, including quality management, standards, good manufacturing practices, documentation, training of all staff, and quality assessment.

Box 2.22: Strategy for blood safety and availability

2.7.3 Safe Surgical Care

Surgery is often the only therapy that can alleviate disabilities and reduce the risk of death from common conditions. Every year, many millions of people undergo surgical treatment, and surgical interventions account for an estimated 13% of the world's total disability-adjusted life years (DALYs).

While surgical procedures are intended to save lives, unsafe surgical care can cause substantial harm **(Box 2.23)**:

a. The reported crude mortality rate after major surgery is 0.5-5%;

b. Complications after inpatient operations occur in up to 25% of patients;

c. In industralised countries, nearly half of all adverse events in hospitalised patients are related to surgical care;

d. At least half of the cases in which surgery led to harm are considered preventable.

Box 2.23: Harm caused by surgeries

WHO's second Global Patient Safety Challenge "Safe Surgery Saves Lives" set about to improve the safety of surgical care around the world by defining a core set of safety standards that could be applied. For implementing surgical checklist and standard indicators a national plan is needed for surgical services at primary, secondary and tertiary care of health care system. The checklist is mentioned in **Fig. 2.2**.

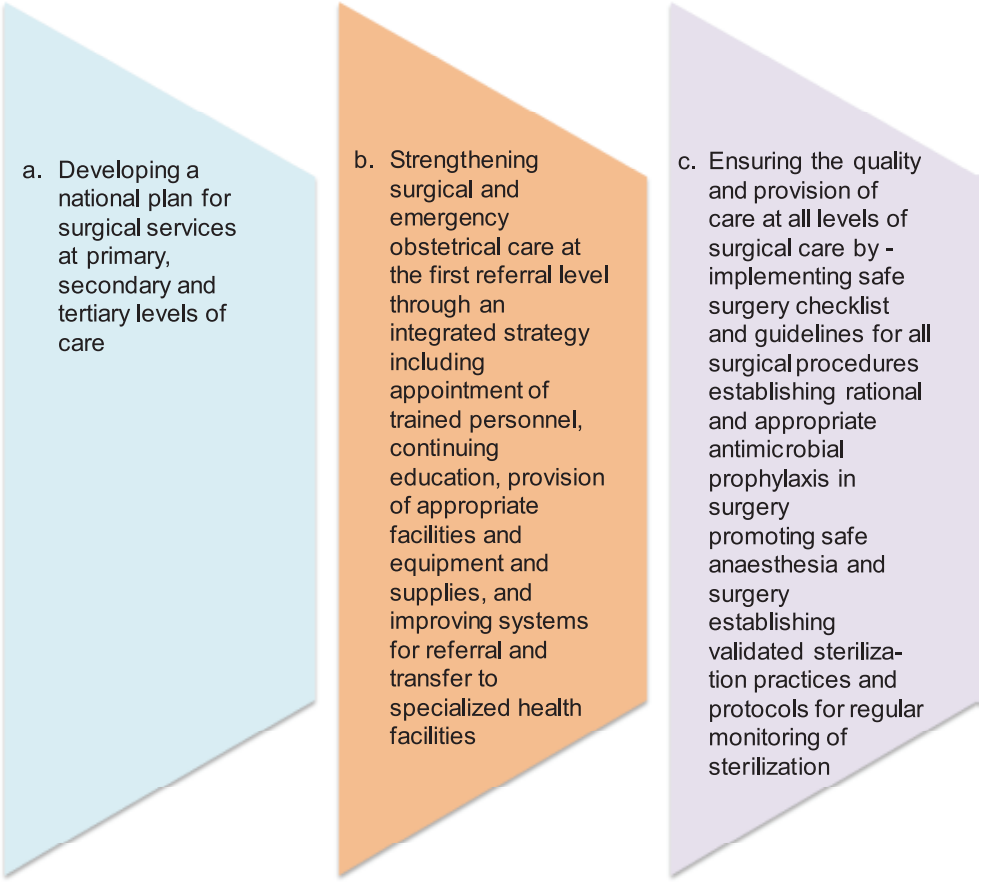

Fig. 2.2: Surgical checklist and standard indicators for patient safety as advocated by WHO

2.7.4 Safe Childbirth

Of the more than 130 million births occurring each year, an estimated 303,000 result in the mother's death, 2.6 million in stillbirth, and another 2.7 million in a newborn death within the first 28 days of birth. The majority of these deaths occur in low-resource settings and most could be prevented. Basic standards of care at all levels from primary health care to higher referral levels are set up. Tools like childbirth checklist support the delivery of essential maternal and perinatal practices.

The interventions are mentioned in **Fig. 2.3**.

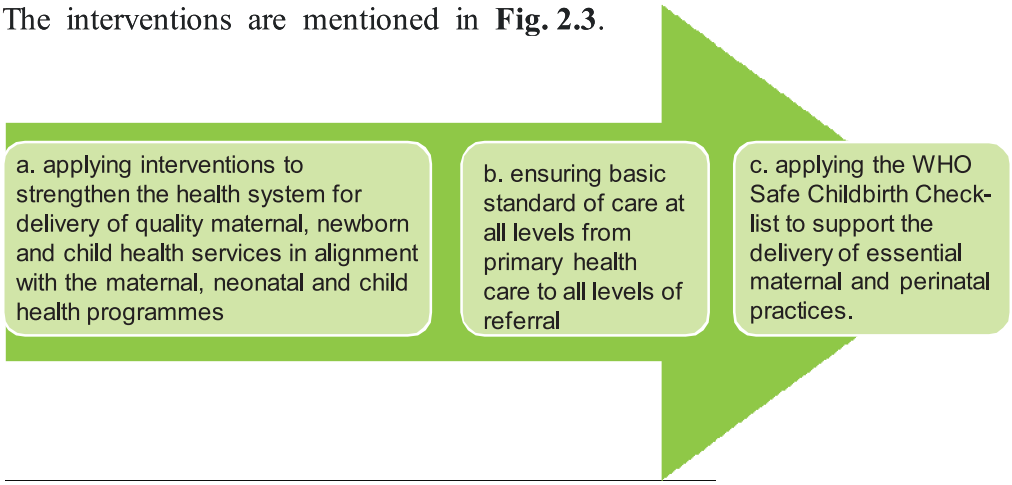

Fig. 2.3: Interventions for safe childbirth

2.7.5 Safe Organ Transplant

Human organ and tissue transplantation is end-stage therapy for diseases that cannot be treated by other means where successful outcomes require high levels of expertise, selection of correct donor and careful monitoring of recipient and recipient compliance. The transplantation of human organs, tissues and cells has led to concerns with respect to the direct transmission of communicable disease, control of processing and ensuring clinical safety and effectiveness. In addition, there are several ethical issues in consideration, therefore to ensure safety of patients the following is needed (**Box 2.24**).

a. National organ transplantation programme and comprehensive legislation for all organs, tissues and cells for transplantation

b. Health system - physical infrastructure and skilled human resource to meet the multidisciplinary requirements of transplantation with quality and safety as the fundamental principles

c. Effective oversight mechanism to assure compliance with national regulations on organ transplantation

d. Deceased donor organ programme to enhance availability of organs

e. Community awareness to overcome religious, social and cultural myths associated with organ donation and stimulating altruistic feelings in the community developing alliances between institutions within and outside the country for cooperation in legal, ethical and technical aspects; and instituting regulations of health tourism to inhibit illegal organ trafficking.

Box 2.24: Interventions in organ transplantation for patient safety

2.7.6 Medication Safety

Selection and use of medicines have a major impact on the quality of care and patient safety. Inappropriate selection of medicines and their use can cause considerable harm and is a frequent cause of medical error. Irrational use of antibiotics can lead to resistance in microbes and at times the organisms can develop resistance to all the available antibiotics. A regional strategy to control antimicrobial resistance was developed. Medication error can also occur due to miscommunication during handovers and the presence of sound-alike look-alike drugs causing inadvertent mistakes in drug

administration. These are patient safety issues and need to be addressed. Safe medication guidelines are enumerated in **Box 2.25**.

a. A medicines policy including medication safety along with a system/programme for medication safety

b. National formulary of essential medicines

c. National standard treatment guidelines for common conditions

d. Regulatory mechanisms to ensure the quality of drugs and including Pharmaco-vigilance as well as drug-testing laboratories

e. Procurement systems of medicines to ensure quality

Box 2.25: Safe medications guidelines

Case Study 02 - Methadone overdose

When Madan presented himself at the methadone clinic, there were three nurses on duty. Two of the nurses failed to identify Madan properly and administered methadone without paying proper attention to the dose.

The dose of methadone given was 150 mg when it should have been 40 mg. The nurses also failed to notify the treating doctor when they became aware of the excessive dose. They then instructed the third nurse to give Madan a take-home dose of 20 mg, despite being aware of the excessive dosage and without the authorisation of the medical practitioner. Madan died in the early hours of the following morning of methadone poisoning.

2.7.7 Medical Device Safety

WHO estimates that at least 50% of medical equipment in developing countries is unusable or only partly usable, in some situations even upto 75-80%. Often the equipment cannot be utilised due to inappropriate selection and lack of supporting skills or commodities. As a result, diagnostic procedures or treatments are affected. In order to ensure device safety the following needs to be ensured (See **Box 2.26**).

a. Policy on health technology (medical devices) in collaboration with all stakeholders (manufacturers, importers, users and the public)

b. Capacity for health technology assessment, management and regulation and establishing/strengthening health technology assessment to inform the use of health technology

c. Strengthen national medical device regulatory body or monitoring programme

d. Manufacturing in conformity with applicable quality system standards

e. Public awareness on safe, quality, affordable and sustainable products

f. Policies and protocols for the reuse of medical devices

Box 2.26: Ensuring medical device safety

Check Your Progress 4

1. What is a safe injection?

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2. What is the donated blood screened for ?

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3. What medical errors can result from medication prescription?

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2.8 LET US SUM UP

In this unit, you have read about the errors that can occur in the health care facilities that may cause grave harm to the health of a patient. All these can be prevented by adopting simple measures. The concept of patient safety is relatively new and emerging. The various areas which require to focus our attention are – Injection safety, Blood safety, Safe surgical care, Safe child birth, Safe Organ transplant, Medication safety and Medical Device safety. Equally important is the safe and proper management of health care waste to prevent the occurrence of healthcare associated infection.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. Patient safety is defined as freedom for a patient from unnecessary harm or potential harm associated with health care.

2. The causes of adverse events in health care are:

   a. failures due to unsafe clinical practices

   b. unsafe processes such as communication failures and ineffective teamwork

   c. poor systems and processes within an organisational culture that do not contribute to safety

Check Your Progress 2

1. Each hospital should have a hospital quality programme which should identify problems and help take corrective actions. Accreditation of hospitals is another important aspect for ensuring quality. Some of the points in a hospital quality programme could be
   a. staff trainings
   b. equipment replacement or maintenance.
   c. use of simulators
   d. bar coding
   e. computerised physician order entry
   f. crew resource management

Check Your Progress 3

Adverse event	An injury that was caused by medical management (rather than the underlying disease) and that prolonged the hospitalisation, produced a disability at the time of discharge, or both."
Errors	"An act of commission (doing something wrong) or omission (failing to do the right thing) leading to an undesirable outcome or significant potential for such an outcome."
Near miss	An error was committed, but the patient did not experience clinical harm, either through early detection or sheer luck
Hospital accreditation	A self-assessment and external peer assessment process used by health care organisations to accurately assess their level of performance in relation to established standards and to implement ways to continuously improve
Quality health care	The optimal achievable result for each patient, the avoidance of physician-induced (iatrogenic) complications, and attention to patient and family needs in a manner that is both cost effective and reasonably documented

Check Your Progress 4

1. A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in any waste that is dangerous for other people.
2. Donated blood for transfusion-transmissible infections, including HIV, hepatitis B, hepatitis C and syphilis, confirmatory testing of the results of all donors screen-reactive for infection markers, blood grouping and compatibility testing.
3. The errors during medicine prescription could be
   a. Inappropriate selection of medicines
   b. Resistance in microbes due to Irrational use of antibiotics
   c. Miscommunication during handovers
   d. Presence of sound-alike look-alike drugs causing inadvertent mistakes in drug administration.

2.10 REFERENCES AND FURTHER READINGS

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NOTES

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