UNIT 6  BIO-MEDICAL WASTE MANAGEMENT AND INFECTION CONTROL

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6.0  INTRODUCTION

'Bio-medical waste' means any solid and/or liquid waste which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research pertaining thereto or in the production or testing
thereof. Biomedical waste if not handled, treated or managed properly it is risk to human health and pollute to the environment. In developed countries, around 1–5 kg per bed per day of waste is generated every day. In India, this figure is about 1–2 kg per bed per day with variation among government and private establishments. Out of total BMW generated in India, less than 57% waste undergoes proper disposal. It is the duty of every owner of an institution generating bio-medical waste which include hospitals, nursing home, clinic dispensary, veterinary institution, animal house, pathological laboratory, blood bank etc. by whatever name called to take all steps to ensure that such waste is handled without any adverse effect to human health and environment.

The aim of any healthcare setting it to provide health service to its patients without any complication and suffering. However, hospital acquire infections are common occurrence which lead to delay in recovery, extra cost to patients and hospital, and sometime deaths. This is also observed that such problems can be avoided by proper and simple infection control measures.

### 6.1 OBJECTIVES

After completing this unit, you should be able to:

- discuss the risk of waste and need of biomedical waste management;
- explain importance of infection control; and
- describe the various methods of bio-medical waste management and infection control.

### 6.2 BIO-MEDICAL WASTE MANAGEMENT

As defined above the bio-medical waste is the waste generated in healthcare settings and can transmit infections to healthcare workers and patients therefore its management is important for health and safety of its worker. It can also transmit infection and cause injuries to general public and environment if thrown without proper treatment. Therefore Bio-medical waste management and handling rule 1998 under the Environment Protection Act 1986 was launched and amended later on many times. The most recent rules are enacted in 2016 as Bio-medical Waste Management Rules, 2016 which provides guidelines to manage such waste in the manner which is not hazardous to human beings and environment.

#### 6.2.1 Types of Waste

Majority of waste produced in health care facilities is non-hazardous waste. Only a small percentage is harmful waste that needs to be properly treated so that it is rendered harmless.

As per WHO, of the total amount of waste generated by health-care activities, about 85% is general, non-hazardous waste. The remaining 15% is considered hazardous material that may be infectious, toxic or radioactive.
6.2.2 Sources of Bio-Medical Waste

There are almost everyplace of healthcare setting where waste is generated. But not all waste is hazardous and need special treatment.

<table>
<thead>
<tr>
<th>Major Sources</th>
<th>Minor Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Hospitals</td>
<td>a) Clinics</td>
</tr>
<tr>
<td>b) Labs</td>
<td>b) Dental clinics</td>
</tr>
<tr>
<td>c) Research centers</td>
<td>c) Home care</td>
</tr>
<tr>
<td>d) Animal research</td>
<td>d) Cosmetic clinics</td>
</tr>
<tr>
<td>e) Blood banks</td>
<td>e) Paramedics</td>
</tr>
<tr>
<td>f) Nursing homes</td>
<td>f) Funeral services</td>
</tr>
<tr>
<td>g) Mortuaries</td>
<td>g) Institutions</td>
</tr>
<tr>
<td>h) Autopsy centers</td>
<td>h) First aid room of schools</td>
</tr>
<tr>
<td>i) Immunization sites (Outreach)</td>
<td></td>
</tr>
</tbody>
</table>

6.2.3 Goals of Bio-Medical Waste Management

Most of the waste generated can be infectious or hazardous to patients, healthcare worker or community and should be managed properly. Goals of the Biomedical waste management are as follows:

1) To reduce the infectious/hazardous nature of the waste
2) To reduce the volume of the waste
3) To prevent misuse or abuse of the waste
4) To ensure occupational safety and health of health workers
5) To reuse the items that can be of repeat utility
6.2.4 Steps of Bio-Medical Waste Management

1) Segregation
2) Collection and storage
3) Packaging
4) Transport
5) Treatment
6) Disposal
7) Maintain records/returns/accidents/follow-ups

6.2.5 Flow of Bio-Medical Waste Management

Check Your Progress 1

1) Explain types of wastes.

2) List source of Bio-Medical wastes.

3) List steps in Bio-Medical Waste Management.
6.3  BIO-MEDICAL WASTE MANAGEMENT RULES, 2016

These rules are applicable on all persons who generate, collect, receive, store, transport, treat, dispose or handle BMW in any form. The rules have 4 schedules as shown below which has guidelines for BMW management.

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>biomedical wastes categories and their segregation, collection, treatment, processing and disposal options</td>
</tr>
<tr>
<td>II</td>
<td>standards for treatment and disposal of bio-medical wastes</td>
</tr>
<tr>
<td>III</td>
<td>list of prescribed authorities and the corresponding duties</td>
</tr>
<tr>
<td>IV</td>
<td>label for bio-medical waste containers or bags, label for transporting bio-medical waste bags or containers</td>
</tr>
</tbody>
</table>

6.3.1 Segregation of Waste

It is the most crucial step in BMW management. It is to be done at the site of generation of BMW. Waste segregation is the process of keeping source separated wastes apart during handling, accumulation interim storage, storage and transport and to assist recovery (reuse, recycling and energy recover), and ensure appropriate designated treatment and disposal. Waste is then labelled for name of department, date, time, transportation site etc. It is responsibility of the waste producer to segregate the waste at the site of waste generation itself. Segregation is done in colour coded bags as explained later.

Rules for segregation

The segregation is important for waste management. The waste is categorise according to the treatment option therefore segregation should be carried out according to colour coded container/liner.

1) Segregation should be done at source
2) Location of container should be determined on the basis of categories of waste generated.
3) Instruction should be pasted at each waste collection point
4) If non-hazardous and hazardous waste are accidentally mixed, the entire should be treated as hazardous waste
5) Should never attempt correction of errors of segregation

Benefits of segregation

1) Minimised the amount of potentially hazardous waste
2) Enabling better accounting within health care institution
3) Reduce occupational health and safety risks
4) Improve infection control within the health care facility
5) Facilitate proper packing and labelling of wastes
6) Establishes uniform waste management practices,
7) Increase the patients and their relative participation.
### 6.3.2 Categories of Bio-Medical Waste

BMW is segregated in 4 categories depending upon the treatment options.

<table>
<thead>
<tr>
<th>Category</th>
<th>Colour of Bag</th>
<th>Type of Waste Disposed</th>
<th>Treatment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Yellow</td>
<td>Human Anatomical Waste, Animal Anatomical Waste, Soiled Waste, Expired or Discarded Medicines, Chemical Waste, Chemical Liquid Waste, Microbiology, Biotechnology and other clinical lab waste</td>
<td>Incineration, plasma pyrolysis or deep burial*</td>
</tr>
<tr>
<td>Category 2</td>
<td>Red</td>
<td>Contaminated Waste (Recyclable)</td>
<td>Autoclaving or microwave/ hydroclaving followed by shredding or mutilation or combination of sterilisation and shredding. Treated waste to be sent to registered or authorised recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.</td>
</tr>
<tr>
<td>Category 3</td>
<td>White</td>
<td>Waste sharps including Metals Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps</td>
<td>Autoclaving or Dry Heat Sterilisation followed by shredding or mutilation or encapsulation in metal container or cement concrete; combination of shredding cum autoclaving; and sent for final</td>
</tr>
</tbody>
</table>

*Note: BMW* stands for Bio-Medical Waste.
### Category 4

<table>
<thead>
<tr>
<th>Category</th>
<th>Colour of Bag</th>
<th>Type of Waste Disposed</th>
<th>Treatment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blue</td>
<td>Glassware, Metallic Body Implants&lt;br&gt;Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.</td>
<td>Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling</td>
</tr>
</tbody>
</table>

*Disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio-medical waste treatment facility. This will be carried out with prior approval from the prescribed authority and as per the Standards specified in Schedule-III. The deep burial facility shall be located as per the provisions and guidelines issued by Central Pollution Control Board from time to time.

### 6.3.3 Containers for Bio-Medical Waste Storage

1. Plastics or metals is colour coded
2. Inner and outer surface should be smooth
3. Should always be kept closed
4. For potentially infected waste, 10% sodium hypochlorite should be put in container. Chemical treatment using at least 10% Sodium Hypochlorite having 30% residual chlorine for twenty minutes or any other equivalent chemical reagent that should demonstrate Log104 reduction efficiency for microorganisms as given in Schedule-III.
5. Quantity of waste should be weighted prior to evacuating the container i.e., 2/3 of the bag or container should be filled and should not be kept more than 48 hours.
6. Incinerable waste should be disposed in Non-polyvinyl chloride plastic bags and non-chlorinated plastic bags will be phased out.
Fig. 6.3: Containers for Bio-medical waste management (Yellow bin)

Fig. 6.4: Container for Bio Medical Waste Management (Red Bin)

put this box in the first and second places

put this box in the second and third place

Fig. 6.5: Disposal of Sharp
**6.3.4 Benefits of Using Colour Coded Waste Container**

1) Assist staff in proper segregation of wastes  
2) Identifies the type of wastes contained in the bag  
3) Identifies the potential hazardous that may be associated with those wastes

**6.3.5 Collection and Storage of Bio-Medical Waste Bags**

1) Bags are tightly closed or sealed when they are about three-quarters full  
2) They are collected on daily basis  
3) Stored in a separate area/room  
4) No waste should be stored for more than 48 hrs

**6.3.6 Packaging and Labelling**

Following is symbol of biohazard. This label should be present on every bag as well as container containing BMW.

![biohazard](image)

**Fig. 6.6: Symbol of Biohazard**

**General rules of labelling**

1) Name of Ward should be specified  
2) Date and time of packaging should be mentioned  
3) Destination (Treatment Site) should be written  
4) Biohazard/Cytotoxic Symbol should be clearly visible  
5) Weighing and recording of waste is specified  
6) Separate register (Log book) should be made having above stated details  
7) Daily recording of movement of BMW is mandatory

**6.3.7 Transportation of Bio-Medical Waste**

**On-site transport**

Dedicated Wheeled trolleys, containers, or carts that are not used for any other
purposes should be used for transportation. The vehicles should be cleaned and disinfected daily with an appropriate disinfectant.

**Off-site transportation of waste**

Manual loading should be avoided as far as possible. A signed document by Nurse/Doctor/designated person mentioning date, shift, quantity and destination should be present always. A special vehicle must be used which is designated only for this purpose is used. There are registered, authorised, BMW transporters that should be used for each facility.

**A common bio-medical waste treatment and disposal facility**

In off-site biomedical waste management common biomedical waste treatment and disposal facility has been suggested by the BWM rules 2016. According to them every operator should perform following activities:

- **a)** take all necessary steps to ensure that the bio-medical waste collected from the occupier is transported, handled, stored, treated and disposed of, without any adverse effect to the human health and the environment, in accordance with these rules and guidelines issued by the Central Government or, as the case may be, the central pollution control board from time to time;

- **b)** ensure timely collection of bio-medical waste from the occupier as prescribed under these rules;

- **c)** establish bar coding and global positioning system for handling of bio-medical waste within one year;

- **d)** inform the prescribed authority immediately regarding the occupiers which are not handing over the segregated bio-medical waste in accordance with these rules;

- **e)** provide training for all its workers involved in handling of bio-medical waste at the time of induction and at least once a year thereafter;

- **f)** assist the occupier in training conducted by them for bio-medical waste management;

- **g)** undertake appropriate medical examination at the time of induction and at least once in a year and immunise all its workers involved in handling of bio-medical waste for protection against diseases, including Hepatitis B and Tetanus, that are likely to be transmitted while handling bio-medical waste and maintain the records for the same;

- **h)** ensure occupational safety of all its workers involved in handling of bio-medical waste by providing appropriate and adequate personal protective equipment;

- **i)** report major accidents including accidents caused by fire hazards, blasts during handling of biomedical waste and the remedial action taken and the records relevant thereto, (including nil report) in Form I to the prescribed authority and also along with the annual report;

- **j)** maintain a log book for each of its treatment equipment according to weight of batch; categories of waste treated; time, date and duration of treatment cycle and total hours of operation;

- **k)** allow occupier, who are giving waste for treatment to the operator, to see whether the treatment is carried out as per the rules;

- **l)** shall display details of authorisation, treatment, annual report etc on its web-site;

- **m)** after ensuring treatment by autoclaving or microwaving followed by mutilation or shredding, whichever is applicable, the recyclables from the
treated bio-medical wastes such as plastics and glass, shall be given to recyclers having valid consent or authorisation or registration from the respective State Pollution Control Board or Pollution Control Committee;

n) supply non-chlorinated plastic coloured bags to the occupier on chargeable basis, if required;

o) common bio-medical waste treatment facility shall ensure collection of biomedical waste on holidays also;

p) maintain all record for operation of incineration, hydroclave, autoclaving for a period of five years; and

q) upgrade existing incinerators to achieve the standards for retention time in secondary chamber and Dioxin and Furans within two years from the date of this notification.

Guidelines for authorising vehicle for transportation of Bio-Medical Waste

The operator of common bio-medical waste treatment facility shall transport the bio-medical waste from the premises of an occupier to any off-site bio-medical waste treatment facility only in the vehicles having label as provided in Biomedical Waste management rule, 2016.

6.4 ADVANTAGES OF BIO-MEDICAL WASTE MANAGEMENT

Advantages of Bio-Medical Waste Management includes:

1) Control nosocomial infections
2) Reduce HIV, sepsis, hepatitis transmission
3) Cut chain of transmission of infection
4) Reduce community exposure
5) Reduced Cost
6) Prevent illegal repackaging
7) Reduce long term risks
8. Minimise the amount of waste produced

Check Your Progress 2

1) Draw table to categorise bio-medical wastes.

................................................................................................................................................
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2) List the Waste to be collected in yellow Bin.

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

3) List the waste to be collected in Red Bin.

................................................................................................................................................
................................................................................................................................................
The emergence of life-threatening infections such as severe acute respiratory syndrome (SARS), ebola, zika virus and re-emerging infectious diseases have highlighted the need for efficient infection control programmes in all health care settings. Health care workers need to be trained effectively and proper infection control measures should be taken in all health facilities. It is the duty of the healthcare worker to prevent the infection to occur while dealing with patient. Disease transmission can be prevented if the personal hygiene, using of personal protective equipment and proper biomedical waste management are carried out.

### 6.5.1 Principles of Infection Control

Agent, host and environment constitute epidemiological triad. Following are principles of infection control focusing on triad and their interaction.

1) **Microbes (Agent)**
   
   a) Identification of causative agent
   b) Specific measures to prevent their spread

2) **Patient (Host)**
   
   a) Admission for absolutely needed patient
   b) Barrier nursing for patient with depressed immunity
   c) Provision of isolation ward
   d) Hospital stay should be minimum possible

3) **Environment**
   
   a) Designing the health care institutions in such a way so that chances of transmission of infection are minimised.
   b) Positive pressure ventilation in high risk area
   c) Effective bio-medical waste management
   d) Effective Cleaning, disinfection and sterilisation

### 6.5.2 Components of Infection Control and Prevention

Infection control and prevention needs following components to be included in every activity planned for it-

a) Basic measures for infection control, i.e. standard precautions;

b) Education and training of health care workers;

c) Protection of health care workers, e.g. immunisation; protective equipments

d) Identification of hazards and minimising risks;

e) Effective work practices and procedures (such as environmental management practices, management of hospital/clinical waste, support services (e.g., food, linen)

f) Surveillance

g) Monitoring

h) Research
6.6 NOSOCOMIAL INFECTIONS

Nosocomial infections are important contributors to morbidity and mortality. They will become even more important as a public health problem with increasing economic and human impact because of:

a) Increasing numbers and crowding of people.
b) More frequent impaired immunity (age, illness, treatments)
c) New emerging microorganisms
d) Increasing bacterial resistance to antibiotics

![Fig. 6.7: Causative Microorganisms of Nosocomial Infections]

6.6.2 Prevention of Nosocomial Infection

Nosocomial infection at the healthcare setting are common and main cause delay in healing, cure and treatment outcome. All health workers should aimed to decrease the nosocomial infection. It is not possible at the individual level, therefore at all level of health system various activities are required.

National level

The responsible health authority should develop a national (or regional) programme to support hospitals in reducing the risk of nosocomial infections.

6.6.3 Objectives

1) To minimise the risk of infection to patients, staff and visitors.
2) To identify the roles and responsibilities of key personnel involved in the prevention and control of infection
3) To recommend antibiotic policy for the hospital and identify areas of irrational use of antibiotics and curb irrational use of antibiotics. The antibiotic policy of the health care setting is framework of using antibiotics, based upon experience of the doctors using different types of antibiotics for health conditions. Those antibiotics which are showing resistance are removed from drug list. Beside this proper drug doses and combination of antibiotics use are also part of policy.

6.6.4 Infection Control Components

1) A yearly work plan to assess and promote good health care, appropriate
isolation, sterilisation, and other practices, staff training, preparation of infection control manual and epidemiological surveillance should be developed.

2) Hospital infection control policy - outlines the broad principles of infection control

3) Infection control manual - A nosocomial infection prevention manual, compiling recommended instructions and practices for patient care. It should be developed and updated by the infection control team, with review and approval by the committee.

6.6.5 Infection Control Committee – Roles and Responsibility

Infection control committee is located in general hospital at the district level and above. This committee should include wide representation from relevant departments and stakeholders.

**Members**-

a) Head, Microbiology – Chairman  
b) Infection control officer/practitioner – Secretary  
c) Infection control nurse  
d) Medical superintendent  
e) Nursing superintendent  
f) Quality assurance officer  
g) Heads of all clinical dept  
h) Representation from relevant departments: e.g. management, physicians, other health care workers, clinical microbiology, pharmacy, sterilising service, maintenance, housekeeping.

**Roles and responsibilities**

a) To review and approve a yearly programme of activity for surveillance and prevention  
b) To review epidemiological surveillance data and identify areas for intervention  
c) To assess and promote improved practice at all levels of the health facility  
d) To ensure appropriate staff training in infection control and safety  
e) To review risks associated with new technologies, and monitor infectious risks of new devices and products, prior to their approval for use  
f) To review and provide input into investigation of epidemics  
g) To communicate and cooperate with other committees of the hospital with common interests such as pharmacy and therapeutics or antimicrobial use committee, biosafety or health and safety committees, and blood transfusion committee.

6.6.6 Infection Control Team (ICT)

Infection control committee should form the Infection control team which is directly responsible for day to day activities in the hospital. Following are members of ICT

a) Infection control officer (ICO)  
b) Microbiologist (if not ICO)
c) Infection control nurse
d) Epidemiologist
e) Clinician interested in Hospital acquired infection

This team should consist of individuals who are specialists in infection control or contributing to it in any way. These individuals have a scientific and technical support role in-

a) Surveillance of infection
b) Regular training of members
c) Develop and update by the infection control manual
d) Advice control measures and periodically check its efficacy
e) Prepare fact sheet on available data related to infection
f) Outbreak management
g) Day-to-day sterilisation, disinfection process
h) Report back to infection control committee

<table>
<thead>
<tr>
<th>Check Your Progress 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) List Infection Control components.</td>
</tr>
</tbody>
</table>

6.7 EDUCATION AND TRAINING OF HEALTH CARE STAFF

The infection control team should:

- Organise regular training programmes for the staff for essential infection control practices that are appropriate to their job description;
- Provide periodic re-training or orientation of staff;
- Assess training needs of the staff and provide required training;
- Review the impact of training.

6.8 NOSOCOMIAL INFECTION SURVEILLANCE

The specific objectives of a surveillance programme include:

a) To improve awareness of clinical staff and other hospital workers (including administrators) about nosocomial infections and antimicrobial resistance.

b) To monitor trends: incidence and distribution of nosocomial infections, prevalence and, where possible, intra- and inter-hospital comparisons.

c) To identify the need for new or intensified prevention programmes, and evaluate the impact of prevention measures.
d) To identify possible areas for improvement in patient care, and for further epidemiological studies (i.e. risk factor analysis).

6.9 LET US SUM UP

'Bio-medical waste' means any solid and/or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research pertaining thereto or in the production or testing thereof. Major steps in biomedical waste management are segregation, collection and storage, packaging, transport, treatment and disposal. Bio-medical waste management rules 2016 are framed which are applicable on all persons who generate, collect, receive, store, transport, treat, dispose or handle BMW in any form. The rules have 4 schedules which has guidelines for BMW management. Segregation is done in colour coded bags. There are 4 categories of BMW and different disposal methods are specified according to categories. All waste bags are properly labelled and transported to the site of disposal. Advantages of BMW management are prevention of nosocomial infections, reduce HIV, sepsis, hepatitis transmission, reduce community exposure, reduced cost and prevent illegal repackaging. The emergence of life-threatening infections has highlighted the need for efficient infection control and prevention strategies in all health care settings. The aim is to provide administrators and health care workers with the tools to enable them to implement the infection control programmes effectively. Infection control addressed the factors related to spread of infections, prevention (via hand hygiene/hand washing, cleaning/disinfection/sterilisation, vaccination), surveillance and outbreak investigation and management (interruption of outbreaks). The responsible health authority should develop a national (or regional) programmes to support hospitals in reducing the risk of health-care-associated infections.

6.10 KEY WORDS

1) Wastes: It is viewed as discarded materials, much of which can be reused or recycled (cardboard, paper, plastic, etc.).
2) General Waste or Non-infectious Waste : It includes domestic waste, packing materials, non-infectious waste bedding, food and kitchen waste, wastewater from laundries, etc., which do not pose any special hazard.

3) Animal Waste : Discarded materials including carcasses, body parts, body fluids, blood, or bedding originating from animals known to be contaminated with infectious agents (i.e. zoonotic organisms) or from animals inoculated during research, production of biologicals, or pharmaceutical testing with infectious agents.

4) Chemical Waste : Includes discarded solid, liquid and gaseous chemicals from diagnostic procedures. Chemical waste may be (a) Non-hazardous, or (b) Hazardous - toxic, corrosive, flammable, reactive (or explosive), or genotoxic in nature.

5) Health-care waste : Includes all the waste generated by Health-care establishment, research facilities, laboratories and minor or scattered sources.

6) Contaminated Wastes means : The waste carrying invisible disease causing microorganisms. These microorganisms are passed from the fluids, tissues, human wastes or contaminated clothes and sheets of infected people to anything that is used to treat them.

7) Cytotoxic Drugs and Cytotoxic Waste : Include antineoplastic agents and chemotherapy drugs, such as actinomycin-D, Bleomycine, busulfan, chlorambucil, cisplatin, cyclophosphamide, methotrexate, nitrogen mustard, uracil, vinblastin, vincristine etc.

8) Infectious Waste is : Defined as "waste capable of producing an infectious diseases," on the basis of four factors - (1) presence of a virulent pathogen, (2) sufficient dose, (3) portal of entry, and (4) resistance of the host.

9) Infection control : The discipline concerned with preventing nosocomial or healthcare-associated infection.

10) Infection control programme : Puts together various practices which, when used appropriately, restrict the spread of infection.
11) **Nosocomial infections or hospital acquired infections (HAIs)**

Defined as an infection occurring in a patient in a hospital or other healthcare facility, in whom the infection was not present neither incubating at the time of admission. It includes infections acquired in the hospital but appearing after discharge and also occupational infections among the healthcare staff. Infections occurring more than 48 hours after admission are considered nosocomial infections.

### 6.11 MODEL ANSWERS

Check Your Progress 1

1) **Types of Waste**

Majority of waste produced in health care facilities is non hazardous waste. Only a small percentage is harmful waste that needs to be properly treated so that it is rendered harmless.

![Pie chart showing types of waste]

<table>
<thead>
<tr>
<th>Non-hazardous waste, 85%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radioactive, Cytotoxic and heavy metals, 1%</td>
</tr>
<tr>
<td>Sharps, 1%</td>
</tr>
<tr>
<td>Chemical Category 1A, 10%</td>
</tr>
<tr>
<td>Pharmaceutical waste, 3%</td>
</tr>
</tbody>
</table>

2) **Sources of Bio-Medical Waste**

There are almost everyplace of healthcare setting where waste is generated. But not all waste is hazardous and need special treatment.

<table>
<thead>
<tr>
<th><strong>Major Sources</strong></th>
<th><strong>Minor sources</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>j) Hospitals</td>
<td>i) Clinics</td>
</tr>
<tr>
<td>k) Labs</td>
<td>j) Dental clinics</td>
</tr>
<tr>
<td>l) Research centers</td>
<td>k) Home care</td>
</tr>
<tr>
<td>m) Animal research</td>
<td>l) Cosmetic clinics</td>
</tr>
<tr>
<td>n) Blood banks</td>
<td>m) Paramedics</td>
</tr>
<tr>
<td>o) Nursing homes</td>
<td>n) Funeral services</td>
</tr>
<tr>
<td>p) Mortuaries</td>
<td>o) Institutions</td>
</tr>
<tr>
<td>q) Autopsy centers</td>
<td></td>
</tr>
</tbody>
</table>
3) **Steps in biomedical waste management**

1) Segregation

2) Collection and storage

3) Packaging

4) Transport

5) Treatment

6) Disposal

7) Maintain records/ returns/ accidents/follow-ups

**Check Your Progress 2**

1) Categories of Bio-Medical Waste

BMW is segregated in 4 categories depending upon the treatment options

<table>
<thead>
<tr>
<th>Category</th>
<th>Colour of Bag</th>
<th>Type of Waste Disposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Yellow</td>
<td>Human anatomical waste, Animal Anatomical Waste, Soiled Waste, Expired or Discarded Medicines, Chemical Waste, Chemical Liquid Waste, Microbiology, Biotechnology and other clinical lab waste</td>
</tr>
<tr>
<td>Category 2</td>
<td>Red</td>
<td>Contaminated Waste (Recyclable)</td>
</tr>
<tr>
<td>Category 3</td>
<td>White</td>
<td>Waste sharps including Metals</td>
</tr>
<tr>
<td>Category 4</td>
<td>Blue</td>
<td>Glassware, Metallic Body Implants</td>
</tr>
</tbody>
</table>

2) Waste to be collected in Yellow Bin

- Soiled linen contaminated gown
- Human anatomical waste placenta
- Pathology Waste-tissues

3) All infectious, non sharp plastic waste, I/V Sets, Plastic culture plates and tubes.

**Check Your Progress 3**

1) Infection Control Components

- A yearly work plan to assess and promote good health care, appropriate isolation, sterilisation, and other practices, staff training, preparation of infection control manual and epidemiological surveillance should be developed.

- Hospital infection control policy— outlines the broad principles of infection Control.

- Infection control manual— A nosocomial infection prevention manual, compiling recommended instructions and practices for patient care. It should be developed and updated by the infection control team, with review and approval by the committee.
6.12 REFERENCES


2) CPCB http://www.who.int/mediacentre/factsheets/fs253/en/Govt of India.


