

HOSPITAL WASTE MANAGEMENT



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INTRODUCTION

The management of a bio-medical waste is a subject of considerable concern to public health administrator, infection control specialists, as well as the general public. It is well known fact that healthcare activities generate various types of hazardous and infectious material. Even though the consequences of discharging such wastes carelessly have been recognized earlier, it is only recently that methods to manage this waste in a scientific manner have been initiated in India.

Bio-medical waste means any waste which is generated during

- the diagnosis
- treatment or
- immunization of human beings or animals or
- in research activities or
- in production or testing of biological an
- Including categories as mentioned in schedule – 1”.

Biomedical waste poses hazard due to two principal reasons

- infectivity and
- toxicity

Bio Medical waste consists of

- Human anatomical waste like tissues, organs and body parts
- Animal wastes generated during research from veterinary hospitals
- Microbiology and biotechnology wastes
- Waste sharps like hypodermic needles, syringes, scalpels and broken glass Discarded medicines and cytotoxic drugs
- Soiled waste such as dressing, bandages, plaster casts, material contaminated with blood, tubes and catheters
- Liquid waste from any of the infected areas
- Incineration ash and other chemical wastes

Classification of hospital waste

S. No.	Waste Category	Description & Examples
1	Infectious waste	Waste contain pathogens e.g. lab cultures, swabs, excreta
2	Pathological waste	Human tissues e.g. body parts, blood, foetus
3	Sharps	Needles, infusion sets, scalpels, knives, blades broken glass
4	Pharmaceutical waste	Expired drugs and medicines
5	Genotoxic waste	Cytotoxic drugs often used in cancer therapy
6	Chemical waste	Lab reagents, film developer, disinfectants
7	Waste with high content of heavy metals	Batteries, BP apparatus, broken thermometer
8	Pressurized containers	Gas cylinders, aerosols cans
9	Radioactive wastes	Unused liquid from radiotherapy, excretes from patients treated with radio nuclides

Need of biomedical waste management in hospitals

The reasons due to which there is great need of management of hospitals waste such as:

- Injuries from sharps leading to infection to all categories of hospital personnel and waste handlers
- Nosocomial infections in patients from poor infection control practices and poor waste management.
- Risk of infection outside the hospital for waste handlers and scavengers and sometimes general public living in the vicinity of hospitals.
- Risk associated with hazardous chemicals, drugs to persons handling wastes
- “Disposable” being repacked and sold by unscrupulous elements without even being washed.
- Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
- Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.

Biomedical Waste Management Process

- Waste collection
- Segregation
- Storage
- Treatment
- Transport to final disposal site
- Final disposal

Categories of Bio-medical Waste in India

- ❑ Categorized as per the “Bio-medical waste (Management and Handling) Rules, 1988
- ❑ Into 10 categories
- ❑ The rules are prescribed by the ‘Ministry of Environment and Forests, G.O.I’
- ❑ Categories shown in the following table

Category	Waste Content	Components	Method of treatment and disposal
Category No. 1	Human Anatomical Waste	Human tissues, organs, body parts	Incineration /deep burial
Category No. 2	Animal Waste	Animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal, Houses	Incineration /deep burial
Category No 3	Microbiology & Biotechnology Waste	Wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents and industrial laboratories, wastes from production of biologicals, from research toxins, dishes and devices used for transfer of cultures	Local autoclaving/ micro waving/ incineration
Category No. 4	Waste sharps	Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps	Disinfections chemical treatment /autoclaving/micro waving and mutilation shredding
Category No. 5	Discarded Medicines and Cytotoxic drugs	Wastes comprising of outdated, contaminated and discarded medicines	Incineration / destruction & drugs disposal in secured landfills

Category	Waste Content	Components	Method of treatment and disposal
Category No. 6	Solid Waste	Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood	Incineration , autoclaving/ micro waving
Category No. 7	Solid Waste	Wastes generated from disposable items other than the waste sharps such as tubing's, catheters, intravenous sets etc	Disinfections chemical treatment /autoclaving/micro waving and mutilation shredding
Category No. 8	Liquid Waste	Waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities	Disinfections by chemical treatment and discharge into drains
Category No. 9	Incineration Ash	Ash from incineration of any bio-medical waste	Disposal in municipal landfill
Category No. 10	Chemical Waste	Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc	Chemical treatment and discharges into drains

(Source- The Bio Medical Waste (Management and Handling) Rules, 1998)

- Bio medical waste should be segregated into containers/bags at the point of generation itself
- The color coding and the type of container should be as prescribed in the rules (shown in a following table)
- The containers should be clearly marked with
 - the bio-hazard symbol and
 - Cytotoxic hazard symbol

- **Segregation**

- Segregation refers to the basic separation of different categories of waste generated at source.
- Segregation is the most crucial step in bio-medical waste management.
- Effective segregation alone can ensure effective bio-medical waste management.
- The BMWs must be segregated in accordance to guidelines laid down under schedule 1 of BMW Rules, 1998 (i.e. categories 1 – 10).

HOW DOES SEGREGATION HELP?

- Segregation reduces the amount of waste needs special handling and treatment
- Effective segregation process prevents the mixture of medical waste like sharps with the general municipal waste.
- Prevents illegally reuse of certain components of medical waste like used syringes, needles and other plastics.
- Provides an opportunity for recycling certain components of medical waste like plastics after proper and thorough disinfection.
- Recycled plastic material can be used for non-food grade applications.

- Reduces the cost of treatment and disposal (80 per cent of a hospital's waste is general waste, which does not require special treatment, provided it is not contaminated with other infectious waste)
- The bins and bags should carry the biohazard symbol indicating the nature of waste to the patients and public.
- Schedule III (Rule 6) of Bio-medical Waste (Management and Handling) Rules, 1998 specifies the Label for Bio-Medical Waste Containers / Bags as:
 - Label shall be non-washable and prominently visible



Drugs that are detrimental or destructive to cells within the body (e.g. cytotoxic, mutagenic, genotoxic or carcinogenic). These agents are commonly used in cancer treatment but may also be used for other disorders.

COLLECTION

- The collection of biomedical waste involves use of different types of container from various sources of biomedical wastes like Operation Theatre, laboratory, wards, kitchen, corridor etc.
- The containers/ bins should be placed in such a way that 100% collection is achieved. Sharps must always be kept in puncture-proof containers to avoid injuries and infection to the workers handling them.

STORAGE

- Once collection occurs then biomedical waste is stored in a proper place. Segregated wastes of different categories need to be collected in identifiable containers.
- The duration of storage should not exceed for 8-10 hrs in big hospitals (more than 250 bedded) and 24 hrs in nursing homes.
- Each container may be clearly labeled to show the ward or room where it is kept. The reason for this labeling is that it may be necessary to trace the waste back to its source.
- Besides this, storage area should be marked with a caution sign.

TRANSPORTATION

- The waste should be transported for treatment either in trolleys or in covered wheelbarrow.
- Manual loading should be avoided as far as possible.
- The bags / Container containing BMWs should be tied/lidded before transportation.
- Before transporting the bag containing BMWs, it should be accompanied with a signed document by Nurse/ Doctor mentioning date, shift, quantity and destination.
- Special vehicles must be used so as to prevent access to, and direct contact with, the waste by the transportation operators, the scavengers and the public.
- The effects of traffic accidents should be considered in the design, and the driver must be trained in the procedures he must follow in case of an accidental spillage.

PERSONNEL SAFETY DEVICES

The use of protective gears should be made mandatory for all the personnel handling waste.

1. Gloves:

Heavy-duty rubber gloves should be used for waste handling by the waste retrievers. This should be bright yellow in color. After handling the waste, the gloves should be washed twice with carbolic soap and a disinfectant. The size should fit the operator.

Aprons, gowns, suits or other apparels: Apparel is worn to prevent contamination of clothing and protect skin. It could be made of cloth or impermeable material such as plastic.

People working in incinerator chambers should have gowns or suits made of non-inflammable material.

Masks: Various types of masks, goggles, and face shields

Boots: Leg coverings, boots or shoe-covers provide greater protection to the skin when splashes or large quantities of infected waste have to be handled.

- The boots should be rubber-soled and anti-skid type.
- They should cover the leg up to the ankle.

TREATMENT AND DISPOSAL TECHNOLOGIES FOR BMW

➤ **Incineration**

- Double – chamber pyrolytic incinerator
- Rotatory kilns

➤ **Chemical disinfection**

➤ **Wet and dry thermal treatment**

- High pressure steam
- Non-burn, dry thermal disinfection

➤ **Microwave irradiation**

➤ **Land disposal**

- Not to be dumped in open dumps
- Sanitary landfills should be used

➤ **Inertization**

- Mixing with cement and other substances before disposal
- Reduces the risk of migration into surface or ground water