BIOMEDICAL WASTE MANAGEMENT: AN OVERVIEW

Biomedical waste is defined as "any solid, fluid and liquid or liquid waste, including its container and any intermediate product, which is generated during the diagnosis, treatment or immunisation of human being or animals, in research pertaining thereto, or in the production or testing of biologicals and the animal waste from slaughter houses or any other similar establishment". All biomedical wastes are hazardous.

According to WHO,

- Nearly 85% of all waste generated by hospital is general waste.
- About 15% waste is Bio-medical Waste, which includes
  - ✓ Infectious waste - 10%.
  - ✓ Non-infectious waste such as radioactive and chemical wastes - 5%.

Hospital waste management is a part of hospital hygiene and maintenance activities. In fact, only 15% of hospital waste (not whole of the waste) i.e. "Biomedical waste" is hazardous. But when hazardous waste is not segregated at the source of generation and mixed with nonhazardous waste, then 100% waste becomes hazardous.

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NEED OF BIOMEDICAL WASTE MANAGEMENT

The need or rationale for spending so many resources in terms of money, manpower, material and machine for management of hospital waste are due to following risks:

1. Injuries from sharps leading to infection to all categories of hospital personnel and waste handlers.
2. Nosocomial infections in patients from poor infection control practices and poor waste management.
3. Risk of infection outside hospital for waste handlers and scavengers and at times, general public living in the vicinity of the hospitals.
4. Risk associated with hazardous chemicals and drugs to persons handling wastes at all levels.
5. Risk of recycling of "Disposables" which are being repacked and sold by unscrupulous elements.
6. Risk of spurious drugs due to repacking of disposed off drugs to unsuspecting buyers.
7. Risk of air, water and soil pollution directly due to waste, or due to defective incineration, emissions and ash

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BIO-MEDICAL WASTE MANAGEMENT RULES, 2016

"Bio-medical Waste Management Rules, 2016" came into force in supersession of the 1998 rules with gazette notification no. G.S.R. 343(E), dated 28th March, 2016. Further, the rules have been amended and published in the Gazette of India, Extraordinary, vide G.S.R. 343(E), dated the 28th March, 2016, after having dispensed with the requirement of notice under clause (a) of sub-rule (3) of rule 5 of the said rules in public interest, namely the Bio-Medical Waste Management (Amendment) Rules, 2018.

According to Bio-medical Waste Management Rules, 2016, the Central Pollution Control Board and the State Pollution Control Committees have the authority to cancel the consent to operate and the authorization of healthcare institutions, for non-compliant hospitals. Indeed, there have been such instances in India.

Steps in the management of biomedical waste include:

A. Generation
B. Segregation
C. Collection
D. Storage
E. Treatment
F. Transport
G. Disposal.

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DUTIES OF OCCUPIER (HOSPITAL/ HEALTHCARE FACILITY):

1. To provide a safe, ventilated and secured location for storage of segregated BMW within premises.
2. As per the Bio-Medical Waste Management (Amendment) Rules, 2018, use of chlorinated plastic bags (excluding blood bags) and gloves has to be phased out by the 27th March, 2019.
3. Provide training to all its health care workers and others involved in handling of bio medical waste at the time of induction and once a year thereafter and maintain records for the same.
4. Immunization against Hepatitis B and tetanus for workers.
5. Maintain and update the bio-medical waste management register daily and display the monthly and annual record on website.
6. Report major accidents like needle stick injuries, broken mercury thermometer, accidents caused by fire, blasts during handling of biomedical waste and the remedial action taken and record the same in Form I.

DUTIES OF OPERATOR OF COMMON BIO-MEDICAL WASTE TREATMENT FACILITY:

1. Report major accidents including accidents caused by fire, blasts during handling of bio-medical waste and the remedial action taken and record the same in Form I to State Pollution Control Board.

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2. Ensure timely collection of BMW from healthcare facilities.

3. Handing over of recyclable waste after treatment by autoclaving and incineration.
4. Assist health care facilities in training of workers.
5. Upgradation of existing incinerators and achievement of standards for secondary chamber.

SEGREGATION, PACKING, STORAGE AND TRANSPORT:

1. Bio-medical waste classified into 4 categories based on treatment options.
2. No untreated bio-medical waste shall be mixed with other wastes.
3. Untreated human anatomical waste, animal anatomical waste, soiled waste and, biotechnology waste shall not be stored beyond a period of forty – eight hours.
4. If required to store beyond 48 hours, the occupier shall ensure that it does not affect human health and inform the SPCC with reason.

MAINTENANCE OF RECORDS

Records in relation to generation, collection, reception, storage, transportation, treatment and disposal shall be maintained for 5 years as per rules.

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ACCIDENT REPORTING:

In case of major accident, the authorised person shall intimate immediately and submit a report within 24 hours regarding the remedial steps taken.

SCHEDULES:

There are 4 schedules (or parts) in the Bio-Medical Waste rules, 2016:

Schedule I (Part-1 & 2): Categorization and Management of BMW.

Schedule II: Standards for treatment and disposal of BMW.

Schedule III: Prescribed Authorities and corresponding duties.

Schedule IV: Label of containers or bags (Part A) and label for transportation of Bio-Medical waste bags or containers (Part B)

Schedule I of Bio-medical Waste Management Rules, 2016 contains details of Bio-medical Waste categories and their segregation, collection, treatment, processing, and disposal options.

Part 1: Bio-medical waste is classified into 4 categories based on treatment options:

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Classification of BMW based on treatment.

Category	Type of bag / container used	Type of waste	Treatment/ disposal options
YELLOW	• Nonchlorinateded plastic bags • Separate collection system leading to an effluent treatment system	a. Human Anatomical Waste b. Animal Anatomical Waste c. Soiled Waste d. Expired or Discarded Medicines & Cytotoxic drugs along with glass or plastic ampoules, vials etc. e. Chemical Waste f. Micro, Bio-t and other clinical lab waste g. Chemical Liquid Waste h. Discarded linen, mattresses, beddings contaminated with blood or body fluids. Also routine mask & gown as per BMW rules, 2018.	Incineration or Plasma pyrolysis or deep burial*
RED	Nonchlorinated plastic bags or containers	Contaminated Waste (Recyclable) Vacutainers, tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles) and gloves	Autoclaving/ microwaving/ hydroclaving and then sent for recycling, not sent to landfill
WHITE (Translucent)	(Translucen t) Puncture, Leak, tamper-proof containers	Waste sharps including Metal sharps-Needles, Syringes with fixed needles, Needles from needle tip cutter/burner, Scalpels, Blades	Auto or Dry Heat Sterilization followed by shredding or mutilation or encapsulation
BLUE	Cardboard boxes with blue colored Marking. Puncture proof and leak proof boxes or containers with blue colored marking, as per BMW rules, 2018	Broken/ discarded glassMedicine vials & ampoules except those contaminated with cytotoxic wastes. Metallic Body Implants	Disinfection or autoclaving, microwaving, hydroclaving and then sent for recycling

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Part 2:

1. Chemical treatment should be done using at least 10% sodium hypochlorite having 30% residual chlorine for twenty minutes. But as per BMW (amendment) rules, 2018, 1% to 2% sodium hypochlorite should be used.
2. There is no need of chemical pre-treatment before incineration, except for microbiological, lab and highly infectious waste.
3. Syringes should be either mutilated or needles should be cut and or stored in tamper proof, leak proof and puncture proof containers for sharps storage.

Schedule II:

Standards for treatment and disposal of BMW

Schedule III:

Prescribed Authorities and corresponding duties

Schedule IV:

Part A: LABEL FOR BIO-MEDICAL WASTE CONTAINERS OR BAGS

Part B: LABEL FOR TRANSPORTING BIO-MEDICAL WASTE BAGS OR CONTAINERS

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Steps of Biomedical waste management:

Step 1: Segregation and pre-treatment of waste:

- Waste is segregated at the site of generation by the persons (nursing staff, attendants, technicians, doctors etc.) who are generating the waste as per the biomedical waste management rules, 2016 in color coded bags.
- Highly infectious and laboratory waste like needles & syringes (first cut in needle cutter), scalpels, blades, vials etc. are pretreated with 1% sodium hypochlorite and then disposed off in color coded bags/ bins at the site of generation.
- Posters detailing segregation list of items are displayed in each area of the hospital
- Biomedical waste generated from any patient found positive for Hepatitis or HIV, is collected in a separate bag and is labelled as positive along with the area and date of generation

Step 2: Collection of segregated waste:

Segregated waste is then collected from all over the hospital in waste trolleys. The frequency of waste collection is:

- Emergencies- 3 times/day.
- OPDs and Laboratories- 2 times/day.
- Wards- Once or twice per day depending on waste generated.
- Administrative area, Offices and Support services- Once a day.

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Step 3: Transportation of collected waste:

- Waste collected from all over the hospital is transported to collection site in color coded waste trolleys.
- The workers transporting the waste use PPEs like boots, gloves, masks and aprons.
- The collected waste is not stored for more than 48hrs. at collection site

Step 4: Weighing of waste bags:

At the collection/ storage site, bags are weighed before transportation for final disposal. Waste collected per day from all over the hospital is approximately:

- Yellow waste: 300-400 Kg
- Red waste: 80-110 Kg
- White waste: 7-8 Kg
- Blue waste: 2-3 Kg
- General waste: 1500-2000 Kg (3-4 municipal bins)

Step 5: Transportation for final disposal

It transports the waste to M/s **Bhopal Incinerators Limited** for final treatment and disposal. Record of the same is being maintained as per schedule.