

Lec.7

Biohazardous Waste

There are 4 general categories of biohazardous wastes based on the physical form of the waste. Each form must be segregated, identified, decontaminated and disposed of in an appropriate manner for the form in order to minimize occupational exposure and environmental release risks.

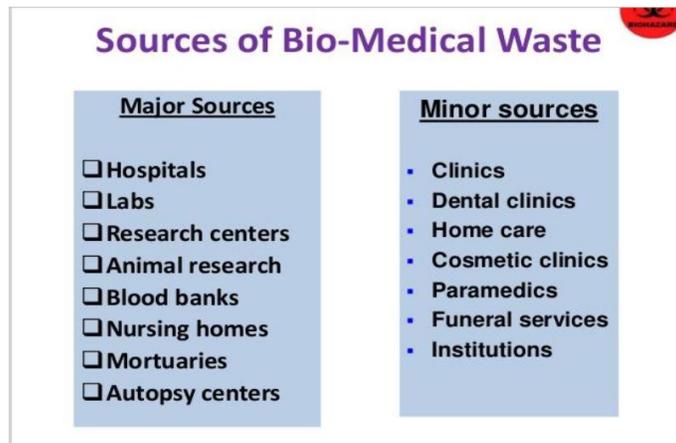
Bio-medical waste means “any solid and/or liquid waste produced during diagnosis, treatment or vaccination of human beings or animals. Biomedical waste creates hazard due to two principal reasons: infectivity and toxicity.



Figure 1. Biomedical waste

Source of Biomedical Wastes: The source of biomedical waste is classified into two types based on the quantity of waste generated.

- 1- Major source
- 2- Minor source



Figure(2): Source of Biomedical Wastes

Classification:

- The classification of the biomedical waste is carried out based on its characteristics, source of generation and the level of hazard to the environment.
- The biomedical waste is classified into two types:
 1. Non hazardous waste
 2. Hazardous waste.
- **Non-hazardous waste:** About 75% to 90 % of biomedical waste characteristics were similar to that of domestic waste and are non- risky in nature. This waste is generated mainly from the organization and maintenance of hospital and health care centers.
- **Hazardous waste:** The remaining 10 – 25% of biomedical waste falls under the hazardous waste categories. The hazardous waste contains infectious characteristics of about 15% - 18 % and toxicity characteristics of about 5% - 7%. The various hazardous wastes includes:
 - **Infectious waste:** Waste containing pathogens; e.g. excreta; laboratory cultures isolation wards waste; swabs, materials, or equipment's that have been in contact with infected patients.
 - **Pathological waste:** Human tissues or fluids e.g. body parts; blood and other body fluids; fetuses.
 - **Pharmaceutical waste:** Waste containing pharmaceuticals; e.g. pharmaceuticals that are expired or no longer needed; contaminated pharmaceuticals (bottles, boxes).
 - **Genotoxic waste:** Waste containing cytostatic drugs (often used in cancer therapy)/genotoxic chemicals.
 - **Chemical waste:** Waste containing chemical substances e.g. laboratory reagents; film developer; disinfectants and solvents that are expired or no longer needed.
 - **Wastes with high content of heavy metals:** Batteries, Broken thermometers, blood pressure gauges, Pressurized containers, gas cylinders, gas cartridges, aerosol cans.
 - **Radioactive waste from radiotherapy:** Waste containing radioactive substances e.g. unused liquids from laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with uncapped radionuclide.

Biomedical Waste management:

- Proper management of biomedical waste is highly essential since it induces various risk to the human health and to the surrounding ecosystem that leads to the ecological hazard, professional hazard and public hazard. Steps involved in biomedical waste management was shown in Figure (3).

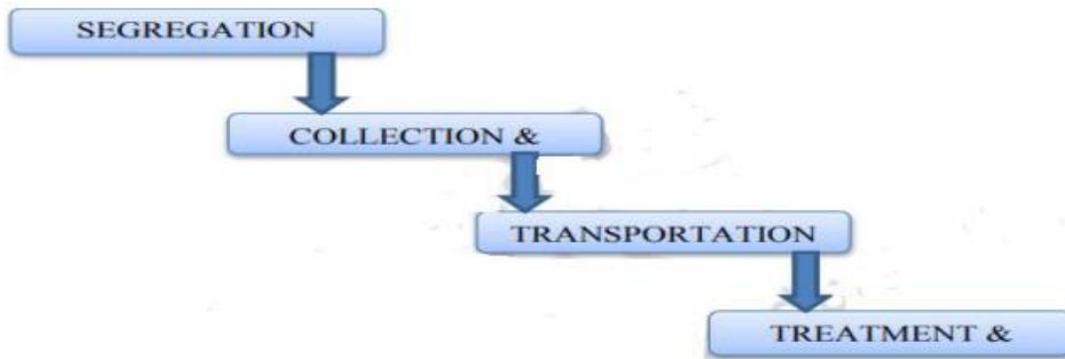


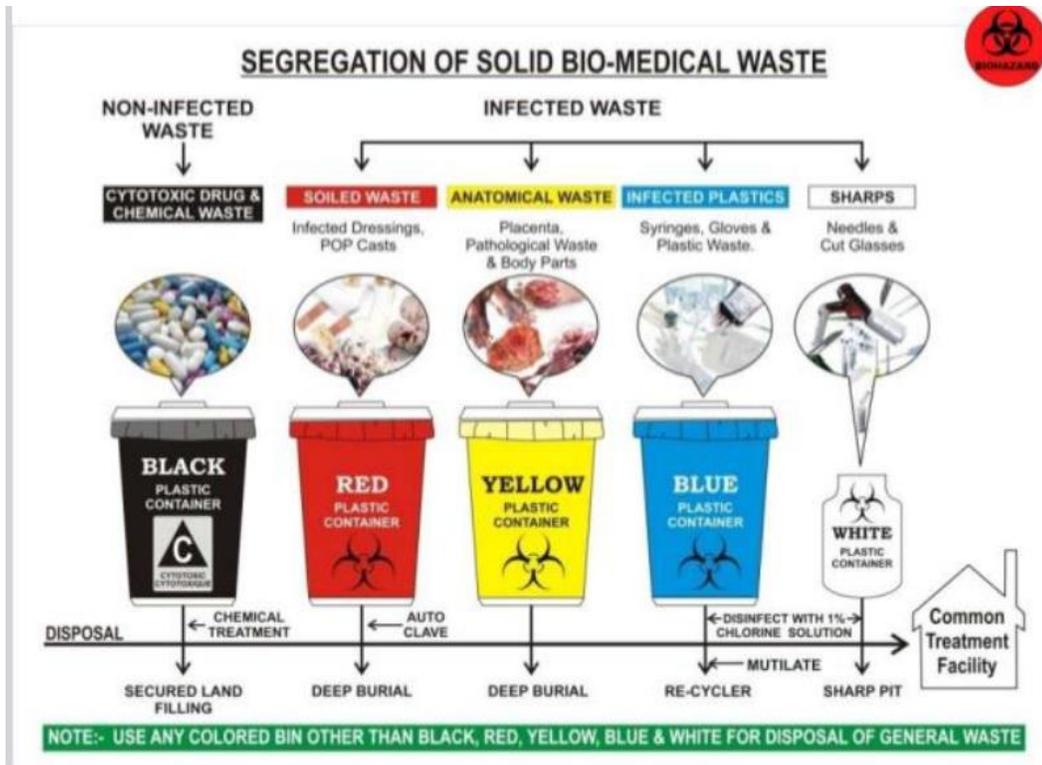
Figure 3. Steps involved in biomedical waste management

Segregation

- To avoid mixing of the biomedical waste with other, a container should be set to the side with colour coding bags at the point of generation.
- The sorting or separation of waste into different categories is referred as segregation.
- Segregation will decrease or minimize the risks in addition to rate of managing and disposal. Segregation is the most important and critical step in bio-medical waste management.
- Only, effective segregation can confirm the effective bio-medical waste management.

COLOR CODING FOR SEGREGATION OF BIOMEDICAL WASTE: -		
COLOR	WASTE	TREATMENT
Yellow	Human & Animal anatomical waste / Micro-biology waste and soiled cotton/dressings/linen/beddings etc.	Incineration / Deep burial
Red	Tubing's, Catheters, IV sets.	Autoclaving / Microwaving / Chemical treatment
Blue / White	Waste sharps (Needles, Syringes, Scalpels, blades etc.)	Autoclaving / Microwaving / Chemical treatment & Destruction / Shredding
Black	Discarded medicines/cytotoxic drugs, Incineration ash, Chemical waste.	Disposal in secured landfill

Figure(4): Color Coding for Segregation of Biomedical Wastes



Figure(5): Segregation of Biomedical Wastes

COLLECTION

COLLECTION, TRANSPORTATION, STORAGE (WITHIN THE HOSPITAL)

Transportation

- The collection of biomedical waste involves use of different types of container .
- 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.

Biomedical Waste (BMW) Management

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Figure(6): Biomedical Wastes Collection

Transportation

- The collected wastes are transported in trolleys or in enclosed wheelbarrow for treatment. The operator should ensure to avoid manual loading.
- The bags / Container containing biomedical wastes must be tied/ lidded before hauling for treatment. Vehicles used for transporting should be special to avoid contact to, and direct contact with the operator, scavengers and the public.
- While transporting the containers, it must be properly enclosed. The effects of traffic accidents should be incorporated in the design, and the driver must be trained in the actions which must be followed in case of an accidental spillage. The interior of the containers should also be rinsed thoroughly.
- **Trolleys** The use of trolleys will make the elimination of infectious waste possible at the source itself, instead of accumulation a new category of waste.
- **Wheelbarrows** Wheel barrows are used to transfer the waste from the point source to the collection centers.
- **Dustbins** It is very important to calculate the amount of waste generated at each point. Dustbins should be of such capacity so that it can be placed at this specific site and that they do not overflow between each cycle of waste collection.

Dustbins have to be cleaned subsequently at each cycle of clearance of waste with disinfectants. Dustbins can be wrapped with plastic bags, which are chlorine-free, and colour coded as per the law.