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ENVIRONMENT SCIENCE (3110007)

Bio-Medical Waste

Generation

Management

Introduction

- 'Bio-medical waste' means any waste (solid and/or liquid waste, including its container), which is generated during the diagnosis, treatment or immunization(રશીકરણ) of human beings or animals, in different Biomedical/medical treatment

  OR

- Biomedical waste/hospital waste is any kind of waste containing infectious (or potentially infectious) materials. (Source: Wikipedia)

  (Note: Biomedical/Medical treatments : Bio-medical research or in the production or testing of bio-medical products, and Medical treatment of patients)

- This waste material is infectious or potentially infectious and presents a hazard to the public health and the environment.

  Example: Recent threat of CORONA virus.

- Waste from kitchen, shops, residents and gardens or health care units etc. can produce BMW. It can enter the municipal waste stream if it's not manage properly.

Generation of Bio Medical Waste

WHY BMW?

- Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment Every day.

- Large amount of potentially infectious and hazardous waste are generated in the health care hospitals and facilities around the world.

- Indiscriminate disposal of BMW or hospital waste and exposure to such waste possess serious threat to environment and to human health that requires specific treatment and management prior to its final disposal.

Examples of Bio Medical Waste:

- Biomedical waste may be solid or liquid.

  - ✓ Discarded blood,
  - ✓ Sharps,
  - ✓ Unwanted microbiological cultures and stocks,
  - ✓ Identifiable body parts (including those as a result of amputation),
  - ✓ Other human or animal tissue,
  - ✓ Used bandages and dressings,
  - ✓ Discarded gloves,
  - ✓ Other medical supplies that may have been in contact with blood and body fluids,
  - ✓ Laboratory waste that exhibits the characteristics described above.

- ✓ Waste sharps include potentially contaminated used (and unused discarded) needles, scalpels, lancets and other devices capable of penetrating skin.(Surgical Equipmentes)

Sources of Bio Medical Waste:

Biomedical waste is generated from biological and medical sources and activities, such as the diagnosis, prevention, or treatment of diseases.

- ✓ Common generators (or producers) of biomedical waste include
- ✓ Hospitals,
- ✓ Health clinics,
- ✓ Nursing homes,
- ✓ Emergency medical services,
- ✓ Medical research laboratories,
- ✓ Offices of physicians,
- ✓ Dentists, and veterinarians,
- ✓ Home health care,
- ✓ In healthcare facilities (i.e., hospitals, clinics, doctor's offices, veterinary hospitals and clinical laboratories)

Management of BMW Disposal

The hospital waste, in addition to the risk for patients and personnel who handle these wastes poses a threat to public health and environment. Keeping in view inappropriate biomedical waste management, the Ministry of Environment and Forests notified the "Biomedical Waste (Management and Handling) Rules, 1998" in July 1998.

In accordance with these Rules (Rule 4), it is the duty of every "occupier" i.e. a person who has the control over the institution and or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment.

The details are given in below Table, The key to minimization and effective management of biomedical waste is segregation (separation) and identification of the waste.

Stage 1: Collection and Segregation

The best practice for medical waste collection is at the point of generation. This approach reduces the risk of the waste spilling on its way from the generation site to the collection container. For the same the categories of wastes are classified as under.

Table 21.1: Categories of Bio-medical Waste (Schedule I)

Option	*Waste Category*	*Treatment & Disposal*
Category No. 1	Human Anatomical Waste (human tissues, organs, body parts)	Incineration[1]/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[1]/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 from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclaving/microwaving/ incineration[1]
Category No. 4	Waste sharps (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (chemical treatment[11]/autoclaving/ microwaving and mutilation/shredding**
Category No. 5	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	incineration[1]/destruction and drugs disposal in secured landfills
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/ microwaving
Category No. 7	Solid Waste (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc.)	disinfection by chemical treatment @@ autoclaving/ microwaving and mutilation/ shredding ##
Category No. 8	Liquid Waste (waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	disinfection 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 discharge into drains for liquids and secured landfill for solids

Using the Right Containers/ segregation Using color coding:

Use of the right collection containers based on the type of waste is crucial. Placing the wrong item in the wrong container may not only hinder safe disposal, but also pose risk of contaminating the environment or infecting working staff or patients.

Here are the common medical waste containers and what they are used for:

- Red Bag – Syringes (without needles), soiled gloves, catheters, IV tubes etc. should be all disposed of in a red colored bag, which will later be incinerated.

- Yellow Bag – All dressings, bandages and cotton swabs with body fluids, blood bags, human anatomical waste, body parts are to be discarded in yellow bags.

- Cardboard box with blue marking – Glass vials, ampules, other glass ware is to be discarded in a cardboard box with a blue marking/sticker.

- White Puncture Proof Container (PPC) – Needles, sharps, blades are disposed of in a white translucent puncture proof container.

- Black Bags – These are to be used for non-bio-medical waste. In a hospital setup, this includes stationary, vegetable and fruit peels, leftovers, packaging including that from medicines, disposable caps, disposable masks, disposable shoe-covers, disposable tea cups, cartons, sweeping dust, kitchen waste etc.

There are broadly four categories today and they are color coded. Yellow and Red are Bags while Blue and White are containers.

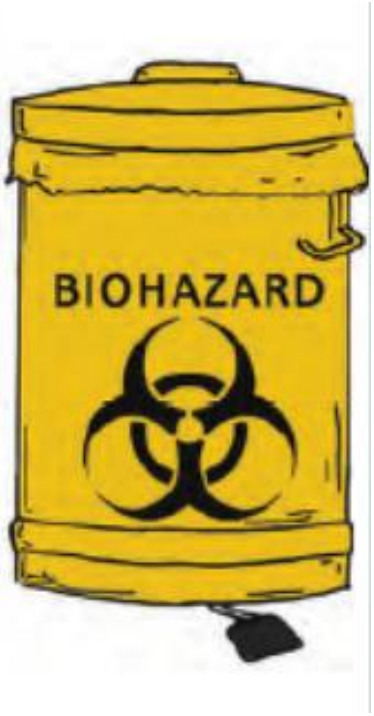
Yellow bags are for Organic waste and they are taken to the Incinerator directly

Experimental animal[4]

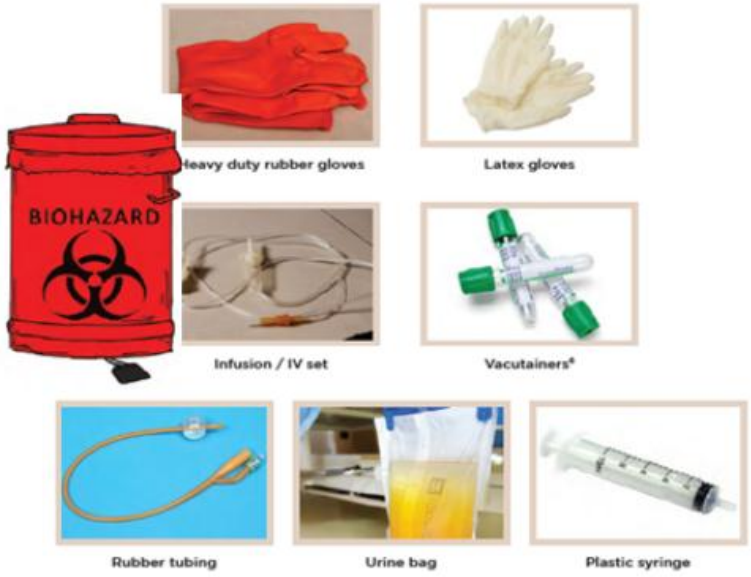
Placenta[5]

Mask

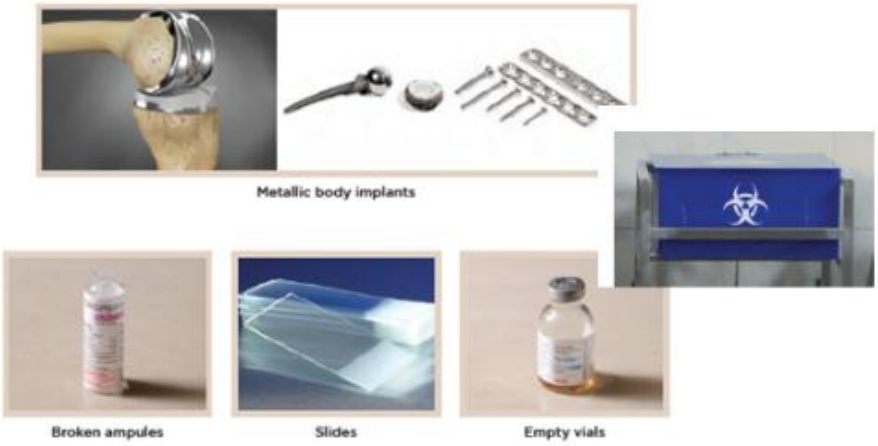
Plaster cast



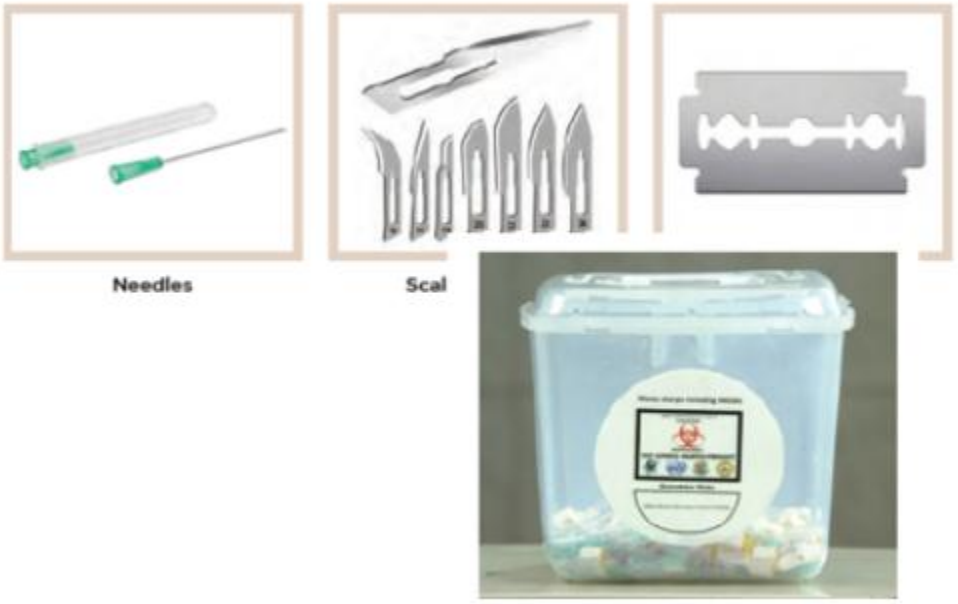
Red Bags are for plastic waste used during treatment and they are sterilised, shredded and recycled.



The Blue Containers are for Glass and Metal waste, which are sterilised



The White Containers are for Sharp objects, which are sterilised.



Stage 2: Storage and Transportation

Upon segregation, it is determined which waste is being picked up and disposed of through a medical waste removal vendor and which waste is reusable or can be disposed of on site.

After segregation waste, before sending waste for on-site autoclave or incinerator, we need to store medical waste at proper isolated place/Storage areas until it can be processed in bulk.

Storage areas should be chosen carefully and should be inaccessible to the general public.
Transportation is also important, so that it can be transported safely to disposal site.

Stage 3: Treatment and Disposal

There are different ways medical waste can be treated and decontaminated.

- ✓ Incineration(Fire) is a common approach that can be used on site or off site to both treat and dispose of waste at the same time.

- ✓ However, BMW can also decontaminate waste with below methods

    - Thermal processing (autoclaving),
    - Irradiative, chemical or biological (enzyme) treatments.

        - ✓ Chemical treatment is often used to decontaminate liquid waste, so that it can be disposed of locally.

    The rest of the methods can be used to decontaminate waste before it can be land-filled.

(Information source):

https://earthronwasteplatform.tumblr.com/post/613619600107700224/compliance-for-pickup-and-transportation-process

http://www.bwaste.com/3-stages-of-medical-waste-disposal/