MEDICAL WASTE MANAGEMENT

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WHAT IS A MEDICAL WASTE?

**Definition:**
Medical waste includes
- all infectious waste
- hazardous
- any other wastes

- Generated from all types of health care institutions
  - Hospitals
  - Clinics
  - doctor’s
  - medical laboratories.
<table>
<thead>
<tr>
<th>Category</th>
<th>Type of waste</th>
<th>Treatment &amp; disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Human anatomical wastes</td>
<td>Incineration/ deep burial</td>
</tr>
<tr>
<td>Category 2</td>
<td>Animal wastes</td>
<td>Incineration/deep burial</td>
</tr>
<tr>
<td>Category 3</td>
<td>Microbiology and biotechnology waste</td>
<td>Local autoclaving/microwaving/incineration</td>
</tr>
<tr>
<td>Category 4</td>
<td>Waste sharps like Needles, syringes, scalpels, blades, glass etc</td>
<td>Disinfection (Chemical/autoclaving/microwaving and mutilation/shredding)</td>
</tr>
<tr>
<td>Category 5</td>
<td>Discarded Medicines and cytotoxic drugs</td>
<td>Incineration/destruction and disposal in land fills</td>
</tr>
<tr>
<td>Category</td>
<td>Type of waste</td>
<td>Treatment &amp; disposal</td>
</tr>
<tr>
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<tr>
<td>Category 6</td>
<td>Soiled wastes&lt;br&gt;Items contaminated with blood and body fluids including cotton, dressings, soiled plaster, linens, bedding, other materials, contaminated with blood</td>
<td>Incineration / autoclaving/microwaving</td>
</tr>
<tr>
<td>Category 7</td>
<td>Solid wastes&lt;br&gt;Wastes generated from disposable items other than waste sharps such as tubing, catheters, IV sets</td>
<td>Disinfection by chemical treatment/autoclaving/microwaving and mutilation and shredding</td>
</tr>
<tr>
<td>Category 8</td>
<td>Liquid wastes&lt;br&gt;Laboratory, blood banks, hospitals, house etc.</td>
<td>Disinfection by chemicals and discharge into drains</td>
</tr>
<tr>
<td>Category 9</td>
<td>Incineration ash</td>
<td>Disposal in municipal land fills</td>
</tr>
<tr>
<td>Category 10</td>
<td>Chemical wastes</td>
<td>Chemical treatment and discharge into drains for liquid and secured land</td>
</tr>
<tr>
<td>Waste Category</td>
<td>Type of waste</td>
<td>Treatment And Disposal Option</td>
</tr>
<tr>
<td>----------------</td>
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</tr>
<tr>
<td>Category No. 1</td>
<td>Human Anatomical Waste (Human tissues, organs, body parts)</td>
<td><strong>Incineration</strong> (Incineration/deep burial)</td>
</tr>
<tr>
<td>Category No. 2</td>
<td>Animal Waste (Animal tissues, organs, body parts, Bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals and colleges, discharge from hospitals, animal houses)</td>
<td><strong>Incineration</strong> Incineration/deep burial</td>
</tr>
</tbody>
</table>
| Category No.3 | Microbiology & Biotechnology Waste  
(Wastes from clinical samples, pathology, hematology, biochemistry, blood bank, laboratory culture, specimen of live microorganisms or attenuated vaccines, infectious agents from research and industrial laboratories) | Local autoclaving/ microwaving/chemical treatment  
F/b mutilation/shredding  
Secured landfill/recyclable |
| --- | --- | --- |
| Category No.4 | Waste Sharps (Needles, syringes, scalpels blades, glass,) | Local autoclaving/ microwaving/chemical treatment  
F/b mutilation/shredding  
Secured landfill/recyclable |
| Category No.5 | Discarded Medicine and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded) | Incineration / destruction and disposal in secured landfills (varies from drug to drug) |
Category No.6 Soiled Waste (Items contaminated with body fluids including cotton, dressings, soiled plaster casts, linens, bedding and other materials contaminated with blood.

Category No.7 Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)

Category No.8 Chemical Waste (Chemicals used in production of biological, chemicals used in disinfecting, as insecticides, etc.)
<table>
<thead>
<tr>
<th>Color code</th>
<th>Type of container</th>
<th>Waste category</th>
<th>Treatment options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Plastic bags</td>
<td>Human and animal wastes, Microbiological and biological wastes and soiled wastes</td>
<td>Incineration /deep burial</td>
</tr>
<tr>
<td>Red</td>
<td>Disinfected container/plastic bag</td>
<td>Microbiological and biotechnological wastes, soiled waste, solid waste category</td>
<td>Autoclaving / Micro waving / chemical treatment</td>
</tr>
<tr>
<td>Blue/white transparent</td>
<td>Plastic bags/puncture proof container</td>
<td>Waste sharps and solid waste category</td>
<td>Autoclaving / Micro waving / chemical treatment, Destruction and shredding</td>
</tr>
<tr>
<td>Black</td>
<td>Plastic bag</td>
<td>Discarded medicines, cytotoxic drugs, incineration ash and chemical wastes</td>
<td>Disposal in secured land fills</td>
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<td>-------------------------------------</td>
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<tr>
<td>1) Apply to those health care center having &gt;1000 pt./month</td>
<td></td>
<td>Apply to all health care center irrespective of no. of patients.</td>
<td></td>
</tr>
<tr>
<td>2) Apply all type of waste including municipal solid waste, radioactive substance, batteries waste, hazardous chemical.</td>
<td></td>
<td>Not Apply to municipal solid waste, radioactive substance, batteries waste, hazardous chemical (separate act for it)</td>
<td></td>
</tr>
<tr>
<td>3) cat.3 and cat.6-red/yellow bag cat.7-red/blue cat.4-blue bag</td>
<td></td>
<td>cat.3—red bag and cat.6---yellow bag cat.7-red bag cat.4-red bag</td>
<td></td>
</tr>
<tr>
<td>4) 10 categories of waste.</td>
<td></td>
<td>4) Only 8 categories of waste.</td>
<td></td>
</tr>
</tbody>
</table>
WHAT IS A REGULATED MEDICAL WASTE?

Definition of Regulated Medical Waste include seven distinct categories:

1. Cultures and stocks of infectious agents.
2. Human pathological wastes (e.g. tissues, body parts)
3. Human blood and blood products
4. Sharps (e.g. needles and syringes)
5. Certain animal wastes
6. Certain isolation wastes (e.g. Sputum, Stool)
7. Unused sharps.
EPA categorizes infectious wastes into the following seven categories:

1. Isolation wastes – wastes generated by hospitalized patients.

2. Cultures and stocks of infectious agents includes:
   - Specimens from medical and biological laboratories.

3. Human blood and blood products – this includes waste blood, serum, plasma.
4. Pathological waste – tissues, organs, body parts, blood, and body fluids.

5. Contaminated sharps – contaminated hypodermic needles, syringes, Pasteur pipettes, and broken glass.

6. Contaminated animal carcasses, body parts, and animal bedding

7. Miscellaneous Wastes include:
   - Wastes from surgery and autopsy
   - Miscellaneous laboratory wastes
   - Dialysis unit wastes
1. Designation of the waste that should be managed as infectious
2. Segregation of infectious waste from the noninfectious waste
3. Packaging
4. Storage
5. Treatment
6. Disposal
7. Contingency measures for emergency situations
8. Staff training
SEGREGATING MEDICAL WASTES

✓ do not combine medical waste with hazardous chemicals or radioactive waste.

✓ Sharps should be stored in puncture-proof containers.

✓ Separate pathology wastes.

✓ Separate chemotherapy wastes.
PACKAGING INFECTIOUS WASTE

- Plastic bags
  • for many types of solid or semisolid infectious waste.
- Bottles, flasks, or tanks
  • for liquids.

✓ Place liquid wastes in capped/ tightly stopped bottles.

✓ Do not compact infectious wastes before treatment.
HANDLING SHARPS

✓ Risk for spreading blood-borne infection:
✓ Due to
  – During recapping of needles
  – Failing to dispose of used needles
  – Accidental breakage of glass test tube.
STORAGE

✓ Locating the storage area near the treatment site.

✓ Minimizing storage time.

✓ Proper packing.

✓ Limited access

✓ Displaying universal biological hazard symbol on storage area.
MEDICAL WASTE HANDLING

Three methods
1. By a healthcare professional employed & facility.
2. By contract with a transporter registered.
3. By parcel post, or courier service (sharps only).
There are several methods.

1. Incineration
2. Thermal inactivation
3. Gas/Vapor Sterilization
4. Sterilization by irradiation
5. Chemical Disinfection
6. Autoclaving
Steam sterilization:
• low-density material such as plastics, bottles, and flasks.

• High-density plastic should not be used in this process.
Particulate Matter
1. Carbon Monoxide
2. Dioxin
3. Sulfur Dioxide
4. Hydrogen Chloride
5. Nitrogen Oxides
6. Cadmium
7. Lead
8. Mercury
THERMAL INACTIVATION

✓ Treatment of waste with high temperatures.

✓ Liquid waste is collected in a vessel and heated by heat exchangers.

✓ The types of pathogens in the waste determine the temperature and duration of treatment.
✓ Consider the following:
  – Type of microorganism.
  – Degree of contamination.
  – Amount of proteinaceous material present.
  – Type of disinfectant.
  – Other factors such as temperature, pH.
Gas/vapor sterilization uses gaseous& chemicals.

Ethylene oxide is the most commonly used agent.
STERILIZATION BY IRRADIATION

- **Advantages**: 
  - Electricity requirements are nominal.

- **Disadvantages**: 
  - Capital costs are high. 
  - Highly trained personnel are required.
PROPORTIONS IN HOSPITAL WASTE

- 80% General waste
- 15% Patho&Infectious waste
- 3% Sharp waste
- 1% Chem.&pharmaceutical waste
- 1% Radio & cytotoxic waste
DECONTAMINATION

- A solution of 5.25% sodium hypochlorite (household bleach / Clorox) diluted between 1:10 and 1:100 with water.

- Lysol for tuberculocidal disinfectant.

- Wear gloves and lab coat.

- Wash hands.