

# Chapter 18

# Healthcare Waste Management

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## Key points

- Sharps are the most likely healthcare waste to cause injury and/or exposure. Therefore, a waste management program must focus on sharps handling.
- Proper segregation will reduce the risk of disease transmission and minimise the amount of potentially infectious health care waste generated.
- A range of treatment options for waste are available. Consideration should be given to those that reduce the opportunity for exposure and not necessarily inactivation of microorganisms.
- Education and regular reinforcement of practices are the keys to success.

## Introduction

Healthcare activities inevitably generate health care waste (HTCW). The proper management of HTCW creates a safer environment for staff, solid waste workers, and the public. HTCW management is dictated by professional standards, local laws and national legislation, and, most importantly, available resources.

## Definitions

HTCW can be considered any waste generated in a healthcare setting. There is more concern regarding the hazardous aspect of waste, i.e., infectious, chemical, or radioactive waste, as listed in Table 18.1.

**Table 18.1:** World Health Organization categories of Health Care Waste (abbreviated)

Waste category	Description and examples
Infectious waste	Waste suspected to contain pathogens, i.e., laboratory cultures, waste from isolation wards, tissues (swabs), materials or equipment that have been in contact with infected patients, excreta. This category also includes pathological and sharps waste.
Pharmaceutical waste	Waste containing pharmaceuticals, i.e., pharmaceuticals that are expired or no longer needed, items contaminated by or containing pharmaceuticals (bottles, boxes).
Genotoxic waste	Waste containing substances that are capable of causing damage to DNA, i.e., waste containing cytostatic drugs (often used in cancer therapy), genotoxic chemicals.
Chemical waste	Waste containing chemical substances, i.e., laboratory reagents, film developer, disinfectants that are expired or no longer needed, solvents.
Radioactive waste	Waste containing radioactive substances, i.e., unused liquids from radiotherapy or laboratory research, contaminated glassware, packages or absorbent paper, urine and excreta from patients treated or tested with unsealed radionuclides, sealed sources.

Infectious waste includes the following 5 categories:

1. Microbiological - culture plates, growth media, etc.
2. Sharps – any object that can cause percutaneous injury
3. Pathological – human tissues
4. Swabs, dressings, bandages contaminated with potentially infectious fluids
5. Blood – tubes of blood, units of blood, blood and blood products, and other containers used to collect blood

## **Collection**

Once waste is identified it must be collected using containers that reduce the risk of exposure. Containers must meet the minimum specifications shown in Table 18.2. They should be labelled with the international biohazard symbol and not overfilled. The biohazard label can be painted on containers or rolls of self-adhesive labels can be used.

HTCW should be segregated from regular garbage at all health care facilities. It should be placed in special collection containers at the point of generation and kept separate from other waste. Labelled containers should be placed in areas where the specific waste is generated, along with containers for general garbage. Non-infectious and non-hazardous wastes should be disposed of with regular garbage, recycled or composted as appropriate.

## **In-House Transport**

Waste transporters should wear gloves. Any cart for transporting HTCW within the facility should be fully enclosed. HTCW carts should be used only for that purpose and not for regular garbage. They should be cleaned and disinfected regularly.

**Table 18.2.** Specifications for Collection Containers

Type of Waste	Specifications for Container or Bag	Examples
Sharps	<ul style="list-style-type: none"> <li>- Container should be puncture-resistant, leak-proof on the sides and bottom, and durable.</li> <li>- Container should have a biohazard label.</li> <li>- Container should be closable if used to transport sharps waste.</li> </ul>	<ul style="list-style-type: none"> <li>- Empty bleach bottle with a biohazard label</li> <li>- Thick rigid puncture-resistant cardboard box with a biohazard label</li> <li>- Rigid plastic container with a biohazard label</li> </ul>
Non-sharps biomedical solid and semi-liquid waste	<ul style="list-style-type: none"> <li>- Plastic bag that is leak-proof; designed to prevent ripping, tearing, or bursting under normal use. The plastic bag should be placed inside a rigid container.</li> <li>- Rigid container should be leak-proof, durable, labelled with a biohazard symbol, and red or yellow in colour.</li> </ul>	<ul style="list-style-type: none"> <li>- Red or yellow plastic bags should be used</li> <li>- Whenever coloured bags are not available, plastic bag with a biohazard label can be placed in a red or yellow-painted garbage can or dust bin</li> </ul>
Non-sharps biomedical liquid waste	<ul style="list-style-type: none"> <li>- Container should be leak-proof and durable.</li> <li>- Container should be marked with a biohazard label if it will be used to transport waste.</li> <li>- Container should be designed to be transported without spillage.</li> </ul>	<ul style="list-style-type: none"> <li>- Bottles, vials, plastic containers, canisters, pails marked with biohazard labels</li> </ul>

## Storage

If storage of waste is necessary, the storage area (skip, shed, etc.) should meet the following parameters:

- Be protected from water, rain, or wind;
- Minimise the impact of odours, putrescent waste (waste that can decompose and produce odours after several days). Do not store for more than 3 days. Putrescent waste should be transported to the landfill immediately and buried in special trenches;

- Be accessible to authorized employees and lockable to prevent unauthorized access;
- Be protected from animals and not provide a breeding place or food source for insects and rodents;
- Keep clean and free at all times of any loose debris and standing water. Container should be disinfected weekly and whenever a spill occurs.

## **Treatment and Off-Site Transport**

Use of campfire-style open-pit burning, burning in a cement firebox, burning in drums, and open-burn cement-block incinerators should be discontinued. The World Health Organization does not recommend these methods because they are inefficient in destroying pathogens and release high levels of toxic pollutants. Use the low-cost interim options shown in Table 18.3. The use of a small in-house incinerator, the local crematorium, and newer large-scale medical waste incinerator should be replaced where possible by interim options and, eventually, by cleaner, state-of-the-art non-burn treatment technologies.

These treatment methods can be used in combination. HTCW from outlying areas could be transported and centralized. The waste should be contained in sealed plastic bags and/or sharps containers and placed in hard corrugated cardboard boxes for transport to the main health centre every few days (sooner for putrescent waste) or whenever sufficient waste has accumulated. The containers should have a biohazard label.

Health centres may decide to bury blood-soaked material, small tissues, and placentas in small burial pits and transport sharps for disposal in special landfill trenches. This would reduce the amount of waste being transported to the landfill and avoid the problem of storing putrescent waste for extended periods. Another approach is to use sharps disposal burial pits only for needles, syringes and items that may injure waste pickers and transporters; other waste such as blood-soaked material, can be picked up and disposed in special landfill trenches.

**Table 18.3.** Waste Treatment and Disposal Options

Type of Waste	Methods	Notes
All infectious wastes <i>except</i> cultures and anatomical parts	Packaging, transport, and burial in special landfill trenches	This method should be used by large facilities (hospitals).
	Small on-site burial pits	This method could be used in health centres away from coastal areas and local wells, in areas that do not flood, and where the water table is at least 1.5 metres deeper than the bottom of the pit.
	Cement encasings	This method could be used in health centres near coastal areas or in areas with a shallow water table.
Cultures	Small on-site autoclave	Preferably in the laboratory
Anatomical parts	Interment at burial grounds or cemeteries	This is the basic method for body parts.
	Cremation	Use a local crematorium.
Placenta waste and small-tissue waste	Small on-site burial pits or interment at burial grounds or cemeteries	These are acceptable methods.
	Composting method	This is an acceptable method.
Free-flowing blood and body fluids	Sanitary sewer	This method applies to all health facilities with sanitary sewers.

A scheme<sup>1</sup> is available that outlines the packaging and transportation requirements of infectious waste based upon the types of microorganisms that may be contained in the waste. Infectious waste is classified into two categories –

**Category A:** an infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease to humans or animals. Category A waste includes waste from highly infectious diseases, such as the Ebola virus, and cultures of certain infectious diseases including *Clostridium botulinum*.

**Category B:** an infectious substance which does not meet the criteria for inclusion in Category A.

## Management

All health care facilities should have a person or group responsible for HTCW and waste management plans. Waste management can be incorporated into policies, procedures, and programmes to minimize the risk of spreading infection in and from the hospital, thereby protecting patients, health-care workers, and the public.

## Training

A training programme should be initiated to present the elements of a plan and begin its implementation. Initial training could emphasise safe HTCW management practices and address issues related to the comprehensive, long-term plan. Practical training should be provided to all those involved in handling, packaging, transporting, and disposing of HTCW.

## Conclusions

Healthcare waste is an inevitable part of health care. Infection prevention and control practitioners must use their experience and understanding of the chain of infection when developing a practical approach to waste management. Even lacking resources, if one focuses on the true risks of HTCW, a safe and effective program can still be achieved.

## References and Further Reading

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