



## **Guideline for Waste Management**

### **Acknowledgements**

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## 1.1 List of Abbreviations

- 1.1.1 **CDC:** Centers for Disease Control and Prevention
- 1.1.2 **IPC:** Infection prevention and control
- 1.1.3 **KPIs:** Key Performance Indicators.
- 1.1.4 **MoHP:** Ministry of Health and Population
- 1.1.5 **PPE:** Personal Protective Equipment
- 1.1.6 **WHO:** World Health Organization

## 1.2 Glossary

- 1.2.1 **Chemical and pharmaceutical waste:** This includes the chemical and pharmaceutical products if not in use, or the expiry date approaches. This waste is returned to the original supplier or manufacturer.
- 1.2.2 **Collection:** Waste is gathered in color-coded bins, stored temporarily in a designated area, and transported daily to the treatment unit.
- 1.2.3 **Cytotoxic waste:** The waste containing substances with genotoxic properties, e.g. waste containing cytostatic drugs (often used in cancer therapy); genotoxic chemicals.
- 1.2.4 **Hazardous healthcare waste:** Waste generated from healthcare facilities activities that pose significant risks to human health, safety, or the environment due to its hazardous properties.
- 1.2.5 **Infectious waste:** Waste is contaminated with blood, bodily fluids, or other substances capable of transmitting infectious pathogens to humans. These wastes pose a significant risk of infection and require specialized handling, treatment, and disposal to prevent the spread of disease, which is collected in red bags.
- 1.2.6 **Non-Hazardous Waste:** Ordinary waste does not pose a risk of injury to workers, patients, visitors, or other members of the community. These wastes are similar in composition to household waste, which is collected in black bags.
- 1.2.7 **Off-site Transportation:** When a facility lacks the necessary treatment equipment, hazardous waste must be transported off-site for proper treatment or disposal.
- 1.2.8 **On-site Transportation:** Transport healthcare waste inside healthcare facilities.
- 1.2.9 **Pathological waste:** The waste is derived from the human body and poses significant risks to health and the environment. This type of waste includes human tissues, organs, fluid, body parts.

**1.2.10 Radioactive waste:** This is a type of waste such as products contaminated by radionuclides including radioactive diagnostic material or radiotherapeutic materials.

**1.2.11 Segregation:** Waste is sorted at the point of generation based on type, using color-coded bags, sharp containers, and designated buckets. This ensures hazardous waste is handled safely and efficiently, following facility policies or national regulations.

**1.2.12 Sharps:** The objects or materials used in healthcare that can penetrate the skin or pose a risk of cuts or puncture injuries. This includes syringes, needles, scalpels, which are collected in safety boxes.

**1.2.13 Temporary Storage:** Store healthcare waste in a secure, lockable area away from patients, visitors, and staff in each department in a healthcare facility.

**1.2.14 Waste Identification:** Recognize and classify hazardous waste according to its potential risks, such as infectious, chemical, pharmaceutical, or radioactive materials.

### 1.3 Management of Waste in Hospitals Executive Summary

Healthcare waste contains potentially harmful microorganisms that can infect patients, health workers and the public. Other potential hazards may include drug-resistant microorganisms which spread from health facilities into the environment. Treatment and disposal of healthcare waste may pose health risks indirectly through the release of pathogens and toxic pollutants into the environment.

Healthcare waste management requires increased attention and diligence to avoid adverse health outcomes associated with poor practice, including exposure to infectious agents and toxic substances.

Recommendations
Inform personnel involved in the handling and disposal of potentially infectious waste of possible health and safety hazards; ensure that they are trained in appropriate handling and disposal methods. <b>(Conditional Recommendation)</b>
Manage the handling and disposal of medical wastes generated in isolation areas by using the same methods as for medical wastes from other patient-care areas <b>(Good Practice Statement)</b>
Place disposable syringes with needles, including sterile sharps that are being discarded, scalpel blades, and other sharp items into puncture-resistant and leak proof containers located as close as practical to the point of use <b>(Conditional Recommendation)</b>
Do not bend, recap, or break used syringe needles before discarding them into a container <b>(Conditional Recommendation)</b>
Store regulated medical wastes awaiting treatment in a properly ventilated area that is inaccessible to pests; use waste containers that prevent the development of noxious odors. <b>(Conditional Recommendation)</b>
If treatment options are not available at the site where the medical waste is generated, transport regulated medical wastes in closed, impervious containers to the on-site treatment location or to another facility for treatment as appropriate <b>(Conditional Recommendation)</b>
Treat medical wastes by using a method (e.g., steam sterilization, incineration, interment (burial), or an alternative treatment technology) approved by the appropriate authority having jurisdiction before disposal in a sanitary landfill <b>(Conditional Recommendation)</b>

Biosafety level 3 laboratories must inactivate microbiological wastes in the laboratory by using an approved inactivation method (e.g., autoclaving) or incinerate them at the facility before transport to and disposal in a sanitary landfill.

**(Conditional Recommendation)**

Biosafety levels 1 and 2 laboratories should develop strategies to inactivate amplified microbial cultures and stocks onsite by using an approved inactivation method (e.g., autoclaving) instead of packaging and shipping untreated wastes to an offsite facility for treatment and disposal **(Good Practice Statement)**

Laboratories that isolate select agents from clinical specimens must comply with MoHP regulations for the receipt, transfer, management, and appropriate disposal of these agents. **(Conditional Recommendations)**

Sanitary sewers may be used for the safe disposal of blood, suctioned fluids, ground tissues, excretions, and secretions, provided that local sewage discharge requirements are met and that the governmental regulations have declared this to be an acceptable method of disposal **(Good Practice Statement)**

## 1.4 Introduction

Healthcare waste management is a critical aspect of maintaining public health and safety within healthcare settings. It involves the systematic handling, treatment, and disposal of waste generated by healthcare facilities, such as medical procedures, surgeries, patient care, and research. Healthcare waste can contain a variety of materials, including infectious substances, chemicals, sharps, pharmaceuticals, and non-hazardous items. If not managed properly, these wastes pose serious risks to human health, the environment, and public safety.

Effective Healthcare waste management aims to minimize these risks by implementing proper waste identification, segregation, storage, transportation, treatment, and disposal practices. It is essential to ensure the protection of healthcare workers, patients, and the broader community from the dangers associated with hazardous or infectious waste. Furthermore, adhering to healthcare waste management guidelines helps healthcare facilities comply with regulatory standards, reduce environmental impact, promote sustainability and protect human health.

## 1.5 Scope and Purpose

The guideline applies to healthcare facilities and all healthcare workers and emphasizes the critical role of effective healthcare waste management in preventing the spread of infection and protecting both public health and the environment. It provides clear

instructions on proper segregation, handling, transportation, treatment, and disposal of healthcare waste. The goal is to support healthcare operators in implementing best practices for waste management and infection control.

Improper handling of healthcare waste poses significant risks of infection, injury, and environmental contamination. Safe and efficient waste management practices are essential to minimize these risks and reduce the likelihood of healthcare-associated infections.

This guideline aims to equip healthcare workers with practical steps to prevent cross-contamination and ensure the safe disposal of hazardous waste, protecting patients, staff, and the broader community.

## **1.6 Target Audience**

- 1.6.1** Medical doctors, Nurses, Pharmacists, Dentists, and other healthcare workers, including cleaners and healthcare waste handlers (Proper healthcare waste management is essential to ensure safety, prevent infections, and protect staff, patients, and the environment from harmful exposures).
- 1.6.2** Infection Prevention and Control (IPC) Practitioners (Understanding the importance of healthcare waste management and implementing best practices is crucial to minimizing risks and promoting safer healthcare environments).
- 1.6.3** Policy- and Decision-Makers (Effective healthcare waste management is a cost-effective strategy to protect public health, meet regulatory standards, and achieve broader environmental and health goals).

## 1.7 Methodology

A comprehensive search for guidelines was undertaken to identify the most relevant guidelines to consider for adaptation.

Inclusion/ exclusion criteria followed in the search and retrieval of guidelines to be adapted:

- Selecting only evidence-based guidelines (guideline must include a report on systematic literature searches and explicit links between individual recommendations and their supporting evidence)
- Selecting only national and/or international guidelines
- Specific range of dates for publication (using Guidelines published or updated in 2013 and later)
- Selecting peer reviewed publications only
- Selecting guidelines written in English language
- Excluding guidelines written by a single author, not on behalf of an organization to be valid and comprehensive, a guideline ideally requires multidisciplinary input.
- Excluding guidelines published without references as the panel needs to know whether a thorough literature review was conducted and whether current evidence was used in the preparation of the recommendations.

The following characteristics of the retrieved guidelines were summarized in:

- Developing organization/authors
- Date of publication, posting, and release
- Country/language of publication
- Date of posting and/or release
- Dates of the search used by the source guideline developers.

All retrieved Guidelines were screened and appraised using AGREE II instrument ([www.agreetrust.org](http://www.agreetrust.org)) by at least three members. The panel decided on a cut-off point or ranked the guidelines (any guideline scoring above 50% on the rigor dimension was retained). The committee decided to adapt from:

- World Health Organization (WHO). Guidelines on Healthcare waste, 2024.
- Centers for Disease Control and Prevention (CDC). Guidelines for Environmental Infection Control in Health-Care Facilities (2003); Part II. Recommendations for Environmental Infection Control in Health-Care Facilities updated January 11, 2024.

## Evidence assessment

According to WHO Handbook for Guidelines, we used the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) approach to assess the quality of a body of evidence, develop and report recommendations. GRADE methods are used by WHO because these represent internationally agreed standards for making transparent recommendations. Detailed GRADE information is available on the following sites:

- GRADE working group: <http://www.gradeworkinggroup.org>
- GRADE online training modules: <http://cebgrade.mcmaster.ca/>
- GRADE profile software: <http://ims.cochrane.org/revman/gradepro>

**Table (1) Quality and Significance of the four levels of evidence in GRADE**

Quality	Definition	Implications
<b>High</b>	The guideline development group is very confident that the true effect lies close to that of the estimate of the effect	Further research is very unlikely to change confidence in the estimate effect
<b>Moderate</b>	The guideline development group is moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different	Further research is likely to have an important impact on confidence in the estimate of the effect and may change the estimate
<b>Low</b>	Confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the true effect	Further research is very likely to have an important on confidence in the estimate of effect and is unlikely to change the estimate
<b>Very low</b>	The group has very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of the effect	Any estimate of the effect is very uncertain

**Table (2) Factors that determine How to upgrade or downgrade the quality of evidence.**

Downgrade in presence of	Upgrade in presence of
Study limitations. 1- Serious limitations 2- Very serious limitations	Dose- response gradient. +1 Evidence of a dose-response gradient
Consistency 1- Important inconsistency	Direction of plausible bias + All plausible confounders would have reduced the effect
Directness 1- Some uncertainty 2- Major uncertainty	Magnitude of the effect +1 Strong, no plausible Confounder, consistent and direct evidence
Precision 1- Imprecise data	+2 very strong, no major threats to validity and direct evidence
Reporting bias 1- High probability of reporting bias	

### The strength of the recommendations

The strength of a recommendation communicates the importance of adherence to the recommendation.

- **Strong recommendations**

With strong recommendations, the guideline communicates the message that the desirable effects of adherence to the recommendation outweigh the undesirable effects. This means that in most situations the recommendation can be adopted as policy.

- **Conditional recommendations**

These are made when there is greater uncertainty about the four factors above or if local adaptation has to account for a greater variety in values and preferences, or when resource use makes the intervention suitable for some, but not for other locations. This means that there is a need for substantial debate and involvement of stakeholders before this recommendation can be adopted as policy.

#### When not to make recommendations?

When there is lack of evidence on the effectiveness of an intervention, it may be appropriate not to make a recommendation.

## 1.8 Recommendations

Recommendations
<p>Inform personnel involved in the handling and disposal of potentially infective waste of possible health and safety hazards; ensure that they are trained in appropriate handling and disposal methods. <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>Manage the handling and disposal of medical wastes generated in isolation areas by using the same methods as for medical wastes from other patient-care areas <b>(Good Practice Statement)</b></p>
<p>Place disposable syringes with needles, including sterile sharps that are being discarded, scalpel blades, and other sharp items into puncture-resistant leak proof containers located as close as practical to the point of use <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>Do not bend, recap, or break used syringe needles before discarding them into a container <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>Store regulated medical wastes awaiting treatment in a properly ventilated area that is inaccessible to pests; use waste containers that prevent the development of noxious odors. <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>If treatment options are not available at the site where the medical waste is generated, transport regulated medical wastes in closed, impervious containers to the on-site treatment location or to another facility for treatment as appropriate <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>Treat regulated medical wastes by using a method (e.g., steam sterilization, incineration, interment (burial), or an alternative treatment technology) approved by the appropriate authority having jurisdiction before disposal in a sanitary landfill <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>Biosafety level 3 laboratories must inactivate microbiological wastes in the laboratory by using an approved inactivation method (e.g., autoclaving) or incinerate them at the facility before transport to and disposal in a sanitary landfill. <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>
<p>Biosafety levels 1 and 2 laboratories should develop strategies to inactivate amplified microbial cultures and stocks onsite by using an approved inactivation method (e.g., autoclaving) instead of packaging and shipping untreated wastes to an offsite facility for treatment and disposal <b>(Good Practice Statement)</b></p>
<p>Laboratories that isolate select agents from clinical specimens must comply with MoHP regulations for the receipt, transfer, management, and appropriate disposal of these agents. <b>(Conditional Recommendation, Moderate Evidence Grade)</b></p>

Sanitary sewers may be used for the safe disposal of blood, suctioned fluids, ground tissues, excretions, and secretions, provided that local sewage discharge requirements are met and that the governmental regulations have declared this to be an acceptable method of disposal. **(Good Practice Statement)**

## Rationale:

### 1.8.1 Training and Awareness

- Training ensures personnel understand the risks and are equipped to handle waste safely, reducing the likelihood of exposure to infectious agents or hazardous materials. This also promotes compliance with safety standards and enhances overall waste management efficiency. Using appropriate personal protective equipment (PPE). Removing PPE and perform hand hygiene when finish handling healthcare waste.

### 1.8.2 Waste Management

- **Proper segregation at source:** Prevents mixing infectious and non-infectious waste, facilitating appropriate disposal and treatment. Color codes and biohazard symbols ensure easy identification, reducing handling errors and risk of exposure. Color codes according to MOH until color codes of MOE are issued.
- **On-site Transportation:** Transport healthcare waste during off-peak hours to avoid high patient flow. Using sealed containers to prevent leaks and exposure during transport, easy-to-clean containers. While following designated routes away from patient and staff areas to minimize contamination in high-traffic areas. Labelling waste bags and sharps containers with origin, date, and weight to ensure traceability and accountability in waste management.
- **Storage of Regulated Medical Waste:** Proper ventilation limits the buildup of noxious odour, while secure containers prevent pest infestation and environmental contamination. Secure storage prevents unauthorized access and accidental exposure of unwanted persons or domestic pets while adhering to time limits reduces odour formation and decomposition of waste, particularly in warmer conditions.

- **Waste Receptacle Management:** Scheduled emptying maintains hygiene and prevents overflow-related hazards. Overfilled bins increase the risk of spills and contamination, making regular emptying essential. Daily cleaning of bins minimizes microbial contamination and prevents odours. Uniform management of healthcare waste in isolation areas ensures consistent safety practices across the facility.
- **Off-site Transportation:** Ensuring the transport vehicle complies with specifications and is licensed by appropriate authorities for hazardous waste transport of healthcare waste. Proper treatment inactivates pathogens, reducing the risk of environmental contamination during handling and transportation toward final disposal area, therefore protecting public health.
- **Disposal of healthcare waste:** Untreated healthcare waste is disposed of in landfills designated for hazardous waste. Treated healthcare waste, after processes such as shredding, sterilization, incineration, or any MOH-approved method, is disposed of in accordance with the specified treatment methods.
- **Safe Sharps Waste Disposal:** Sharps containers prevent injuries and ensure safe handling during and after disposal. Proximity of containers to usage points minimizes handling and reduces needlestick injuries. Avoiding manipulation of used needles reduces the risk of accidental injury or contamination.

### 1.8.3 Biosafety Laboratory Waste Management

Laboratory waste often contains highly infectious agents; inactivation at the source according to regulations will minimize the risks of accidental release during transport or disposal.

## 1.9 Indicators for Monitoring

Key Performance Indicators (KPIs) for waste segregation and management in infection prevention and control can help healthcare facilities ensure effective waste management practices, minimize risks of infection, and promote environmental sustainability:

### 1.9.1 Waste Segregation Compliance Rate:

- **Definition:** Measures the percentage of waste correctly segregated according to the specified categories (e.g., general, biohazard, sharp objects, pharmaceutical waste).
- **Calculation:**  $(\text{Number of waste bins correctly segregated} / \text{Total number of waste bins audited}) \times 100$

### 1.9.2 Sharps Disposal Compliance Rate

- **Definition:** Tracks proper disposal of sharps in designated containers to prevent accidental needlesticks and injuries.
- **Calculation:**  $(\text{Number of sharps containers correctly used} / \text{Total number of sharps disposal points audited}) \times 100$

### 1.9.3 Percentage of Healthcare Workers Trained in Waste Segregation Protocols

- **Definition:** Measures the percentage of healthcare workers trained annually in waste segregation protocols to ensure knowledge and adherence to best practices.
- **Calculation:**  $(\text{Number of trained workers} / \text{Total number of staff}) \times 100$

### 1.9.4 Waste Collection Timeliness

- **Definition:** Tracks the percentage of waste collected on time to prevent overflow and maintain hygiene standards.
- **Calculation:**  $(\text{Number of collections made on schedule} / \text{Total number of scheduled collections}) \times 100$
- **Target:** 95% or higher.

### 1.9.5 Audit Compliance Rate for Waste Segregation Protocols

**Definition:** Measures compliance with waste segregation protocols during regular internal or external audits.

**Calculation:** (Number of compliant audit findings / Total audit findings) x 100

### 1.10 Plan to Update this National Clinical Guideline

This guideline will be reviewed and updated when new evidence emerges that is likely to influence the recommendations.

## References

- World Health Organization (WHO). Guidelines on Healthcare waste, 2024. Available at: <https://www.who.int/news-room/fact-sheets/detail/health-care-waste>
- Centers for Disease Control and Prevention (CDC). Guidelines for Environmental Infection Control in Health-Care Facilities (2003); Part II. Recommendations for Environmental Infection Control in Health-Care Facilities updated January 11, 2024. Available at: <https://www.cdc.gov/infection-control/hcp/environmental-control/recommendations.html>
- Occupational Safety and Health Administration (OSHA). Healthcare: Workplace Safety and Health Topics, (2021).
- National Health Service (NHS) England. Health Technical Memorandum 07-01: Safe Management of Healthcare Waste, (2021).
- Center for Disease Control and Prevention (CDC). Infection Control: Environment of Care and Medical Waste Management, (2020).
- World Health Organization (WHO). Safe Management of Wastes from Health-Care Activities. 2nd ed. Geneva: WHO Press, (2017).
- World Health Organization (WHO). Guidelines on Hand Hygiene in Health Care, (2009).