مـــوان MWAN
المركز الوطني لإدارة النفايات
National Center for Waste Management

الضوابط والأدلة الفنية
لإدارة نفايات الرعاية الصحية

Technical Guidelines
Healthcare Waste Management

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List of acronyms, abbreviations, and definitions

GCC	Gulf Cooperation Council
IR	Implementing Regulations
IR of MWM	Implementing Regulations of Uniform Law for Medical Waste Management
KACARE	Abdullah City for Atomic Renewable Energy
KSA	The Kingdom of Saudi Arabia
MoH	Ministry of Health
MWAN	Nacional Centre for Waste Management
PET scan	Positron emission tomography (PET) scan
PPE	Personal protective equipment
TG	Technical Guideline
WHO	The World Health Organisation
WML	Waste Management Law

Definitions

Bag containers	Stainless steel, or an easy-to-clean plastic, bin with a tightly closing, foot-pedal operated lid, bearing the phrase “Hazardous Medical Waste” and the hazardous biowaste pictogram on its lid and front.
Black bags	A black plastic bag of at least 150-micron thickness with a maximum capacity of 100 litres.
Body organs, parts and remains	Waste containing tissues, human organs, embryonic and placental tissues, blood and its derivatives, and body fluids.
Carcinogenic	Causes cancer
Chemical waste	Waste containing solid, liquid, or gaseous chemicals resulting from diagnostic, treatment, or laboratory activities or used in cleaning and disinfection or sterilization procedures.
Cytostatic substance	A chemical designed or used to stop or slow cell growth
Cytotoxic substance	A chemical designed or used to kill cells
Healthcare facility	Any hospital, clinic, medical Center, pharmaceutical company, medical research Center, pharmacy, or public or private convalescence home.
General waste	Waste that is similar in composition and nature to municipal waste
Genotoxic substance	A chemical that is poisonous to genes
Hazardous waste	Waste classified as hazardous based upon the provisions of the Law and Regulations, which is resulting from industrial or non-industrial activities that contain toxic, flammable, or reactive materials, or corrosives, solvents, degreasers, oils, colorants, paste residuals, acids and alkalis.
Healthcare waste	Waste that is produced from facilities that provide various health care services, laboratories, drug production centers, pharmaceuticals and vaccines, veterinary treatment centers and research institutions, and from treatment and nursing in the home: a. Non-Hazardous Healthcare Waste: Any Waste containing materials such as those found in Municipal Solid Waste, produced from administrative sections and hygiene work within health facilities. b. Hazardous Healthcare Waste: Any Waste produced from contaminated or potentially contaminated sources by infectious or chemical factors and imposes harm towards individuals, society or environment in the process of its production, collection, handling, storage, transport or disposal of.
Highly Infectious waste	Infectious waste certainly and significantly containing dangerous biological factors.
Infectious waste	Waste that may transport any of the infectious diseases as a result of their contamination with bacteria, viruses, parasites, and fungi.
Internal transport	Means of moving healthcare waste from where it is produced to the temporary storage in a facility
Liquid waste container	Rugged and tightly locked yellow containers made of a substance that does not interact with the chemicals in which they are placed, and its capacity does not exceed 50 litres, printed on their sides the phrase “Chemical Waste” and the hazardous medical waste pictogram in clear writing.

Medical Waste Officer	A person holding a university degree in ecologies or allied medical sciences and science who is authorized to follow up on the application of medical waste management within the facility.
Medical Waste Program	The administrative unit authorized to follow up on the medical waste management within the ministry.
Micron	One millionth of a metre or one thousandth of a millimetre.
Mutagenic	Produces mutation in living cells
Non-halogenated plastic	Organic polymers without combined chlorine, bromine, or iodine, such as polyethylene and polypropylene and excluding PVC and plastics containing brominated flame retardants and similar compounds.
Offensive waste	Non-hazardous medical waste, such as used diapers or disposable nappies, incontinence pads, disposable bed liners etc., which may be unpleasant to handle but carry no more risk of infection, than such waste associated with a normal, healthy person.
Pharmaceutical waste (medications)	Waste medications and drugs from the preventive or treatment activities.
Pictogram	The internationally recognised UN symbol denoting a particular hazard.
Preliminary processing	Processing Highly Infectious waste in their production areas using temperatures under pressure or with chemicals to reduce their biological factors.
Processing	Any method or technology used to change the physical, chemical, or biological characteristic of waste and used to neutralize waste, to utilize the substances or energy contained therein or released therefrom, to convert hazardous waste to non-hazardous, less hazardous, or safer waste for Transporting, storage, or disposal, or to condition thereof for the purpose of storage or reducing their size.
Producer	A person who produces locally or abroad or derives them from other materials for the purpose of selling or consuming them.
Radiation pictogram	The logo stated in Figure No. 3 of Form No. (2) of the IR
Radioactive substances containers	Containers made of or surrounded by lead substance bearing the international radiation hazard pictogram.
Red bag	A red plastic bag of at least 150-micron thickness with a maximum capacity of 100 litres bearing the phrase “Hazardous Medical Waste” and the logo of Hazardous Biowaste pictogram.
Sharps container	A rugged, non-pierceable, and Impermeable to liquids yellow plastic container bearing the phrase “Dangerous Sharp Waste” and the dangerous sharps waste pictogram, with a slot that allows for sharp tools waste to be inserted and a cap for sealing and a handle for easy carrying.
Sharp waste	Waste containing sharp materials, such as, syringes, scalpels, surgical scalpels, saws, blades, broken glass, and any other sharp tools may cause a cut or puncture of the body.
Temporary storage	The Storage for no more than 24 hours of hazardous medical waste at a specified storage unit or room at the Facility.
Temporary storage unit/room	A place in which waste is temporarily stored until it is transported outside the healthcare facility or until it is processed.
Teratogenic	Causes mutation to a foetus when a pregnant woman is exposed.

Center	The National Center for Waste Management.
Toxic Substances waste of Genes and Cells	Extremely hazardous special pharmaceutical waste that can kill or prevent the division of cells or gene components, including substances used to treat certain types of cancer and organ transplants. This waste also includes any supplies used in the preparation of these substances in addition to the patient's excretions treated with these substances for a week from the date of the last administered dose.
Transport document	The form specified by the competent entity to follow up on the waste from the point of production to the point of safe storage, handling, or disposal.
Transporter	a person engaged in the off-site transportation of waste by air, rail, highway or water and anyone who transports the trackable waste from its place of production or storage to another location.
Waste contaminated with radioactive substances	Waste containing all solid, liquid, or gaseous substances contaminated with the supplies of radioactive substances resulting from their use in the examinations of human tissues and fluids and in oncology diagnostic, identification, and treatment procedures.

1 Purpose and Scope

1.1 Purpose

This document provides staff in healthcare and waste management with the necessary guidance to facilitate the safe identification, separation, containment, transport, and management of wastes from establishments caring for the health of others.

This guideline has been drafted to assist the correct classification of waste from health care activities that is hazardous and/or offensive and its proper segregation and management via different methods if necessary.

The guideline makes it clear that each facility should produce a specific Waste Management Plan that covers all the waste produced at that facility and implements the requirements of this technical guideline for classification, segregation, separation, storage, transportation, and treatment, as well as any other requirements detailed in this document, such as all health & safety.

1.2 Scope

The guideline outlines the requirements that apply generally to all facilities and organizations which have responsibilities for healthcare waste, and in addition provides a summary of the main aspects of healthcare waste management for each type of establishment or location that produces healthcare waste.

This guideline covers wastes from any facility, organization or location where human healthcare is provided or overseen by a healthcare professional, including:

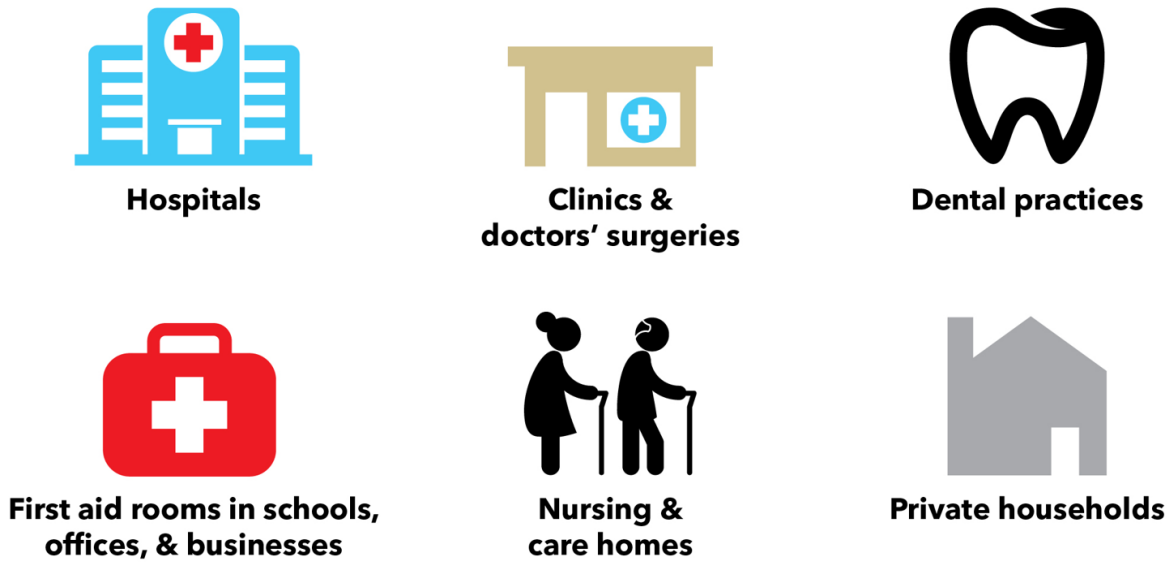

Figure 1-1: Healthcare Facilities covered by the TG

And includes the following types of waste:

Figure 1-2: Type of healthcare waste covered by the TG

It deals mainly with waste once it has been produced but does outline measures for the prevention or reduction of the quantity and/or hazardousness of waste.

2 Legal requirements

This Technical Guideline on Healthcare Waste Management complements:

- Waste Management Law (WML) and its Implementing Regulations for the WML;
- Medical Waste Management Law and the Implementing Regulations of Uniform Law for Medical Waste Management (IR of MWM)1.

It is designed to guide users through the safe, environmentally sound, and lawful management of healthcare waste from all settings. For the precise legal requirements, however, users should consult the WML and its implementing regulations (particularly Chapter 4 Waste Value Chain, Section 8 Waste Treatment, Articles 138 to 150), and in particular the Implementing Regulations of Uniform Law for Medical Waste Management (IR).

2.1 The Waste Management Law (WML)

The WML sets out, inter alia, the duties and responsibilities of waste producers and of licensed waste transporters and waste management service providers.

The WML does not cover healthcare waste specifically. However, it sets the overall framework for waste management in Saudi Arabia and requires all those involved to recycle, recover resources, and ensure safe disposal of waste to achieve better environmental and economic outcomes.

The WML requires waste producers to conserve natural resources and materials, reuse products, reduce waste, store it in the designated areas, and separate it for reuse or recycling. It also covers extended producer responsibility on products for manufacturers and importers, financial sustainability for the waste management sector and the concept of circular economy. The WML prescribes the responsibilities of those providing waste services, including compliance with the waste management standards and means of transportation set by the national waste management centre (MWAN).

This law also regulates the import and export of waste as well as dealing with emergency situations and prohibits the import of hazardous waste without a licence and the import of recycled waste. It provides for both financial and custodial punishments for offenders.

2.2 The Implementing Regulation of the WML

Chapter 4 Waste Value Chain of the Implementing Regulation for the WML sets out more detail on the rules and procedures for many components of the waste value chain and different waste streams, including: industrial waste (both hazardous/ non-hazardous), construction and demolition waste and municipal solid waste. Sub-section 6 under Section 8 Waste Treatment covers Articles 138 to 150 and sets out broad requirements for the management of healthcare waste.

Article 138 defines the obligations of the producers of healthcare waste as follows:

- To reduce the volume of Healthcare Waste generated and its Hazardous content;
- To segregate different categories of Healthcare Waste at source to effectively reduce not only the volume of Hazardous Waste but also the risk of contamination of Non-hazardous Waste;

[1] Implementing Regulations of Uniform Law for Medical Waste Management, as modified In Jumada Al-Thani 1440 H - February 2019 G by the Minister of Health's Resolution No. 1058519 on 05/03/2019

- Not to mix the different categories of Hazardous Waste or Hazardous Waste with Non-hazardous Waste and to separate the Waste;
- To ensure proper packaging, collection, labelling, signage, handling, and temporary storage of Hazardous Healthcare Waste;
- To treat Hazardous Healthcare Waste by its own means (under Licence) in thermal facilities or to transfer such waste, to a relevant Service Provider;
- To ensure the transport and disposal of Healthcare Waste, is only undertaken by appropriately Service Providers.

Articles (139) to (143) set the general requirements for the treatment and storage of both hazardous and non-hazardous healthcare waste.

Article (144) requires service providers to designate a responsible person to ensure the fulfilment of all requirements and obligations provided by the Waste Management Law, its Implementing Regulations, and the technical controls issued by the Centre. Article (145) requires the service provider to be able to demonstrate that it is adequately complying with the provisions of the Law, the Regulations, the licences and/or permit terms and technical controls and to provide full access at any time to allow inspection of the facility, equipment, technology, and the premises.

Article (147) sets out the data the service provider must keep and provide to the Centre every month and Article (148) requires them to produce a monthly report to the Centre detailing the amount of waste received and treated on a daily basis.

Articles (149) set out the circumstances under which hazardous medical waste treatment facilities must reject and refuse waste and immediately notify the Centre.

Finally, under Article 146 service provider must regularly train and educate their staff to manage the relevant waste streams and annually medically examine staff to certify their fitness and health.

2.3 The Implementing Regulations of Uniform Law for Medical Waste Management

The Unified Law for Healthcare Waste Management apply throughout the Gulf Cooperation Council (GCC) countries and aim to develop appropriate command and control methods for the production, classification, storage, transportation, processing, and safe disposal of hazardous medical waste. The IR apply to every producer, transporter, or disposer engaged in the collection, storage, transportation, processing, or disposal of hazardous medical waste[2].

The IR set out the requirements for everyone involved in the management of all healthcare waste, which is defined as both hazardous medical and non-hazardous medical waste, including:

- The responsibilities of the competent authorities in KSA (the Centre and the various government ministries);
- The steps that producers of healthcare waste must follow; and

[2] Radioactive substances must be handled in accordance with the GCC Uniform Law for Handling Radioactive Substances.

- The duties and responsibilities of those who transport and dispose of healthcare wastes to ensure that this takes place without harm to human health or the environment.

Article 3 of the IR sets out the responsibilities of producers of hazardous medical waste. Article 4 defines the categories into which hazardous medical waste should be classified (outlined here in section 4.1.1). Articles 5 and 6 set out the requirements for separation of different classifications of waste and its packaging and labelling to ensure its safe handling. Article 7 defines the handling procedures, including internal transport and storage. Article 8 describes the requirements that any temporary storage must meet before transportation off site. Article 9 sets out the requirements on producers for transport off site (outside the facility where it is produced) and Article 10 defines the records that must be kept by producers.

Articles 11 to 13 sets out the requirements on anyone who transports hazardous medical waste outside a healthcare facility and Article 14 to 18 cover the duties and responsibilities of anyone treating or disposing of hazardous medical waste. Article 19 sets out controls on its cross-border movement. Penalties for breach of the IR are detailed under Article 20 and Article 23 sets out the requirements on those involved in producing, transporting, or disposing of hazardous medical waste to care for the health and safety of their workers.

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3 Roles and Responsibilities

This technical guideline should be used by all parties involved in all the stages of the management of healthcare waste from producers to waste service providers. The parties involved in the waste management as defined in the WML, include: the competent authorities (the government, the Centre), waste generators and waste service providers (of collection, transport, storage, treatment, and disposal facilities. Figure *3-1* lists the main types of organizations responsible for healthcare waste management and some of their responsibilities.

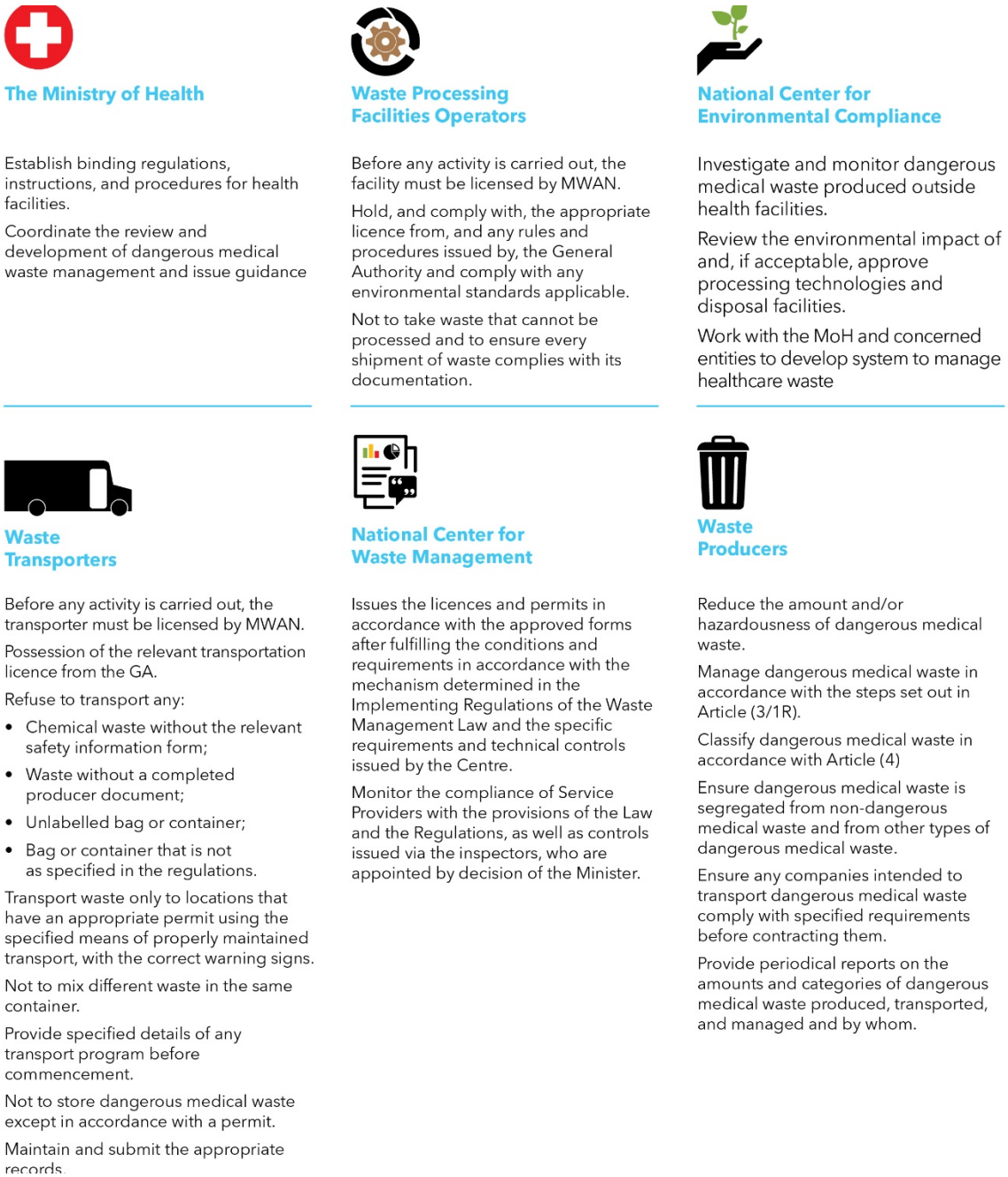


Figure 3-1: Organizations responsible for healthcare waste management and some of their responsibilities

4 Categories, sources, and segregation of healthcare waste

4.1 Categories of healthcare waste

Healthcare waste consists of hazardous medical waste and non-hazardous medical waste.

4.1.1 Hazardous medical waste

The IR of the Medical Waste Management divide hazardous medical waste into the eight categories described in Figure *4-1*

Figure 4-1: Categories and descriptions of hazardous medical waste

4.1.2 Non-hazardous medical waste

Although the main focus of this technical guideline is necessarily on healthcare waste that is classified as hazardous medical waste, some 85% of the waste from healthcare establishments is likely to be non-hazardous[3], meaning that it is similar in nature to municipal waste.

Such waste arises from waiting rooms, canteens, general ward waste, treatment rooms, clinical staff offices etc. Its proper segregation is important because, if it is not segregated from hazardous medical waste, all the waste from healthcare would have to be dealt with as if it contained hazardous waste, increasing the cost.

4.2 Sources of healthcare waste

Although hospitals will create most healthcare wastes and are likely to produce the widest range, such wastes can arise from any establishment or dwelling where any form of medical treatment is undertaken.

4.2.1 Sources covered in this guideline

This guideline covers healthcare waste from the following types of healthcare facility or location:

Figure 4-2: Sources of Healthcare Waste

Medical laboratories cover a diverse range of activities, many of which are not involved in front line healthcare of patients. They include medical research, pathology (including post-mortem or autopsy establishments), clinical and diagnostic laboratories, haematology, virology, clinical toxicology, pharmaceutical and molecular biology laboratories. Taken together, these medical laboratories produce a wide range of wastes, including highly infectious and hazardous chemical waste. Those responsible for waste management in such establishments should refer to the section on hospitals in this guideline, as well as other, relevant guidance, e.g., on storage and hazardous waste.

4.2.2 Sources not covered in this guideline

There are other activities or locations that produce waste which are similar to some categories of healthcare wastes, these include ear piercing and tattoo parlours, and feminine hygiene waste from public toilets. These types of premises are not intended to be specifically covered by this guideline, although the same principles will apply.

[3] World Health Organization, Safe management of wastes from health-care activities, a summary, 2017.

Section 5 describes the categories of waste produced from hospitals and their management in more detail and provides a summary of the main requirements relating to other producers of healthcare waste. Users of this guideline should refer this section if required.

4.3 Segregation of healthcare waste

Every location in a healthcare setting that is dealing with the treatment of patients should be assessed for the potential types or categories of waste likely to be produced. In addition to hazardous medical waste, all publicly accessible locations, as well as offices, consulting rooms etc. used by staff are likely to produce non-hazardous medical waste, similar to municipal waste.

4.3.1 Segregation

The easiest way to separate different categories of healthcare waste is not to allow them to become mixed in the first place. Due to the relatively small amounts of hazardous medical waste compared with non-hazardous waste and the ease with which different categories of hazardous medical waste can be recognised, the approach taken is:

- To identify and to segregate all hazardous medical waste by category at the point where it is produced, rather than trying to separate it later, which is both more difficult and potentially more hazardous;
- Any waste that does not fall one of the hazardous categories should then be classed as non-hazardous.

As a minimum healthcare waste should be segregated into the categories defined above and listed in Figure *4-3* below before removal from the location where it is produced.

However, some categories of healthcare waste should be further subdivided for reasons of safety, or improved waste management. This applies to both hazardous and non-hazardous medical wastes. For example, chemical wastes need to be further separated by suitably trained staff to ensure that bottles or jars of chemicals that can react with each other are stored in separate containers or that flammable liquids are stored in the appropriate non-flammable lidded containers (see Technical Guideline of Temporary Storage of Waste).

Non-hazardous wastes should wherever practicable be segregated at least into those materials that can be relatively easily recycled, or digested or composted, and other, mixed, residual waste for energy recovery or disposal. The following waste types are relevant:

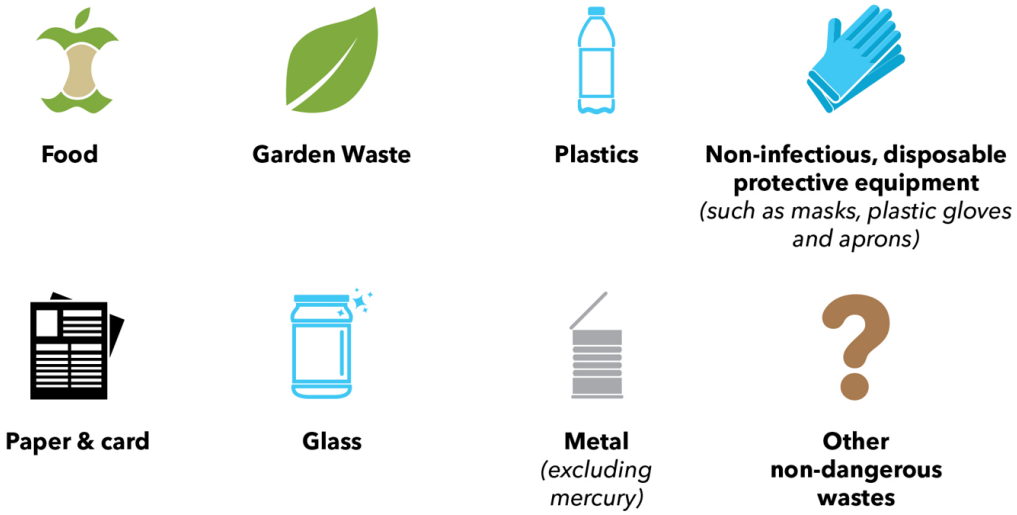


Figure 4-3: Non-hazardous healthcare waste

Figure *4-4* below outlines the colours of the immediate, disposable containers and other containment specifications that should be used for the different categories of healthcare waste.

Where the segregation of non-hazardous medical waste can be carried out without adversely affecting the segregation of hazardous medical waste, for example in canteens, waiting areas and offices, recyclable and organic materials should be segregated for recovery. The dry recyclables, such as, glass, paper, plastic, and metals can be collected in the same container, or if there is space and it does not impact on the segregation of hazardous medical wastes, they can be collected in separate containers.

		SYMBOL
Yellow	**Infectious waste** 100 liter yellow LDPE bag, at least 150 microns thickness. Marked 'Dangerous Medical Waste'	
 *Red*	**Body parts** 100 liter red LDPE bag, at least 150 microns thickness. Marked 'Dangerous Medical Waste'	
Yellow with yellow, red or orange lid	**Sharps waste** A rugged, non-pierceable, impermeable, yellow plastic container, marked 'Dangerous Sharp Waste'	
Yellow	**Pharmaceutical waste (medications)** Leak resistant containers inside 50 liter maximum yellow LDPE bag, at least 150 microns thickness, marked 'Medications & drugs waste'	
 *Yellow with black stripe*	**Offensive waste** 100 liter yellow and black striped LDPE bag, at least 150 microns thickness	none

		SYMBOL
Yellow with yellow, or purple lid	**Waste substance toxic to genes & cells** Liquids in leak resistant plastic containers similar to sharps bins, yellow or yellow with purple lid. Solids in bags. Both marked 'Remains of Toxic Substances of Cells'	 CYTOTOXIC
Yellow	**Chemical waste** Liquids in thick, sealed, canisters, marked 'Chemical Waste'; solids in bags marked 'Chemical Waste (Medications)'	
 *not specified*	**Radioactive waste** Sealed box – lead or lead lined or lead covered.	
 *Black*	**Municipal waste** 100 liter black LDPE bag, at least 150 microns thickness	none
not specified	**Compressed gas canisters** High pressure cylinders must be returned to supplier. Aerosols should be packed without puncturing in black bags.	none

Figure 4-4: Means of containment and colours for different healthcare waste categories[4]

Any of the containers for hazardous medical waste shown above in which waste will be transported and disposed of should be clearly labelled with both the relevant warning symbol and a warning in words, for example, 'Biohazard' or 'Hazardous Medical Waste' as required.

Within the hospital setting all bags should be placed inside a stainless steel or sturdy plastic bin, lidded, and operated by a foot pedal. The bin should not have any sharp edges or other places where a bag could snag and be punctured or torn. The bin should be clearly labelled with the category of waste to be placed in it, with any hazard symbol if applicable on the front and, if possible, details of the types of waste that should and should not be placed in that bin on the lid.

The lid and the label should preferably match the colouring of the bag. Wherever practicable, it is sensible to co-locate bins for hazardous medical waste with others for non-hazardous medical waste, as this assists segregation and helps prevent incorrect management due to time pressures or other errors. Figure *4-5* shows foot-pedal operated, co-located bins with colour-matched lids. Three of the four bins also have pictures of the types of waste that are and are not acceptable in the bin. They do not have the biohazard symbol on the front of the bin that they should have.

Figure 4-5: Co-located hazardous (infectious) and non-hazardous waste bins

4.3.2 Planning and implementing segregation

Segregation improves the identification of wastes and their sources; and facilitates waste reduction, recycling, and better waste management. It also decreases costs by separating out the vast majority of healthcare waste that is classed as non-hazardous. This means:

[4] Container colours from 'Implementing Regulations of Uniform Law for Medical Waste Management', as modified in Jumada Al-Thani 1440 H - February 2019 G, By the Minister of Health's Resolution No. 1058519 on 05/03/2019

Figure 4-6: Planning and implementing segregation

4.3.3 Recommended additional segregation

In addition to the above, it is recommended that offensive wastes, such as used diapers or disposable nappies, incontinence pads, disposable bed liners etc. which are unpleasant to handle but carry no more risk of infection, than waste associated with a normal, healthy person, should be segregated from both hazardous and non-hazardous medical waste, and contained in yellow plastic bags with a black stripe and stored and dealt with separately from hazardous and non-hazardous medical waste.

5 Management of healthcare waste from hospitals

Hospitals present the greatest challenges for the safe management of healthcare waste, because they will usually produce the widest range of healthcare wastes and all categories of healthcare waste should be expected.

5.1 Types of hazardous or potentially hazardous waste from hospitals

Hospitals will produce the following categories of hazardous medical waste.

- **Body parts and body fluids**, such as limbs from amputations, organs removed from patients, such as, gall bladders and kidneys, bones from hip replacements, blood, and plasma bags;
- **Infectious wastes** and potentially infectious wastes, for example, dressings and swabs used in the treatment of patients who are isolated due to an infectious disease, such as Middle East Respiratory Syndrome (MERS-CoV), dengue fever, measles, chickenpox, and brucellosis, and bacterial and fungal cultures;
- **Sharps**, for example, discarded hypodermic needles, cannulas, scalpels, broken glass;
- **Pharmaceutical wastes** – drugs and medicines past their expiry date, removed from the market, or the remainder of a course of treatment not given to a patient, due to discharge or death;
- **Genotoxic, cytotoxic and cytostatic drugs**. These are particularly used in chemotherapy for the treatment of cancers. Although designed to target specific cancerous cells, they are highly toxic to all living cells and, in addition, genotoxic substances are also mutagenic;
- **Chemical wastes** (including halogenated and non-halogenated solvents) will arise in hospitals from departments such as pathology, histopathology, and laboratories, as well as other departments carrying out treatment with chemicals such as iodoform, alcohol used to clean wounds, disinfectants, and mercury from thermometers, blood pressure devices and small (button) batteries:
    - Reactive and explosive chemical wastes - although hospitals do not use explosives, certain chemical wastes from hospitals may be highly reactive when exposed to air or water, or even potentially explosive in a confined space;
    - Some chemicals used in hospitals may be carcinogenic, mutagenic, or teratogenic and must be handled with extreme care by staff.
- **Radioactive substances** may arise as waste from nuclear medicine (radioactive tracers) or from x-ray equipment (e.g., 'used' cobalt-60 or other radioactive sources);
- **Compressed gases**, such as oxygen or nitrous oxide, under pressure.

5.2 Non-hazardous or potentially hazardous waste from hospitals

Hospitals also produce considerable quantities of non-hazardous medical or general waste. Depending on the waste management facilities available, non-hazardous medical waste should also be separated into the following waste types:

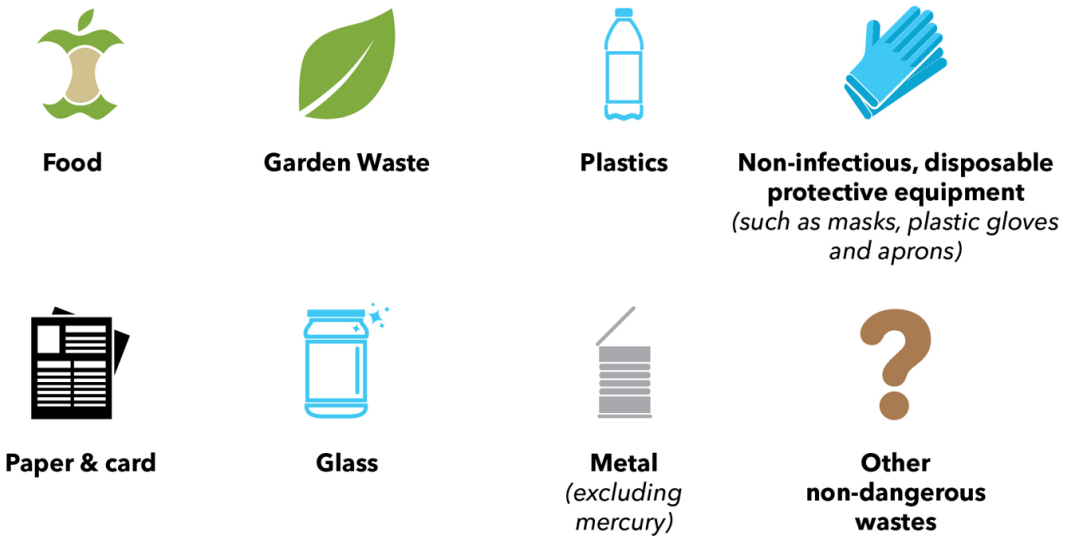


Figure 5-1: Type of Non-hazardous medical waste

5.3 Offensive waste from hospitals:

In addition to the above, hospitals produce considerable quantities of offensive type waste as shown in Figure *5-2*.

These items are unpleasant to handle but usually carry no additional risk of infection when from a normally healthy person. Bags containing liquids (blood or urine bags) should be emptied into an appropriate sluice or toilet. It is recommended that offensive waste should be segregated and contained in a dedicated yellow and black striped, plastic bags. It should be placed in clearly identified separate containers, sealed for reasons of sensitivity and cleanliness.

Figure 5-2: Offensive waste from hospitals

5.4 Waste reduction from hospitals

Before waste management system requirements are finally determined, assessments of the nature and quantities of both the hazardous and non-hazardous medical waste produced should be carried out. Existing studies reviewed to establish if and where there is a clear environmental advantage to be gained by better design, substituting a disposable product with a reusable one that can be sterilized. Such reviews are costly and are generally applicable and therefore are better carried out nationally using life cycle principles. The review should cover other life cycle studies carried out in accordance with the relevant ISO standards and which consider the raw materials required, the emissions from waste management and the energy required and the energy source used to launder and or sterilize equipment.

The assessment should also examine the ordering policies for time-limited consumables, such as PPE and in particular, pharmaceuticals. Stock rotation policies should be in place to reduce any wastage that may arise through overstocking or usage of newer stock before old.

Any review will ultimately have to balance the potential increased risk of infection to patients and the change in costs against any potential environmental benefit.

Aside from the above, there is substantial environmental and financial benefit to be gained from the segregation of non-hazardous medical waste. The WHO estimates that non-hazardous waste represents approximately 85% of all healthcare waste[5] and therefore separating this non-hazardous general waste for recycling reduces the overall amount of waste classified as hazardous and potentially produces both environmental and financial benefits from recycling.

5.5 Management systems

Hospitals should have an adequate management structure and staff numbers to be able to both plan and provide suitable segregation systems and to train staff in the correct segregation procedures for those waste that are generated.

For those wastes that are produced after waste reduction measures, it is strongly recommended that the hospital produces a specific waste management plan that incorporates and implements all the requirements of this technical guideline and other relevant guidance, for the segregation, separation, containment, storage, transportation, and treatment for different wastes, as well as any other requirements detailed in this document, such as those relating to health & safety.

Each area of the hospital where healthcare and associated activities are carried out should be assessed by a responsible person to establish the categories of waste and the amounts of each likely to be produced. If the responsible person does not work in that area, he or she should liaise with appropriate members of staff who do work there to establish the activities undertaken which generate waste and the categories and amounts of different categories of waste.

For each hospital department, the volume of every different waste category requiring separate containment that is generated every day should be calculated and sufficient containers of the correct specification provided at least in every separate room used for treatment and for nursing; as well as every room to which members of the public have access, taking into account the number of hours that the department operates, the variation

[5] World Health Organization, Safe management of wastes from health-care activities, a summary, 2017.

in workload, the fact that no container should be filled more than three-quarters full and the number of times staff will be able to change containers each day.

A scale plan for each part of each floor of the hospital should be marked up with the location of each type of waste container shown (e.g., by a circle of the appropriate colour) and each location marked with the number of changes expected per day. The hospital official in charge of organising waste collections should discuss with a senior clinician the best routes for waste collection staff to follow, keeping hazardous and non-hazardous waste separate and working from the areas of highest vulnerability (for example, ICU) to those with lowest vulnerability (for example, outpatient clinics).

5.5.1 Designated waste producer

A senior person should be appointed as the designated waste producer, responsible for all wastes from healthcare and ancillary activities, including hazardous medical waste. In particular they should be responsible for the following:

Records: The designated waste producer must keep summary details of all contracts for the transport of hazardous medical wastes, including the category of waste covered, the transporter, the amounts specified and the treatment or disposal facility.

Data: The designated waste producer should ensure the key data from one of the copies of each waste data label are recorded, *viz*: the originating department, the date and time, the waste category, the weight of the bag or other container and the number of patients in that department at the time of collection.

In addition, possible exposure incidents and any instances of disease or injury that have resulted from or appear to have resulted from hazardous medical waste should be recorded.

Monitoring: The designated waste producer is responsible for monitoring the production and management of healthcare waste by:

- Periodic inspection of the storage of hazardous and non-hazardous medical waste;
- Questioning staff in the department and of those responsible for emptying waste containers to gauge satisfaction, problems, and improvements;
- Comparing data for different periods and from different departments; noting and acting on any differences.

Reporting: The designated waste producer should prepare reports regarding all aspects related to hazardous medical waste and provide a copy to the competent authorities.

More details of these requirements are contained in Section 14.

5.6 Segregation and containment

5.6.1 Categories of waste

Most treatment activities, including emergency departments, outpatients, and wards, will produce two main categories of hazardous medical waste:

- Used sharps; and
- Infectious and potentially infectious items, such as bandages, swabs, tissues etc.

Specialist departments of a hospital will generate other types of waste, including body parts from operating theatres and pathology departments, liquids such as blood, plasma, urine, hazardous chemicals, and infectious wastes.

Each category of waste must be segregated from all other categories and placed in the appropriate specification of container. Figure *5-3* lists the main categories of healthcare waste together with the type of container required. These are shown pictorially, and the full specification is given in the IR.

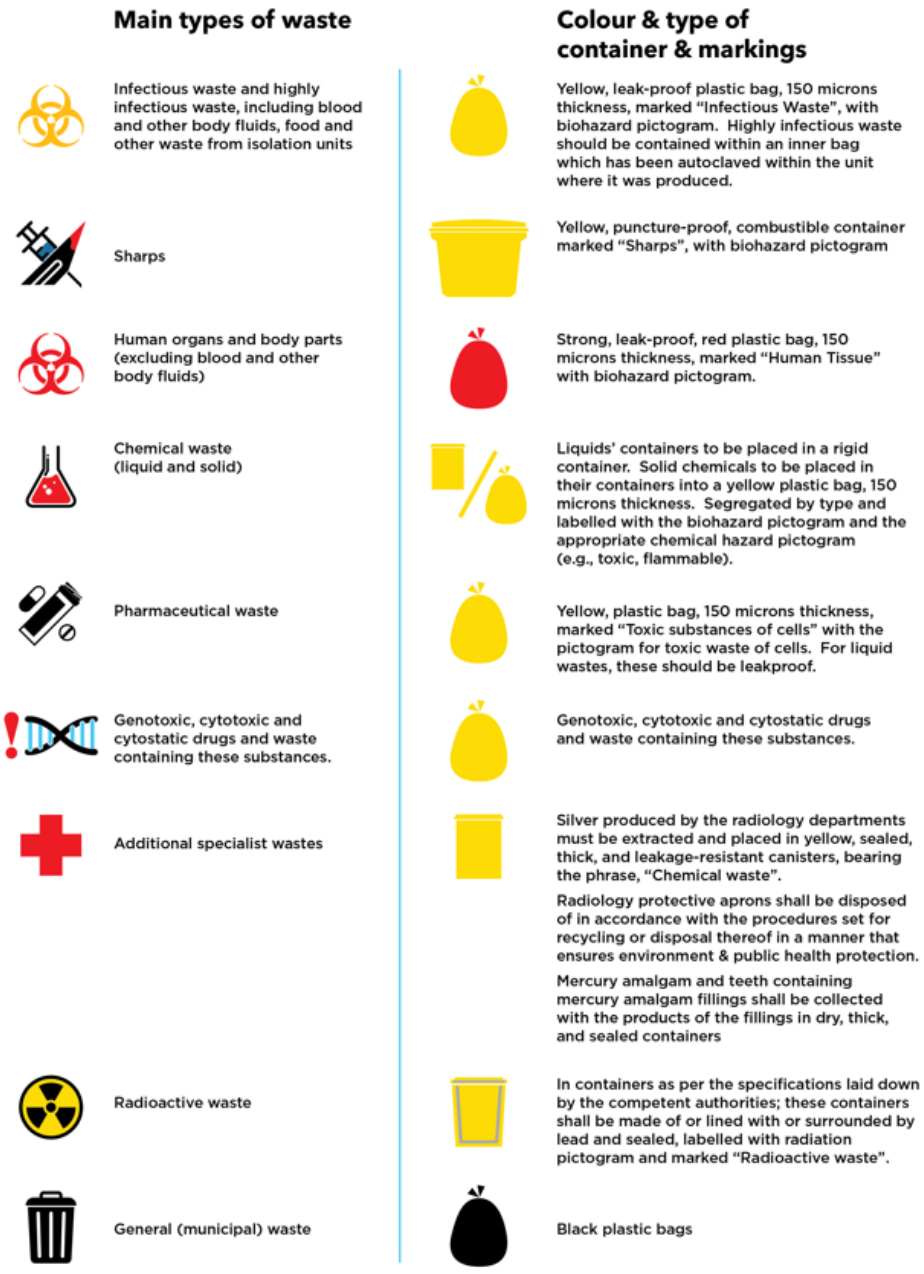


Figure 5-3: Main categories of hospital waste and containers[6]

[6] Implementing Regulations of Uniform Law for Medical Waste Management, As modified in Jumada Al-Thani 1440 H - February 2019 G, By the Minister of Health's Resolution No. 1058519 on 05/03/2019

5.6.2 Segregation

Segregation should be carried out as close as possible to its place of generation (for example, in a treatment room, in a ward, in an operating theatre or in a laboratory) by those who produced it (for example, by nursing staff, surgeons, physicians and technicians) and who therefore know what the waste is. If classification of a waste item is uncertain, as a precaution it should be placed into a container used for the most hazardous health-care waste available in the vicinity. However, on no account should sharps waste be placed in anything other than a designated sharps container.

In addition to the above, all treatment areas are likely to generate non-hazardous medical waste. Consequently, the segregation of general, non-hazardous waste, potentially infectious waste and used sharps requires a minimum of three separate containers.

5.6.3 Containment

All containers for potentially infectious wastes, body parts, except containers for sharps, must be robust with a closing lid and operated by foot pedal or other hands-free mechanism. The lid of the outer container should be the same colour as the bags for the intended waste, and the lid should be clearly labelled with the type of waste. Sharps containers must be made from thick, puncture-proof, non-halogenated plastic and coloured yellow with the sharps and biohazard pictograms and the words “Dangerous Sharp Waste” (See Figure *5-4* below).

5.6.4 Pharmaceutical and other chemical wastes

Pharmaceuticals should preferably be returned to the pharmacy to be recorded and either re-prescribed or disposed of. However, pharmaceutical (and any other) waste containing genotoxic, cytotoxic, and cytostatic substances must be kept separate from other pharmaceutical waste and placed in leak-resistant yellow containers bearing the phrase “Remains of toxic substances of cells” and the cytotoxic pictogram (Figure *4-4*).

Other hazardous chemicals, such as alcohols, will arise infrequently and should be stored temporarily in a rigid, non-halogenated, lidded, plastic container (Figure *5-4*) and removed by specialist staff within the hospital who should be called to collect the specific item or items as they arise, without waiting for the container to be filled.

Figure 5-4 Example sharp tools containers (L) and suitable container for liquid chemical wastes (R)

5.6.5 Highly infectious wastes

Highly infectious waste (from departments dealing with highly infectious diseases or isolation units) must be bagged in suitable heat resistant, plastic bags and pre-treated by autoclave, or a technique proven to deliver similar levels of sterilization, within the department producing the highly infectious waste. The autoclaved bags should be placed inside a yellow, infectious waste bag, filled no more than three-quarters full and must only be collected under the direct supervision of a responsible hospital medical waste officer.

5.6.6 Mixing wastes

Waste categories should be kept separate and not mixed. If different categories of hazardous medical waste are mixed, the hospital department responsible for waste collection must be informed and specialist advice given on the appropriate course of action. Where hazardous medical waste is inadvertently (or deliberately) mixed with non-hazardous medical waste, or vice versa, the hospital department responsible for waste collection must again be informed and all that non-hazardous medical waste must be classified as the type of hazardous medical waste with which it is mixed, unless this would compromise safe transport, treatment, or disposal.

5.6.7 Segregating non-hazardous waste

Wherever possible a consistent approach to waste segregation and containment should be adopted throughout the hospital. This will simplify staff training and, as far as practicable, ensure mistakes are avoided. Care should be exercised with regards to the maximum number of containers placed in each location to minimise confusion and mistakes. Where departments and locations are producing more than two types of hazardous medical wastes, the health and safety of staff and patients should be prioritized over segregation for recycling and either a single container for all non-hazardous wastes provided, or a maximum of two containers - one for all recyclable items, such as plastics, glass, paper, card, and metals and one for any residual waste.

For areas where no direct healthcare activities are carried out on patients (e.g., canteens, offices and patient waiting areas) and the only wastes are non-hazardous, suitable containers (ideally, but not necessarily, foot-pedal operated) should be provided for each separate recyclables and residual waste to allow the public and staff to segregate materials for recycling and thereby to improve waste management.

5.7 Responsibilities of the producing department

5.7.1 Designating a waste producer

An appropriate member of staff should be designated as the waste producer for each department producing the waste. This designated person will be responsible for ensuring:

bags are not overfilled;

are the correct type;

of the appropriate colour, signage and labelling; and also,

for ensuring the waste data label is promptly and correctly completed and affixed to the bag.

Some or all of these actions can be delegated to the non-clinical staff member who collects the waste, but the responsibility should still rest with the designated staff member.

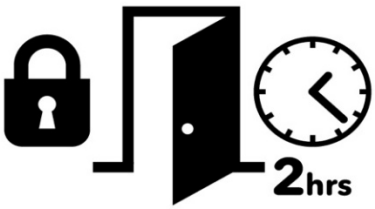
5.7.2 Responsibilities of the waste producer

The designated staff member should:

Ensure the bags used are suitable, of the correct colour and correctly labelled with the required hazard pictogram

Monitor the amount of waste in the bags in the department for which he or she is responsible to ensure that they are not becoming overfull

If a bag is liable to be filled more than three-quarters full before being changed, the designated officer should contact the department responsible for changing waste bags to confirm when they will be able to change the bag(s)



Where the waste will not be removed sufficiently soon to avoid overfilling, the designated officer should ensure the bags are changed as per the procedure above and stored safely (for no more than two hours) until they are collected.

Ensure any highly infectious wastes are bagged and treated in accordance with the requirements of section **5.6.5** above.

Ensure the required details are recorded on the waste data label as outlined in section 5.7.3.

Figure 5-5: Responsibilities of Waste Producers

5.7.3 Recording details

When bags are collected, each sealed bag should be weighed (a hand-held spring balance may be used) and the weight recorded A waste data label should be completed in indelible ink and must be affixed to the bag when it is sealed, preferably as a self-adhesive label. The content of the label is stipulated in the IR (see Figure *5-7* below) and includes the following.

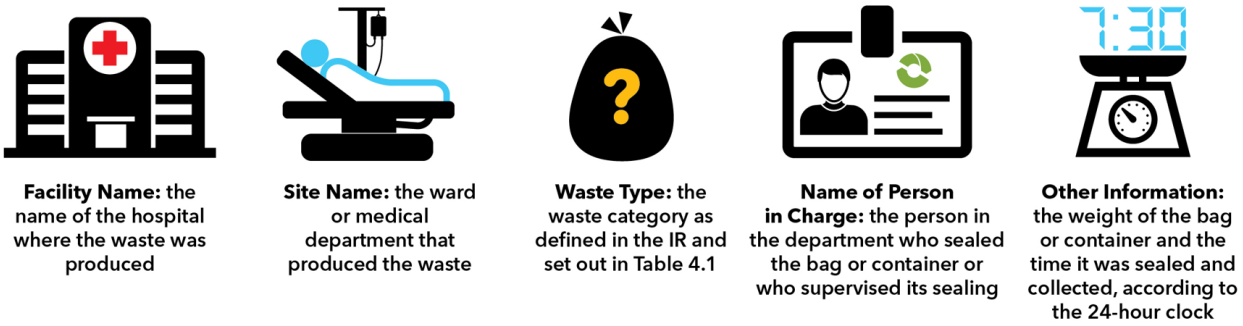


Figure 5-6: Recording Details

Facility name: .....

Site Name (Department) .....

Waste Type: .....Weight .....

Name of Person in Charge: .....

Signature: .....

Date: .....Time .....

Other information: .....

.....

.....

Figure 5-7 Waste label to be fixed to each container

It is advisable that the labels are printed in advance for each waste category that is produced by a ward or department, leaving only the date, time, weight, name, and signature to be completed.

5.7.4 Spillages

If hazardous medical waste is spilt, the spilt waste should be regarded as a hazardous waste requiring immediate action and the following procedure implemented.

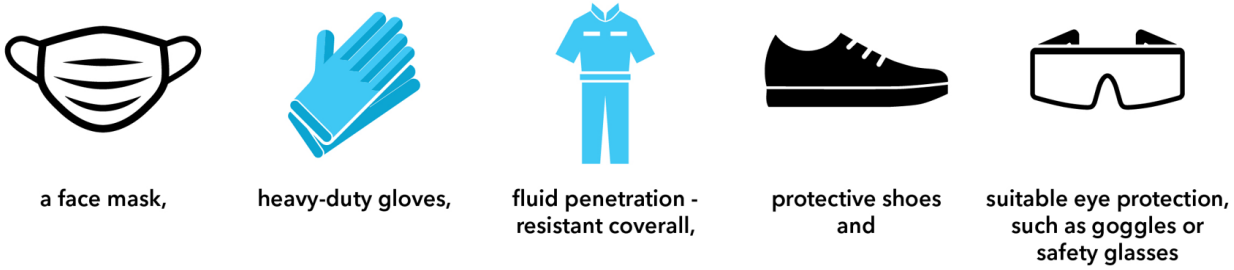
Figure 5-8: Procedure to be implemented in case of spillages

5.8 Removing waste from wards etc.

The prompt and efficient removal of hazardous and other wastes is essential for the orderly and safe operation of a hospital. Sufficient non-clinical staff must be available to change bags and other containers regularly according to the agreed route and schedule, and also when requested by a responsible person in the producing department. Such a request may occur, for example, if there has been an unusually high number of patients in a ward requiring wound dressings to be changed and surgical drains to be removed; or from an operating theatre, where waste can only be removed between operations during the cleaning and disinfection procedures.

5.8.1 Personal protective equipment (PPE)

The members of staff designated to remove the waste must be provided with, and wear, suitable protective equipment including:



a face mask, | heavy-duty gloves, | fluid penetration - resistant coverall, | protective shoes and | suitable eye protection, such as goggles or safety glasses

5.8.2 Waste handling

Infectious waste, body parts, treated highly infectious waste to be removed should be contained inside the specified plastic bags in a metal or rigid, non-halogenated plastic container (see Figure *4-1*). The bag containing waste to be removed should not be filled more than three-quarters full. It should be carefully detached from its rigid container or frame, removed holding it by the top, sealed with a plastic tie or by tying the neck of the bag. Compression or pressing the bag should be avoided. Figure 5-9 shows a bag containing hazardous medical waste being carried incorrectly on the left and correctly on the right.

Figure 5-9: Wrong and right way to carry a bag of hazardous medical waste

Throwing a bag over the shoulder, as in the left-hand photo, is potentially hazardous because it will expel air containing potentially infectious agents close to the nose and mouth of the person carrying the bag. In addition, if there are sharp items that have been (incorrectly) placed in the bag, the force of the bag hitting the person's back could cause these to pierce the bag, any protective clothing and puncture the skin.

The bag should be tied or sealed, using a cable-tie and placed in the trolley (see section 5.8.3 below). The rigid container from which the bag has been removed should be sprayed with antibacterial (disinfectant) spray and wiped clean. A new bag identical to that removed should be fitted inside the rigid container.

When all the bags in a ward or department have been collected (or the trolley is fully loaded), the person removing the waste must contact the person responsible for waste from that department or ward so that the latter can observe the weighing and complete the relevant waste data labels with the date, time, weight, their name, and signature.

5.8.3 Internal transport

Staff designated to collect waste should use only yellow, lidded trolleys that can be kept tightly closed when moved, which are a suitable size to transport ten bags of waste. The trolleys should be made of stainless steel or anti-leak substances that are not affected by acids or alkalis and should have easy-to-clean surfaces and corners and a handle for movement. They should be marked on the sides and lid in clear writing with the phrase 'Hazardous Medical Waste' and the hazardous biowaste pictogram. Where practicable, trolleys should also have additional storage for new, replacement bags, and for disinfectant and wipes to be used for the bag containers.

The trolleys themselves must be cleaned, washed, and disinfected daily with disinfectants under the supervision of the Hazardous Medical Waste Officer in the hospital at a site dedicated for this purpose.

5.8.4 Other wastes collection

Where offensive waste is collected separately it will arise on an *ad hoc* basis and should be immediately bagged, sealed, and stored in the sluice room or similar non-sterile area to await collection.

Non-hazardous medical waste should be in black plastic bags and should be collected, transported, and handled separately from the hazardous medical waste until it is transported to its final disposal site.

Figure 5-10: Example of trolley used for the internal transport of healthcare waste

5.9 Storage

5.9.1 Non-hazardous medical waste

Non-hazardous medical waste can be stored in bags or other containers in a suitable compound and/or in suitable bulk containers, ready for transportation. Any bags containing waste food should wherever possible

be stored in suitable sealed lidded containers, such as compactor containers, to prevent flies, birds and rats and other vermin and vectors breeding or feeding on the waste.

5.9.2 Hazardous medical waste

Hospitals may store healthcare waste at a central point or points in a suitable building for up to 24 hours in total, including any initial emergency storage of up to two hours that may be required for filled bags in the departments that produced the waste.

5.9.3 The storage site

The storage site must be located remotely from food stores, kitchens, places of food preparation, consumption and patient care but must be easily accessible for the purpose of storage, transportation, and cleaning. Storage of waste must not cause any pollution of the environment or harm to human health and should be in a securely locked building equipped with means to prevent the entry of rain, rodents, insects, birds, and stray animals and the emission of water and malodour with a solid, resistant floor that withstands washing and disinfection. The site must be clearly signed as to the site contents as follows: “KEEP OUT - AUTHORISED PERSONNEL ONLY Potentially Hazardous Medical Waste, Risk of Infection” (See example notice in Figure 5-11 below).

Figure 5-11: Example warning sign for hazardous medical waste store

As well as being locked and sealed with an impermeable floor, the storage site must be equipped with:

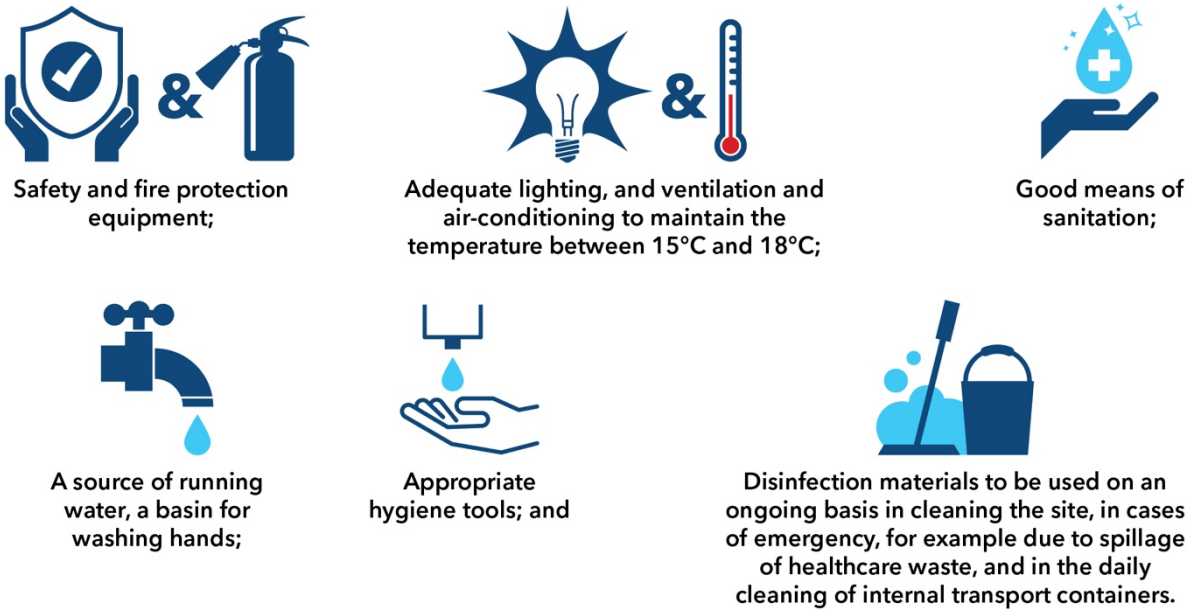


Figure 5-12: Minimum requirements of a storage site

The storage site must not be allowed to become overfull, so that bags of waste are stored outside and/or bags are not stored in containers (see Figure 5-13 below).

The storage site must be managed by staff specialized in the management of hazardous medical waste and access to the storage site should be restricted to authorized employees only.

Figure 5-13: Hazardous medical waste incorrectly stored, outside and not in closed containers

5.9.4 Storing human tissues and organs

Human tissues and organs, and embryonic and placental tissues must be stored in a suitable, separate refrigerator in the mortuary until they are sent to the competent authorities to be handled in accordance with the relevant Sharia Fatwa .

5.9.5 Radioactive wastes

Hospitals use a variety of radioactive materials that may appear as different types of radioactive waste,

Radioactive wastes must be stored, contained, transported, and disposed of in accordance with the GCC Uniform Law for Handling Radioactive Substances. This will usually require containment within a lead-lined or lead-shielded container marked with the UN international pictogram for radiation (Figure 5-14Figure 5-14).

Figure 5-14 Radiation warning sign

Healthcare facilities must provide a special store inside the health facility, where radioactive waste can be stored for a period 10 times the half-life, which may be many years. After this period, the waste must be managed based on its chemical composition and not on any residual radioactivity.

It is important to clarify that radioactive waste is not within MWAN's jurisdiction, as that this entity does not regulate or licence service providers or facilities responsible for managing radioactive waste, recognizing its specialized nature and potential hazards.

More details can be found in section 12.2.5.

5.9.6 Other wastes

Recyclable compressed gas canisters must be returned to distributors or manufacturers.

Non-recyclable gas canisters must be disposed of, without piercing or emptying the contents, in non-hazardous landfills.

5.10 Responsibilities for arranging transport of waste outside the facility

One person at the hospital should have overall responsibility for, and arrange, all transport of hazardous and non-hazardous medical waste. The responsible person (as the waste producer) should ensure that:

- Any person or organization transporting hazardous medical waste has a valid licence from the competent authorities;
- That the facility it is to be taken to has a valid licence to receive and treat the waste;
- The relevant producer documents including any safety information forms are completed;
- Any waste is accompanied by the relevant completed producer documents; and
- Any chemical waste is accompanied by its safety information form.

As the regulatory authority, MWAN is responsible for issuing licences to service providers who specialize in transporting medical waste. This ensures that all waste transportation operations meet the necessary standards, guidelines, and safety protocols.

6 Clinics, blood transfusion centres and doctors' surgeries

The range and the amounts of wastes from clinics, doctor's surgeries are unlikely to be as great as that from hospitals. However, medical staff at these facilities will still give injections, take blood and blood samples, change dressings, plasters and remove sutures and therefore will produce hazardous medical wastes in the form of potentially infectious wastes, such as dressings and sutures or clips that have been removed from incisions, sharps waste such as needles or cannulas, pharmaceuticals, some chemical wastes such as alcohol and mercury from thermometers, blood pressure devices and small (button) batteries.

Some chemicals or drugs may be hazardous and must be handled with extreme care; and occasionally there may be cylinders of gases under pressure, such as oxygen.

6.1 Waste reduction

The types and amounts of waste that are produced from each treatment room should first be quantified and assessed to see whether there are actions that could be taken to reduce the amount of waste produced, although this will be potentially more difficult for these healthcare facilities compared with hospitals due to their comparatively small size. It is important that these healthcare establishments are able to access sound, national guidance on this issue.

As for hospitals, there is substantial environmental and financial benefit to be gained from careful ordering and stock rotation of PPE and other disposable equipment; and the segregation of non-hazardous medical waste and separating this non-hazardous general waste for recycling reduces the overall amount of waste classified as hazardous and potentially produces both environmental and financial benefits from recycling.

6.2 Management systems

Clinics, doctors' surgeries etc. should produce a waste management plan (see section 5.5) and provide suitable separation systems and to train staff in the correct segregation procedures for those waste that are generated at the facility and in relation to any home or other outside visits.

A responsible person should be appointed to ensure that all waste bags to be collected are properly labelled with the appropriate warning pictogram and waste data label and are collected by a properly licensed transporter.

Each treatment room or surgery should be assessed by the responsible person to establish the volume of each different waste category requiring separate containment that is generated every day and sufficient containers of the correct specification provided at least in every separate room used for treatment.

6.3 Segregation and containment

For most treatment activities, hazardous medical waste can be separated into two main categories:

Used sharps; and

Infectious and potentially infectious items, such as bandages, swabs, tissues etc.

In addition to the above, all treatment, offices, reception and waiting areas are likely to generate non-hazardous medical waste. Consequently, the segregation of general, non-hazardous medical waste, potentially infectious waste and used sharps into separate containers should use three separate containers as a minimum.

6.3.1 Infectious wastes

Bags for infectious wastes must be yellow plastic and marked as set out in Figure *5-3*. They must be placed within a purpose-built steel or non-halogenated plastic container. All containers for (potentially) infectious wastes (excepting containers for sharp tools), must be robust with a closing lid and preferably operated by foot pedal or other hands-free mechanism. The lid of the outer container and the bag should both be of the correct colour as the bags for the waste they are intended for and should be clearly labelled.

6.3.2 Sharp tools containers

Sharp tools containers must be made from thick, puncture-proof, non-halogenated plastic and coloured yellow with the biohazard pictogram and the words “Sharp tools”.

6.3.3 Other wastes

Other types of waste, including liquids, chemicals and pharmaceuticals etc. must be segregated from all others and placed in a container with the correct specification. Figure *5-3* lists the main categories of healthcare waste together with the type of container required. The full specification is given in the IR. If classification of a waste item is uncertain, as a precaution it should be placed into a container used for the most hazardous healthcare waste available.

6.3.3.1 Hazardous chemicals

Hazardous chemicals, such as alcohols and other solvents should be stored in a rigid non-halogenated, plastic container and removed by specialist waste transport companies. Chemical wastes should be segregated and stored in accordance with the guideline on the reactivity and chemical compatibility of different types of chemical waste contained the Environmental Standards – Waste Handling and Storage guidelines.

6.3.3.2 Non-hazardous medical waste

For areas where no healthcare is carried out (e.g., waiting rooms and offices) and the only wastes are non-hazardous, suitable containers (not necessarily foot-pedal operated) should be provided for each separate recyclables and residual waste to allow the public and staff to segregate materials for recycling.

Where hazardous medical waste is produced, the health and safety of staff and patients should be prioritized over segregation for recycling and either a single container for all non-hazardous wastes provided or a maximum of two containers, one for recyclable items, such as plastics, glass, paper, card and metals and one for any residual waste.

6.3.4 Mixing wastes

Where hazardous medical waste is inadvertently (or deliberately) mixed with non-hazardous medical waste or vice versa, all that non-hazardous medical waste must be classified as the type of hazardous medical waste with which it is mixed.

6.4 Emptying and storage

The prompt and efficient removal of hazardous and other healthcare wastes is essential for the orderly and safe operation of a clinic or surgery. The following guidelines shall be implemented.

6.4.1 Emptying bags

Bags/containers should be emptied at least daily or on request of each clinician when they are no more than three-quarters full. The members of staff designated to remove the waste must be provided with and wear suitable protective equipment including a face mask, heavy-duty gloves, coverall, and suitable eye protection.

6.4.1.1 Infectious wastes

Infectious waste to be removed should be contained inside the specified plastic bags in a rigid frame or metal or non-halogenated plastic container. The bag containing waste to be removed should be no more than three-quarters full. It should be carefully detached from its rigid container or frame, removed holding it by the top, sealed with a plastic tie or by tying the neck of the bag. Excessive compression or pressing the bag should be avoided. The sealed bag should be weighed using a hand-held spring balance and the weight recorded A waste data label completed in indelible ink (as required by Article (6) of the IR of MWM) must be affixed to the bag (preferably by self-adhesive label) when it is sealed. The rigid container from which the bag has been removed should be sprayed with antibacterial (disinfectant) spray and wiped clean. A new bag identical to that removed should be fitted inside the rigid container.

Each clinician is responsible for ensuring the bags they are using are:

- Not overfilled;
- The correct type of the appropriate colour, signage and labelling; and also
- The waste data label is promptly and correctly completed and affixed to the bag.

These actions may be delegated to the non-clinical staff member who collects the waste, but the responsibility should still rest with the relevant clinician.

If a bag is liable to be filled more than three-quarters full, the relevant clinician should ensure the bag is changed as per the procedure above and stored inside safely in a separate room until collection. A waste data label must be completed and attached to each bag as detailed above and required by the regulations.

If hazardous medical waste is spilt, the spilt waste should be regarded as a hazardous waste and dealt with immediately, with all due disinfection and safety procedures.

6.4.1.2 Other wastes

Recyclable compressed gas canisters must be returned to distributors or manufacturers.

Non-recyclable gas canisters such as aerosols must be disposed of, without piercing or emptying the contents, in non-hazardous landfills.

Non-hazardous medical waste in black plastic bags must be collected, transported internally, and handled separately from hazardous medical waste, until it is transported to its final disposal site. Non-hazardous wastes will also arise from reception, waiting areas and offices and should be managed as municipal waste (see section 12.1).

6.4.2 Transport

Where hazardous and non-hazardous waste are carried moved to storage by hand, bags should be carried by the neck of the bag. For larger facilities it may be more appropriate to use yellow or black, wheeled bins for hazardous and non-hazardous respectively to transport waste to storage.

6.4.3 Storage

Each facility must provide a temporary storage room that is as remote as practicable from areas used by patients and meets the temperature and other requirements set out in section 5.9 above or dedicated freezing unit(s) of a suitable size for collecting hazardous medical waste bags bearing the phrase “Hazardous Medical Waste” on their top and sides with the pictogram of “Hazardous Biowaste”. Hazardous medical waste must not be stored for longer than 24 hours in the room at between 15^{o}C and 18 ^{o}C or no longer than 72 hours in a dedicated freezing unit.

The waste bags can be stored in the temporary storage room inside lidded, wheeled bins or the bags unloaded into the room or freezing unit to await collection.

7 Dental practices

Dentists perform a range of minor oral surgeries, including replacing fillings and the extraction of teeth. They routinely use local anaesthetic administered by hypodermic needles and they occasionally use general anaesthetic from compressed gas cylinders. They also apply dressings to open wounds in gums after extractions. Many dental fillings that are used or removed are an amalgam containing mercury, copper, tin, and silver, and should be considered as hazardous medical waste due to their effect on the environment.

7.1 Waste reduction

The types and amounts of waste that are produced from each treatment room should first be quantified and assessed to see whether there are actions that could be taken to reduce the amount of waste produced, although this will be more difficult for dental surgeries compared with hospitals due to their comparatively small size; and therefore, it is important that dental surgeries are able to access sound, national guidance on this issue.

As for hospitals and other healthcare facilities, the ordering, levels of and rotation of stocks, of PPE and drugs should be examined to minimise wastage. There is also substantial environmental and financial benefit to be gained from the segregation of non-hazardous medical waste and separating this non-hazardous general waste for recycling reduces the overall amount of waste classified as hazardous and potentially produces both environmental and financial benefits from recycling.

7.2 Management systems

Dentists' surgeries etc. should produce a waste management plan (see section 5.5) and provide suitable segregation systems and to train staff in the correct separation procedures for those waste that are generated.

A responsible person should be designated to oversee all waste management, including ensuring that all waste bags to be collected are properly labelled and is collected by a properly licensed carrier as required. Each treatment room or surgery should be assessed by the responsible person to establish the volume of each different waste category requiring separate containment that is generated every day and sufficient containers of the correct specification provided at least in every separate treatment room.

7.3 Segregation and containment

7.3.1 Hazardous medical waste

For most treatment activities, hazardous medical waste from dental surgeries can be separated into three main categories:

Used sharps;

Infectious and potentially infectious items, such as swabs, tissues, human tissue such as unfilled or composite filled teeth etc

Dental amalgam of silver, tin, copper, and mercury, where mercury is approximately half the weight. Any mercury-containing waste should be segregated from all other wastes and disposed of separately.

In addition to the above, all treatment areas are likely to generate non-hazardous, medical waste Consequently, the segregation of non-hazardous waste, potentially infectious waste, used sharps, teeth and other waste containing mercury requires a minimum of four containers.

All containers for infectious wastes, excepting containers for sharps and mercury, must be robust with a closing lid and preferably operated by foot pedal or other hands-free mechanism. The outer container and the bag should both be of the correct colour for the waste they are intended for and be clearly labelled.

Sharps containers must be made from thick, puncture-proof, non-halogenated plastic and coloured yellow with the biohazard pictogram and the words “Sharp tools”.

Waste dental amalgam containing mercury and extracted teeth containing dental amalgam must be separated from other wastes in a suitable container and sent for recovery.

Other categories of waste, including liquids, other chemicals and pharmaceuticals etc. must be segregated from all others and placed in separate containers with the correct specification. Figure *5-3* lists the main categories of healthcare waste together with the type of container required. The full specification is given in the IR. If classification of a waste item is uncertain, as a precaution it should be placed into the most suitable available container used for hazardous medical waste, provided this is safe and suitable.

7.3.2 Hazardous chemicals

Hazardous chemicals, such as alcohols, or other solvents etc. should be stored in their original containers in a rigid non-halogenated plastic container. They should be removed by specialist waste transport companies. Chemical wastes should be segregated and stored in accordance with the guideline on the reactivity and chemical compatibility of different types of chemical waste contained the Environmental Standards – Waste Handling and Storage.

7.3.3 Non-hazardous medical waste

As well as the above, some areas are likely to produce non-hazardous medical waste, much of which could be segregated for recycling. For areas where no healthcare is carried out (e.g., waiting rooms and offices) and the only wastes are non-hazardous, suitable containers (not necessarily foot-pedal operated) should be provided for each separate recyclables and residual waste to allow the public and staff to segregate materials for recycling.

Where hazardous medical wastes are being produced, the health and safety of staff and patients should be prioritized over segregation for recycling and either a single container for all non-hazardous wastes provided or a maximum of two containers, one for recyclable items, such as plastics, glass, paper, card, and metals and one for any residual waste.

7.3.4 Mixing waste

Different categories of waste should be collected and stored separately. Where hazardous medical waste is inadvertently (or deliberately) mixed with non-hazardous medical waste or vice versa, all that non-hazardous medical waste must be classified as the type of hazardous medical waste with which it is mixed.

7.4 Emptying and storage

The prompt and efficient removal of hazardous and other wastes is essential for the orderly and safe operation of a dental practice. Containers should be emptied at least daily or on request of the clinician or the responsible member of staff, whichever is the sooner. The members of staff designated to remove the waste must be provided with and wear suitable protective equipment including a face mask, heavy-duty gloves, coverall, and suitable eye protection.

Each clinician is responsible for ensuring the bags they are using are:

- Not overfilled;
- The correct type of the appropriate colour, signage, and labelling; and also
- The waste data label is promptly and correctly completed and affixed to the bag.

These actions may be delegated to the non-clinical staff member who collects the waste, but the responsibility should still rest with the relevant clinician.

If a bag is liable to be filled more than three-quarters full, the relevant clinician should ensure the bag is changed as per the procedure above and stored inside safely in a separate room until collection. A waste data label must be completed and attached to each bag as detailed in section 5.7.3 above and required by the regulations.

If hazardous medical waste is spilt, the spilt waste should be regarded as a hazardous waste and dealt with immediately, with all due disinfection and safety procedures.

7.4.1 Infectious waste

Infectious waste etc. to be removed should be contained inside the specified plastic bags in a rigid frame or metal or non-halogenated plastic container. The bag containing waste to be removed should be no more than three-quarters full. It should be carefully detached from its rigid container or frame, removed holding it by the top, sealed with a plastic tie or by tying the neck of the bag. Excessive compression of, or pressing, the bag should be avoided. The sealed bag should be weighed using a hand-held spring balance and the weight recorded. A waste data label completed in indelible ink (as required by Article (6) of the IR of MWM) must be affixed to the bag when it is collected. The rigid container from which the bag has been removed should be sprayed with antibacterial (disinfectant) spray and wiped clean. A new bag identical to that removed should be fitted inside the rigid container.

7.4.2 Mercury-containing waste

Extracted teeth filled with amalgam, fillings that have been removed and excess amalgam plus any other waste containing mercury should be stored in a specialist container and collected and recovered separately.

7.4.3 Non-hazardous wastes

Non-hazardous wastes will also arise from reception, waiting areas and offices and black plastic bags should be provided in black containers for such wastes. Non-hazardous medical waste should be collected in black plastic bags, transported internally, and handled separately from the hazardous medical waste, until it is transported to its final disposal site. Non-hazardous wastes, e.g. from reception, waiting areas and offices, should be managed as municipal waste (see section 12.1).

7.4.3.1 Other wastes

Recyclable compressed gas canisters must be returned to distributors or manufacturers.

Non-recyclable gas canisters must be disposed of without piercing or emptying the contents in non-hazardous landfills.

7.4.4 Spillages

If hazardous medical waste is spilt, the spilt waste should be regarded as hazardous and dealt with immediately, with all due disinfection and safety procedures.

7.4.5 Transport

Where hazardous and non-hazardous waste are carried moved to storage by hand, bags should be carried by the neck of the bag. For larger facilities it may be more appropriate to use yellow and black, wheeled bins for hazardous and non-hazardous wastes respectively to transport the waste to storage.

7.4.6 Storage

Each facility must provide a storage room for temporary storage that is as remote as practicable from areas used by patients and meets the temperature and other requirements set out in section 5.9 above. Alternatively, a dedicated freezing unit of a suitable size for collecting hazardous medical waste bags can be used. This should bear the phrase “Hazardous Medical Waste” on the top and sides with the pictogram of “Hazardous Biowaste”. Hazardous medical waste must not be stored for longer than 24 hours in the room at between 15^{o}C and 18 ^{o}C or no longer than 72 hours in a dedicated freezing unit.

The waste bags can be stored in the temporary storage room inside lidded, wheeled bins or the bags unloaded into the room or freezing unit to await collection. The waste may be collected from the wheeled bins or emptied into larger containers for collection, depending on the size of the clinic or practice.

8 Nursing and care homes

Nursing homes and care homes provide different levels of nursing and care and the amounts and types of waste they produce will depend on the type of home, for example, residential, nursing or day care and the degree of healthcare support and treatment provided.

Healthcare waste from nursing and other care homes is similar in nature to healthcare waste from doctors' surgeries because minor treatments, examinations and the dressing and cleaning of wounds are often carried out in residents' rooms. Unlike other locations, where waste should be classified and segregated as close to the point of production as possible, for these establishments hazardous medical waste should not be left in resident's rooms and should be removed by the clinician and placed in the appropriate waste container in a central storage room.

8.1 Waste reduction

The types and amounts of waste that are produced should first be quantified and assessed to see whether there are actions that could be taken to reduce the amount of waste produced, although this will be potentially more difficult for these establishments compared with hospitals due to their lower staff numbers. Therefore, it is important that care and nursing homes can access sound, national guidance on this issue.

The assessment should also examine the ordering policies for time-limited consumables, such as PPE and in particular, pharmaceuticals. Stock rotation policies should be in place to reduce any wastage that may arise through overstocking or usage of newer stock before old.

As for hospitals, there is substantial environmental and financial benefit to be gained from the segregation of non-hazardous medical waste and separating this non-hazardous general waste for recycling reduces the overall amount of waste classified as hazardous and potentially produces both environmental and financial benefits from recycling.

8.2 Management systems

Nursing and care homes should produce a waste management plan (see section 5.5) and provide suitable separation systems and to train staff in the correct segregation procedures for those wastes that are generated. Each resident or person being cared for should be assessed by a responsible person to establish the overall volume of each different waste category that is likely to be generated every day and sufficient containers of the correct specification provided.

A suitable person should be designated as responsible for ensuring the safe and correct management of waste arising in the home.

Unlike other healthcare locations, where waste should be classified and segregated as close to the point of production as possible, in nursing and care homes, hazardous medical waste should not be left in resident's rooms or in other rooms used by persons under care and should be removed by the clinician and placed in the appropriate waste container in a secure, central storage room.

8.3 Segregation and containment

For most treatment activities in a residential care or nursing home, hazardous medical waste can be separated into the following categories:

Figure 8-1: Categories of hazardous medical waste

Various non-hazardous wastes, similar to those from hospitals, also arise from reception, waiting areas, offices, residents' rooms and dining and other communal areas.

8.3.1 Infectious wastes

All containers for potentially infectious wastes, excepting containers for sharps, must be robust with a closing lid and preferably operated by foot pedal or other hands-free mechanism. The outer container and the bag should both be of the correct colour for the intended waste and be clearly labelled.

8.3.2 Sharp tools wastes

Sharps containers must be made from thick, puncture-proof, non-halogenated plastic and coloured yellow with the biohazard pictogram and the words "Sharp tools".

8.3.3 Hazardous chemicals

Other types of waste, including liquids, chemicals and pharmaceuticals etc. must be segregated from all others and placed in a container with the correct specification. Figure *5-3* lists the main categories of healthcare waste together with the type of container required. The full specification is given in the IR. If classification of a waste item is uncertain, as a precaution it should be placed into a container used for the most hazardous health-care waste available.

Hazardous chemicals, such as alcohols should be stored in a rigid non-halogenated plastic container and removed by specialist waste transport companies. Chemical wastes should be segregated and stored in accordance with the guideline on the reactivity and chemical compatibility of different types of chemical waste contained the Environmental Standards – Waste Handling and Storage[7].

[7] Ref to Waste handling and storage guidelines

8.3.4 Gases under pressure

High pressure gas cylinders should be returned to a supplier or, if this is not possible, sent for reuse or recycling with a specialist company. Aerosol containers, whether full or empty, should be collected, unpunctured and without emptying and sent to non-hazardous landfill.

8.3.5 Non-hazardous wastes

Non-hazardous wastes will also arise from reception, waiting areas dining area, residents' rooms and offices and should be collected, placed in in black plastic bags, and transported and handled separately from the hazardous medical waste, until it is transported to its final disposal site.

In areas where no healthcare is carried out (e.g., waiting rooms, dining rooms and offices) and the only wastes are non-hazardous, suitable containers (not necessarily foot-pedal operated) should be provided for each separate recyclables and residual waste to allow residents, visitors, and staff to segregate materials for recycling.

Where hazardous medical waste is being produced, the health and safety of staff and residents should be prioritized over segregation for recycling and either a single container for all non-hazardous wastes provided or a maximum of two containers, one for recyclable items, such as plastics, glass, paper, card, and metals and one for any residual waste.

8.3.6 Offensive wastes

In addition to the above, nursing and care homes produce considerable quantities of used diapers or disposable nappies, incontinence pads, disposable bed liners etc. which are unpleasant to handle but carry no more risk of infection than waste associated with a normal, healthy person. It is recommended that this waste should be segregated from both hazardous and non-hazardous medical waste and contained in yellow and black, plastic bags. It should be placed in clearly identified separate containers, sealed for reasons of sensitivity and cleanliness, and stored and dealt with separately from both hazardous and non-hazardous medical waste.

8.3.7 Spillages

If hazardous medical waste is spilt, the spilt waste should be regarded as hazardous waste and dealt with promptly, with all due disinfection and safety procedures.

8.3.8 Mixing

Where hazardous medical waste is inadvertently (or deliberately) mixed with non-hazardous medical waste or vice versa, all that non-hazardous medical waste must be classified as the type of hazardous medical waste with which it is mixed.

8.4 Emptying, internal transport and storage

Unlike hospitals, clinics etc., potentially hazardous waste is likely to be generated in residents' rooms and should be taken directly to the central store and placed in the appropriate plastic lined container.

Unless infectious waste can be stored in a purpose-built container and kept outside the rooms while different residents are treated, potentially infectious waste should be placed in a small bag, taken to the central storage room, and placed in the appropriate yellow bag inside a container.

The designated person responsible should ensure bags are:

- Not overfilled;
- The correct type of the appropriate colour, signage and labelling; and also
- The waste data label is promptly and correctly completed and affixed to the bag when it is removed for collection.

The bag containing waste should be removed when no more than three-quarters full. It should be carefully detached from its rigid container or frame, removed holding it by the top, sealed with a plastic tie or by tying the neck of the bag. Excessive compression of, or pressing, the bag should be avoided.

The sealed bag should be weighed using a hand-held spring balance, and the weight recorded. A waste data label completed in indelible ink (as required by Article (6) of the IR of MWM) must be affixed to the bag when it is removed. The labelled bag should be placed inside a yellow, lidded, wheeled bin to await collection.

If a bag is liable to be filled more than three-quarters full, the responsible person should ensure the bag is changed as per the procedure above and placed in a yellow, lidded, wheeled bin in the storage room until collection. A waste data label must be completed and attached to each bag as required by the IR.

The rigid container from which the bag has been removed should be sprayed with antibacterial (disinfectant) spray and wiped clean. A new bag identical to that removed should be fitted inside the rigid container.

Waste containers or bins should be kept in the dedicated central storage room that meets the requirements set out in section 5.9 until collection. The members of staff designated to remove the hazardous medical waste must be provided with and wear suitable protective equipment including a face mask, heavy-duty gloves, coverall, and suitable eye protection.

9 First aid rooms in schools and offices

First aid rooms in schools and offices will treat a range of minor injuries, such as cuts and grazes and therefore can produce potentially infectious wastes, such as dressings and plasters that have been removed from a wound or swabs which have been used to clean a cut or graze. They may also produce waste sharps, (e.g., from self-administered insulin), pharmaceuticals, some chemical wastes such as alcohol and possibly mercury from thermometers and small (button) batteries.

Non-hazardous wastes such as plastic, paper and card may also arise from first aid rooms.

A designated person should be appointed for any first aid room to be responsible for the segregation of different categories of hazardous medical waste and of non-hazardous waste from hazardous wastes.

First aid rooms should have two containers for hazardous medical waste as a minimum:

- Used sharp tools; and
- Infectious and potentially infectious items, such as bandages, swabs, tissues etc.

In addition to the above, they should segregate general, non-hazardous waste into separate containers from potentially infectious waste and used sharps.

It is not practical for first aid rooms to empty containers of potentially hazardous medical waste every day. Therefore, all waste containers in first aid rooms should be inspected daily and emptied when required. This should be at least weekly or when they are three-quarters full, whichever is the sooner. Consideration should be giving to storing the hazardous waste containers in a dedicated, separate refrigerator.

10 Private households

Hazardous medical waste should not normally be produced from private households. However, where treatment is given via a home visit from, for example, a community nurse, midwife, or doctor, or where a patient is using a treatment such as home dialysis or is injecting themselves with insulin, hazardous medical waste may be produced.

Where healthcare waste arises in domestic premises, the assessment of the likely types and the separation and management routes required should be made by the visiting healthcare professional responsible for the routine care of the patient. For example, where a patient has suffered an acute injury but is otherwise healthy, waste from their healthcare will not carry any higher risk of infection than that from the general population and the clinician should allow waste whose only hazard is the potential for infection, to be disposed of with municipal waste. In all other settings, this assessment and identification of the containers required should be the responsibility of a named person with the appropriate level of authority.

Where hazardous medical waste is produced as a result of a clinician visiting and treating a patient for an acute condition, it is the responsibility of that clinician to classify any waste produced as hazardous or non-hazardous medical waste. Any hazardous medical waste should be removed by the clinician responsible. Hazardous waste produced by the patient, for example, due to a chronic illness or condition, such as the requirement for renal dialysis, should be stored and disposed of in accordance with the instructions of the supervising clinician and according to the requirements of the competent authorities of the municipality responsible.

11 Collection and transport of healthcare waste

11.1 Before collection

Any person or organization who transports hazardous medical waste must have a valid licence issued by the competent authorities.

As part of their contract, the waste transporter should agree with the responsible person at the medical facility, the dates or frequency, and times for the waste collection, and the quantities of each category to be collected – this will be the waste transporting programme.

MWAN serves as the competent authority responsible or overseeing the collection and transportation of healthcare waste. Therefore, all service providers involved in healthcare waste collection and transportation must obtain a licence from MWAN.

Before collecting hazardous medical waste, transporters must provide the competent authority with a waste transporting programme for each facility from which hazardous medical waste is to be collected. This programme must set out the following information:

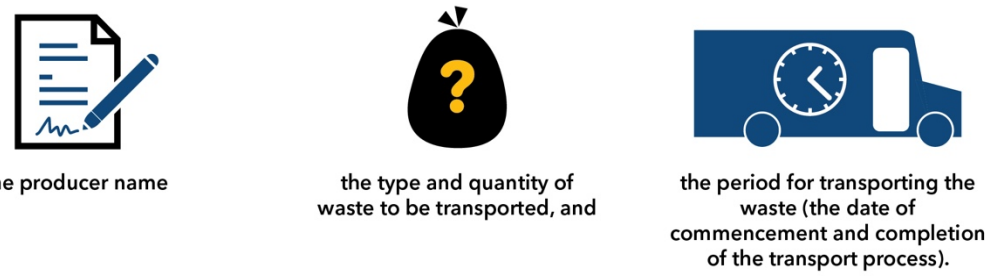


Figure 11-1: Transporting programme before collection

If waste chemicals are part of the collection contract, in addition to the above, the waste producer must inform the transporter of the quantities and names of chemicals and any hazard pictograms on the chemical containers (see Figure *11-4*).

11.2 Collection

When collecting hazardous medical waste, sealed bags may be stored loose in the storage area or storage room, or may be stored in other containers, such as lidded, wheeled bins. Loose bags can be carried to the transport vehicle by hand and loaded into it. Any compaction, other than that due to the weight of waste, should be avoided, as this can cause bags to split and leak. Where waste is stored in lidded, wheeled bins (see Figure *11-2* below), it may be quickest and safest to move to the vehicle it in those bins, loading the bins with waste into the vehicle using a tail lift and exchanging the full bins that are removed with empty, clean, bins. If this method is adopted, the waste producer must certify that all bags have a completed waste data label.

Figure 11-2: Hazardous medical waste being collected using wheeled bins and a tail lift.

If it is not possible to exchange the bins for empty, clean ones, the collection personnel must remove the bags from each container and load these separately into the waste vehicle. Any loose bags must be checked for completed waste data labels.

The generators and transporters of hazardous medical waste are required to initiate and complete a hazardous waste manifest before transporting such waste. The hazardous waste manifest is a crucial document that provides detailed information about the type, quantity, and origin of the hazardous medical waste. It also includes essential details about the destination facility and the transportation process.

11.3 Prohibitions for transporters

In addition to any specific requirements of the license, transporters of hazardous medical waste must not:

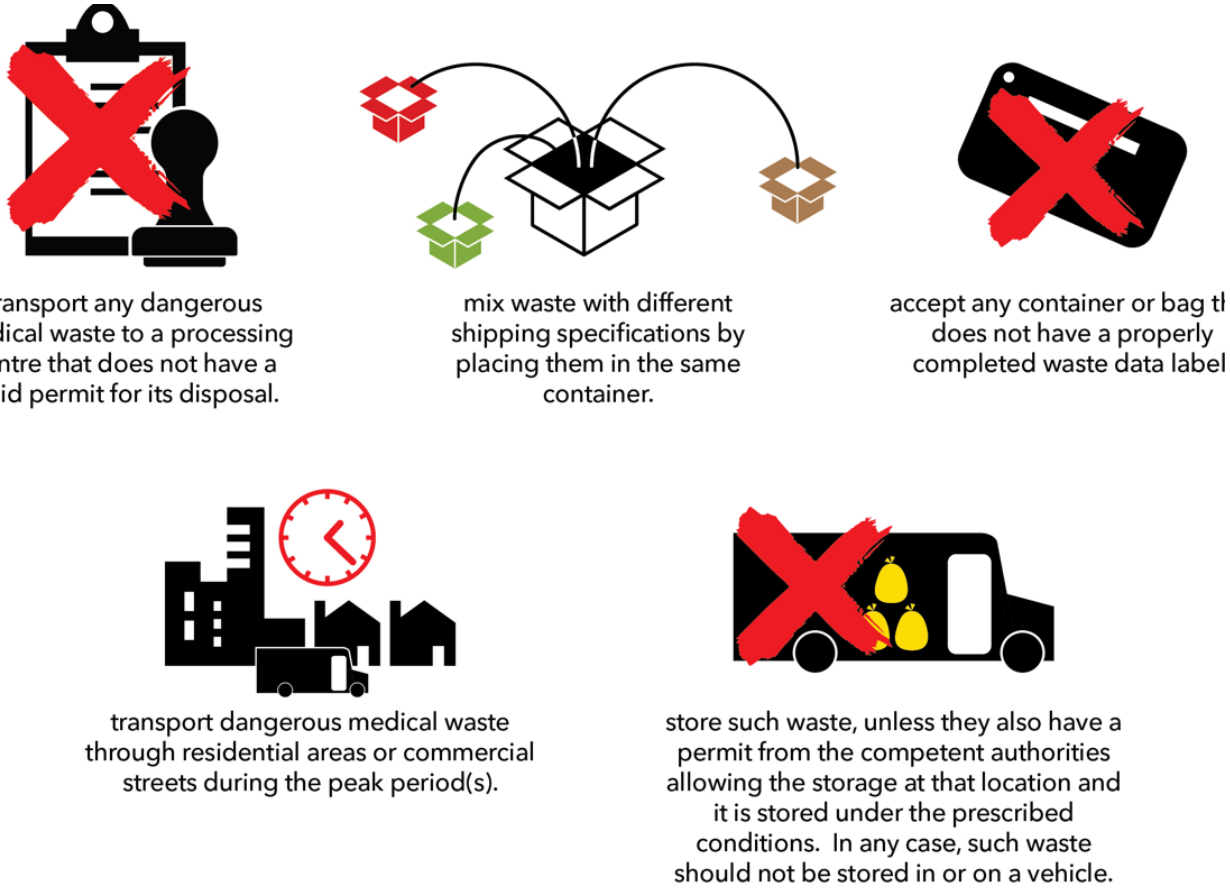


Figure 11-3: Prohibitions for transporters

Figure 11-4: Hazardous pictograms to be displayed as appropriate on chemical waste loads

11.4 Requirements for transporters

Transporters of hazardous medical waste must ensure:

- Any container or bag meet the specifications stipulated in Article (5) of the IR of the MWM, which presents the requirements of classification (separating) and packaging of hazardous medical waste;
- Any waste is accompanied by a document completed by the Producer;
- Any chemical waste is accompanied by the relevant Safety Information Form;
- They use the means of transportation as approved in their licence and place the sealed bags of waste inside any vehicle, and not to empty the waste from the bags into the vehicles;
- They allow the appropriate time for transportation that is determined by the competent authorities;
- Any vehicle used to transport hazardous medical waste carries the appropriate signs that indicate the type of transported materials and any hazard and contain the relevant UN warning signs (see Figure *11-4*);
- The driver of the vehicle is fully aware of the severity of danger and the steps to be followed in the event of an emergency during the transport process;
- The driver completes the section related to transporters in the transport document;
- They maintain and submit records and documents related to waste transportation to the competent authorities when required within a maximum period of one week from the date of any request;
- Vehicles and containers are designed and built to enable effective and efficient cleaning and decontamination;
- Transporters carry decontamination kits;
- Vehicles and containers are cleaned and disinfected daily;
- They periodically maintain the means of transportation and equipment used in accordance with the manufacturers' recommendations to keep them in a safe condition and to reduce any harmful effects on human health and the environment;
- Transporters of hazardous medical waste are required to initiate and complete a hazardous waste manifest before transporting such waste.

12 Treatment and disposal of healthcare waste

The treatment technologies for healthcare wastes depend on the category of the healthcare waste and, in particular, whether it is classified as hazardous or non-hazardous medical waste.

MWAN strictly enforces that all treatment and disposal facilities handling both hazardous and non-hazardous medical waste must be appropriately licenced. Additionally, MWAN also requires treatment technologies to undergo a licensing process before their adoption.

12.1 Non-hazardous medical waste

Non-hazardous medical waste is similar to municipal waste and, where it has been sorted into separate materials, it should be recycled. Mixed recyclables should also be recycled after sorting into separate materials at an appropriate materials recovery facility. Where non-hazardous medical waste is separated into mixed recyclables and residual waste or is solely residual or municipal waste, the residual/municipal waste should be treated or disposed of at a suitably licensed waste facility using the appropriate and approved treatment methods: these include incineration, preferably with energy recovery as electricity or if this option is not available, it can be landfilled, although this will have a more detrimental impact on climate change due to the generation and release of methane from biodegradable waste.

Where food waste is collected separately, it should preferably be processed in an anaerobic digestion plant to produce fertiliser, a soil improver and biogas consisting of carbon dioxide and methane, which may be burned to generate electricity, or the carbon dioxide removed, and the methane converted into a vehicle fuel or another basic organic chemical. If this option is not available, food waste can be composted in a specially designed vessel to produce a compost.

If neither of these options is available, food waste can be mixed with other non-hazardous municipal or healthcare waste and incinerated or as a last resort it can be landfilled.

12.2 Hazardous medical waste

For hazardous medical wastes, the method of treatment or disposal depends on the category of waste. However, a waste management facility that is able to accept some waste in a category (e.g., chemical waste) may not be able to accept all wastes in that category and it is imperative that the waste producer checks that the specific wastes are permitted. The following groups should be considered for treatment and disposal:

- Infectious and highly infectious waste;
- Body organs, body parts and remains;
- Sharps waste;
- Pharmaceutical waste (medications);
- Genotoxic, cytotoxic and cytostatic substances, and body fluids and other materials contaminated with these substances;
- Chemical waste, e.g., toxic, flammable, corrosive, reactive or explosive, carcinogenic, mutagenic, or teratogenic substances;
- Radioactive waste;
- Compressed gas cylinders.

12.2.1 Infectious and highly infectious wastes

The main objective in the treatment of infectious wastes is to remove the danger of infection to humans and animals by sterilizing the waste. WHO[8] defines sterilization as the destruction of all microbial life. Since the complete destruction of all microorganisms is difficult to establish, sterilization of medical and surgical instruments is generally expressed as a 99.9999% reduction or greater of a specified microorganism that is highly resistant to the treatment process. Known as a 6 log10 reduction, this corresponds to a one millionth (0.000001) survival probability of the microbial population.

The following treatment methods can be effective for the treatment of infectious wastes.

- Autoclaving;
- Microwaving;
- Dry heat treatment;
- Clinical waste incineration;
- Chemical treatment or disinfection;
- Alkaline hydrolysis;
- High temperature hazardous waste incineration;
- Gasification and pyrolysis ;

Note that highly infectious waste must be placed in appropriate high heat disposable autoclave bags and autoclaved within the producing department. Autoclaved waste in bags should then be placed inside a standard yellow infectious waste bag with the biohazard pictogram bearing the words “INFECTIOUS WASTE” and sent with other infectious wastes to be subjected to one of the above treatments as for infectious wastes.

12.2.2 Sharps waste

Sharps waste must be contained in puncture-proof yellow plastic containers specifically designed for the purpose and should be incinerated in an incinerator permitted for healthcare (clinical) waste.

12.2.3 Pharmaceutical and genotoxic, cytotoxic, and cytostatic wastes

Pharmaceutical waste should be:

Waste containing genotoxic, cytotoxic and cytostatic substances must be kept separate from other pharmaceutical waste and placed in leak-resistant yellow containers bearing the phrase “Remains of toxic

[8] World Health Organisation, Safe management of wastes from health-care activities – 2nd ed., WHO, 2014.

substances of cells". They must be returned to the supplier or manufacture or burned at a very high temperature (1200 °C and above). They must not be landfilled or discharged to sewer.

12.2.4 Chemical waste

Chemical waste may be toxic, flammable, corrosive, reactive, explosive, carcinogenic, mutagenic, or teratogenic. Chemicals must be packed securely to avoid breakage and the packing of materials that will react with one another avoided. The provisions of the Technical Guidelines on Waste Storage should be followed.

Different chemicals should be managed by different treatment and disposal methods. For example, non-halogenated solvents, such as ethanol and acetone may be sent for recovery or incinerated. Halogenated solvents should be recovered or incinerated. Acids, alkalis, and metal salts should be sent for chemical treatment.

12.2.5 Radioactive waste

Healthcare facilities may produce many different types of radioactive waste, including low-activity fluids, short half-life radioactive tracers used in nuclear medicine (e.g., for PET scans) and radioactive sources, such as cobalt-60.

All radioactive wastes must be stored for a period 10 times the half-life in special warehouses inside the health facility, according to the instructions issued by Abdullah City for Atomic and Renewable Energy (KACARE), and after this period, the waste must be managed as a chemical waste, based on its chemical composition and not on any residual radioactivity.

Radioactive tracers for injection are usually specifically prepared and will only become waste if the patient is not available for the scan or they fail a quality control check. In any case, they generally have a very short half-life. For cobalt-60 sources, whose half-life is approximately 5 years and 3 months, this requires secure storage in suitable shielded containers for over 50 years. Tritiated solvents have a half-life of over 12 years, requiring storage for almost 125 years.

It is important to clarify that radioactive waste is not within MWAN's jurisdiction, as that this entity does not regulate or licence service providers or facilities responsible for managing radioactive waste, recognizing its specialized nature and potential hazards.

12.2.6 Compressed gas cylinders

Hospitals and other health care facilities use many different gases, including oxygen, carbon dioxide and nitrous oxide. These are often in portable cylinders under high pressure. These cylinders should be returned to the supplier or manufacturer of the gas. They must not be incinerated, landfilled, or mechanically compromised in any way.

12.2.7 Body organs, body parts and remains

Any body parts, excluding bodily fluids, are potentially infectious and must be contained in red, leakproof plastic bags marked with the hazardous biowaste pictogram. They must be stored under refrigeration, in a mortuary until handled in accordance with the relevant sharia fatwa when they should be passed to the appropriate authority, the Ministry of Municipal and Rural Affairs, who will receive them from health facilities to be buried in accordance with the procedures in each secretariat and municipality.

13 Health and Safety Requirements

Although the environmental impacts of different materials, equipment and waste management methods should be carefully considered, the health and safety of staff and patients in a healthcare setting should be the primary consideration in the generation, handling, storage, transport, and management of healthcare wastes.

13.1 Rules and responsibilities

A senior person should be made responsible for the health and safety of staff in relation to the management of healthcare waste.

All organizations and facilities must adhere to the colour-coded system of bags specified in these guidelines and in the IR.

Containers for hazardous and non-hazardous wastes should be a similar colour to the bags they contain and be clearly labelled on the lid with examples of the types of waste that can be placed in that container.

All facilities and organizations producing, storing, transporting, processing, and disposing of healthcare waste must comply with the following[9] to keep and maintain the safety and health of workers.

Employees must be trained to accomplish the work with high efficiency and to care for their own safety and the safety of others. To achieve this goal, each facility or organization must carry out the following:

- Pre-commencement checks:
  - Medically examine staff before they commence work in their employment; and
  - Administer the following vaccinations: hepatitis B, tetanus, tuberculosis, and any other vaccinations determined by the MoH.
- Induction (pre-commencement) training - before commencing work, employees should be trained on the following aspects of their job:
  - The layout of the hospital or other health facility, including the different departments and their functions.;
  - The characteristics of the waste they will deal with, including all the different categories of hazardous medical waste, where these arise and what to expect;
  - The dangers of hazardous medical waste and ways to prevent or to mitigate any danger;
  - Different types of emergencies, such as spills, overfull bags and how to deal with them as safely as possible;
  - PPE, its purpose, how to use it, care for it and when to change it;
  - The coloured bag system in use, the quality of the bags and the reasons for this;
  - How to use a plastic tie to seal a bag;

[9] The Labor and Workers Law promulgated by Royal Decree No. M/51 of 23/08/1426H

- How to carry and handle a bag;
- Changing a bag and disinfecting a container;
- Sharps containers, how they are used and how to handle them;
- Other, specialist containers, for example for chemicals or for radioactive wastes;
- The waste data label and its completion;
- Waste storage facilities, operating procedures, and any restrictions;
- Special procedures for dealing with body parts, organs etc.;
- An overview of the transport and disposal of healthcare wastes.

- Occupational health - The organization or facility management must:
  - Provide changing rooms and toilets for personal hygiene;
  - Provide personal protective equipment; such as coveralls, rugged and long boots, medical rugged long leather gloves, masks, goggles or safety glasses, and head covers, if required;
  - Implement an occupational health and safety program for those handling hazardous medical waste, including the following:
    - Maintain a special file for each employee including the dates of examinations and vaccinations they received and any findings or reactions. This file shall be kept in the workplace;
    - Report work injuries and, unless otherwise specified by the Ministry of Health, record these against each employee, each job function, location worked and overall for the facility;
    - Notwithstanding the above, cases of injuries shall be dealt with according to the instructions issued by the Ministry. And the Medical Waste Program in the Directorate shall report the cases of injury by puncture or cutting with sharp tools using the form prepared by the Ministry of Health;
    - The Medical Waste Program in the Directorate shall report any detected disease or infection resulting from exposure to medical waste.

- Ongoing training in addition to the induction training above, all employees working with hazardous medical waste shall be given refresher training and/or information at least:
  - Annually; and
  - Whenever a significant change occurs that means a change in the way of working, e.g., in the means of containment or a new department.

14 Data Recording, Monitoring and Reporting

14.1 Data recording

It is the responsibility of each organization and facility that produces, transports, processes, or disposes of hazardous medical waste to record the following data:

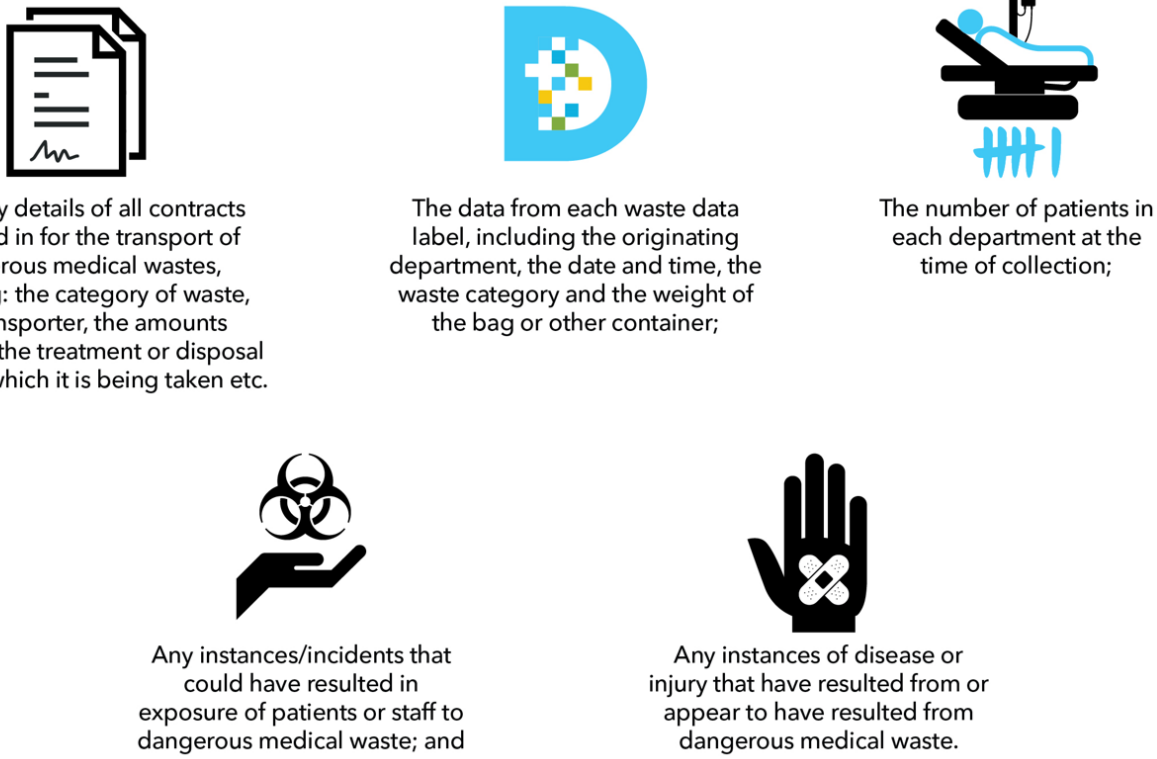


Figure 14-1: Data Recording

14.2 Monitoring

Each facility should designate a person as Hazardous Medical Waste Producer, who is responsible for monitoring the production and management of healthcare waste.

This monitoring should be conducted in three ways:

- Periodically but irregularly, the responsible person should inspect the storage of hazardous and non-hazardous medical waste in each department, the degree to which containers are filled, how the bag exchange works, the procedures adopted, the labelling and any temporary storage areas, including the length of time bags have been stored there and the safe storage of chemical wastes;
- The responsible person should ask questions on those in the department and of those responsible for emptying waste containers whether they are satisfied, whether they have encountered any problems and what suggestions, if any, they may have for improvements;

- The data on the amount of each waste category, including non-hazardous healthcare waste in total and per patient, who transports it, where it is taken and the processes it is subjected to, should be compared between departments and for the same department but for different periods and any differences noted and acted upon.

14.3 Reporting

The designated person should use the data recorded above to monitor the production and management of healthcare waste from the facility on an ongoing basis. The designated person must prepare reports regarding all aspects related to hazardous medical waste such as production, storage, transport, and processing and provide a copy of these to the competent authorities periodically as determined by these authorities.

In addition, the MoH or other competent authority should analyse the data from each facility to compare the amounts of different categories of healthcare waste reported overall and per patient and seek reasons or explanations for any significant differences.