

National Guidelines for the Safe Management of Healthcare Waste in Liberia



NPHIL
NATIONAL PUBLIC HEALTH
INSTITUTE OF LIBERIA



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Foreword

Health care waste is generated and disposed of every day, at medical facilities across Liberia; which is normal. Since the 2014-2016 Ebola Outbreak, the safe management of healthcare waste has drawn the attention of medical and non-medical practitioners. To some extent, this public attention has allowed for some improvements in recent years, as compared to the Per-Ebola Period. However, there is a need to sustain and increase the gains. A national document, documenting the Dos and Don'ts gives some systematic ways of handling these technical issues still faced by health care providers, relative to safely managing health care wastes. Therefore, these guidelines seek to ensure that health care waste is safely managed and that practices are standardized. The compliance of health institutions, we believe will further promote the safety of patients, staff, and the environment.

The quality of care and safety of patients, rest upon how well these guidelines are adhered to within healthcare facilities; in reducing the risk and harm experienced daily by care providers.

Managements and heads of health institutions are key implementers of these guidelines. Regulatory authorities are to ensure that the enabling environment is created and sustained, for the implementation of this instrument, which requires a collaborative effort, and must not be taken lightly.

The National Public Health Institute of Liberia takes the opportunity to renew its commitment to creating an enabling environment for the implementation of these guidelines in partnership with healthcare facilities, district authorities' development partners, non-governmental organizations, the private sectors, and other stakeholders. By maintaining healthcare waste management standards together, the harm to human health and the environmental risks can be reduced and the healthcare system will be allowed to continue to grow and succeed in safe sustainable settings.

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Acronyms and Abbreviations

BCC	Behavioral Change Communication
CBOs	Community Based Organizations
CDC-USA	Center for Disease Control-United States of America
CHO	County Health Officer
CHT	County Health Team
CSOs	Civil Society Organizations
DEOH	Division of Environmental and Occupational Health
DHO	District Health Officer
EHTs	Environmental Health Technicians
EPA	Environmental Protection Agency
EVD	Ebola Virus Disease
FBOs	Faith Based Organizations
GoL	Government of Liberia
HC	Health Center
HCFs	Healthcare Facilities
HCW	Healthcare Waste
HCWM	Healthcare Waste Management
HCWO	Healthcare Waste Officer
HF	Health Facility
IEC	Information, Education, Communication
IPC	Infection Prevention and Control
LMDC	National Medical and Dental Council
LMHR	Liberia Medical Health Regulation
M&E	Monitoring and Evaluation
MoH	Ministry of Health
NGO	Non-Governmental Organization
NHP	National Health Program
NPHIL	National Public Health Institute of Liberia
NWASHC	National Water, Sanitation, and Hygiene Commission
OHS	Occupational Health & Safety
PAM	Physical Assets Management
PPE	Personal Protective Equipment
QMU	Quality Management Unit
SOP	Standard Operating Procedure
SSL	Sanitary Standards License
UNICEF	United Nations International Children Education Fund
VC	Vector Control
WASH	Water Sanitation and Hygiene
WHO	World Health Organization

Definition of Selected Terms

Waste: means any substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of. Waste includes product leftover at the end of a process or action and is a resource out of place.

Waste Management” means the administration and operation that are used in handling waste. (storage, segregation, transportation, treatment, minimization, recycling, reusing, and disposal of waste

Healthcare wastes: are all the waste (solid, liquid, or gaseous) generated by healthcare facilities, research facilities, and laboratories. Also, it includes the waste originating from “minor” or “scattered” sources, such as that produced in the course of healthcare undertaken in the home (dialysis, insulin injections, etc.).

Medical waste: is defined as potentially infectious waste materials generated at health care facilities, such as hospitals, clinics, physician's offices, dental practices, blood banks, and veterinary hospitals/clinics, as well as medical research facilities.

Hazardous Waste: is a waste that has substantial or potential threats to public health or the environment; characteristics are material that are or tested to exhibit one or more of the following hazards traits: Ignitability reactivity, corrosivity, and toxicity(paint and solvent automotive waste and pesticide, etc).

General Waste also called residual waste: is material from businesses and households. It includes materials such as non-recyclable plastics, polythene, some packaging materials, and kitchen scraps, etc.

Hazardous healthcare waste: is waste containing substances or compounds which are directly harmful or directly harmful to the environment.

Waste minimization: All reasonable measures or operations to minimize the volumes of waste materials generated.

Occupational health and safety: The system must ensure that all wastes are handled and disposed of safely. This applies particularly to hazardous waste such as discarded sharps, cytotoxic pharmaceuticals, microbiological cultures, and radioactive waste. The waste management plan and procedures should be readily available to all workers involved.

Chapter 1.0: Background & Introduction

1.1: Background & Introduction

The effective management of healthcare waste is of vital importance to the healthcare sector and the people in Liberia who need to be assured that such wastes are managed and disposed of properly.

The guideline has been produced by the National Public Health Institute of Liberia in collaboration with the Ministry of Health (MoH) and international partners. This guideline is considered as a tool to support healthcare facilities and other institutions producing healthcare waste to implement the National Health Policy, the National Health Plan, and the National Policy on Healthcare Waste Management. It is part of the Essential Package of Health Services (EPHS). The guidance set out in this guideline should help those responsible for the management of healthcare waste, and does not remove their obligations to comply with other legislation and good practices.

Other Liberian laws and regulations such as the National Environmental Policy of the Republic of Liberia and the Environmental Protection and Management Law of Liberia are also included. International agreements and conventions Liberia signed and/or ratified such as the Stockholm Convention on the Persistent Organic Pollutants and the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal was considered while compiling this document.

The requirement for risk assessment in the context of the protection of workers engaged in healthcare and waste management must be recognized. There are also clear policy and legal obligations detailing responsibilities for the protection of the environment. All those responsible for the management of healthcare waste should ensure that they know their responsibilities/obligations.

The guideline shall be understood as not only to be specially set up for the social and physical conditions prevailing in post-conflict affected Liberia but as a tool for the long term implementation of sustainable healthcare waste management solutions in Liberia. Nevertheless, it provides also a guide for the national government, the local authorities, and international donors on how to implement a sustainable system under consideration of the existing healthcare system in Liberia. A public consultation process with national and international organizations and agencies involved in Healthcare Waste Programs begun in October 2009 with the initial distribution of the first draft guideline.

The provision of healthcare services, by default, creates waste. Some specifically from diagnosis, treatment, and most are general household-type of waste. In this national document, healthcare wastes are considered as wastes, which arise from diagnosis, treatment, and from the immediate care of patients. Healthcare

wastes also arise from the homes of patients, residential and nursing homes, clinics, the premises of health centers, tertiary hospitals, and in places where people are cared for.

The adequate management of healthcare waste (HCW) is still a new subject in Liberia where integrated waste management concepts hardly exist. The main treatment method, if at all exist, is the burning of the waste in small incinerators. In Monrovia and other major cities, efforts to improve the situation are underway but a large portion of the HCW stream is still disposed of without any treatment in both urban and rural areas. During the last Ebola epidemics, shortcomings in the management of infectious waste in Liberia became apparent due to limited integrated waste management systems.

Transmission of disease sometimes occurs through injuries from contaminated sharps and inhalation of bio-aerosols. Besides tuberculosis (TB), blood-borne diseases like hepatitis B (HBV), hepatitis C (HCV), and the human immunodeficiency virus (HIV) are infections of particular concern. Toxic risks arise among others from reagents (particularly laboratory reagents), drugs, and mercury thermometers (CEC, 1993).

The different categories of waste normally generated from a healthcare setting are hazardous (infectious, sharps, pharmaceuticals, chemicals, radioactive, etc.) and non-hazardous (paper plastics, cartons, and household wastes). The healthcare wastes categorization is discussed further in the section on classification and segregation.

The personnel responsible for healthcare waste management, i.e. for waste minimization, collection, transportation, storage, treatment, and disposal, will require access to relevant professional advice and the implementation of a sound management system adequate for the purpose. Risk assessment is required in the contexts of the protection of staff and the protection of the environment.

Due to the changes in healthcare processes, the volume of waste generated is steadily raising. Those responsible for healthcare waste are increasingly challenged to investigate further the management of healthcare wastes. The aim, where possible, should be to substantially reduce the volume of waste. Special consideration should be given to hazardous waste, because of its higher risks and the cost-intensive associated with specialized treatment and disposal. In particular, sound and practical systems of segregation are required. The main objective of waste management is the cost-effective handling, minimization, treatment, and disposal of waste under the key constraint of legislation and its enforcement. This national document is valid for all entities being it private or public involvement in the management of healthcare and solid wastes in Liberia.

Healthcare Waste Management is concerned with efforts to minimize wastes including identification of waste and the sources of generation, selecting and implementing the most appropriate techniques concerning cost.

Healthcare facilities have a duty of care for patients and the public. This includes that they also have a particular responsibility for healthcare waste management as they are the generators and owners of these wastes. Any failure in classification, collection, transportation, storage, treatment, and disposal processes will create potential risks to human health and the environment. Establishing and monitoring robust healthcare wastes management system is a major challenge to good waste management practices. Therefore, healthcare workers should know what is expected of them in waste management and that they are motivated and trained to act properly. The systems should be sufficiently vigorous to accommodate both changes in personnel and treatment methods.

1.2: Objectives

To adopt the cost-effective management of healthcare waste while serving as a guard for the safety of the public, healthcare workers, patients, and caregivers. This national document is designed for use by policymakers, health practitioners, research institutions, and businesses that are engaged with healthcare services. It is expected that these guidelines will standardize the safe management of healthcare waste in Liberia and **MUST** be adhered to by all involved with services that generate these wastes.

1.3: Specific Objectives

1. To manage healthcare wastes at healthcare facilities and increase access to basic services and improved sanitation
2. To develop a risk base plan for improving waste management, environmental sanitation, and the National Infection Prevention and Control (IPC) protocols
3. To establish a framework for inter-sectoral coordination and collaboration

Chapter 2.0: Technical Guidelines of Healthcare Waste Management

2.1: Sources of Healthcare Waste

The nature and risk of healthcare waste can be determined by their sources.

The following are the various sources of healthcare waste:

Healthcare facilities which include (clinics, health centers, hospitals, county, and regional referrals) Biomedical and Medical Research centers, laboratories related to medical procedures, medical institutions, pharmacies, prisons clinic and hospital, animal research and testing centers, mortuary, nursing and old folk homes, and military medical centers.

2.2: Classification of waste

Wastes are classified into two categories: **Hazardous** and **non-hazardous**. is a waste that has substantial or potential threats to public health or the environment; characteristics are: materials that are or tested to exhibit one or more of the following hazards traits: Ignitability reactivity, corrosivity, and toxicity (paint and solvent automotive waste and pesticide, etc.; while non-hazardous waste is referred to as general wastes such as papers, plastics, etc. According to the World Health Organization (WHO), about 10-25% of wastes generated in the healthcare facilities are considered as medical wastes and 75-90% of wastes generated are considered as general wastes.

The waste-management team including all staff is responsible for making sure that waste management policies are enforced at all levels.

2.3: Hazardous Wastes

Hazardous healthcare wastes (HCW) are usually classified into 9 groups.

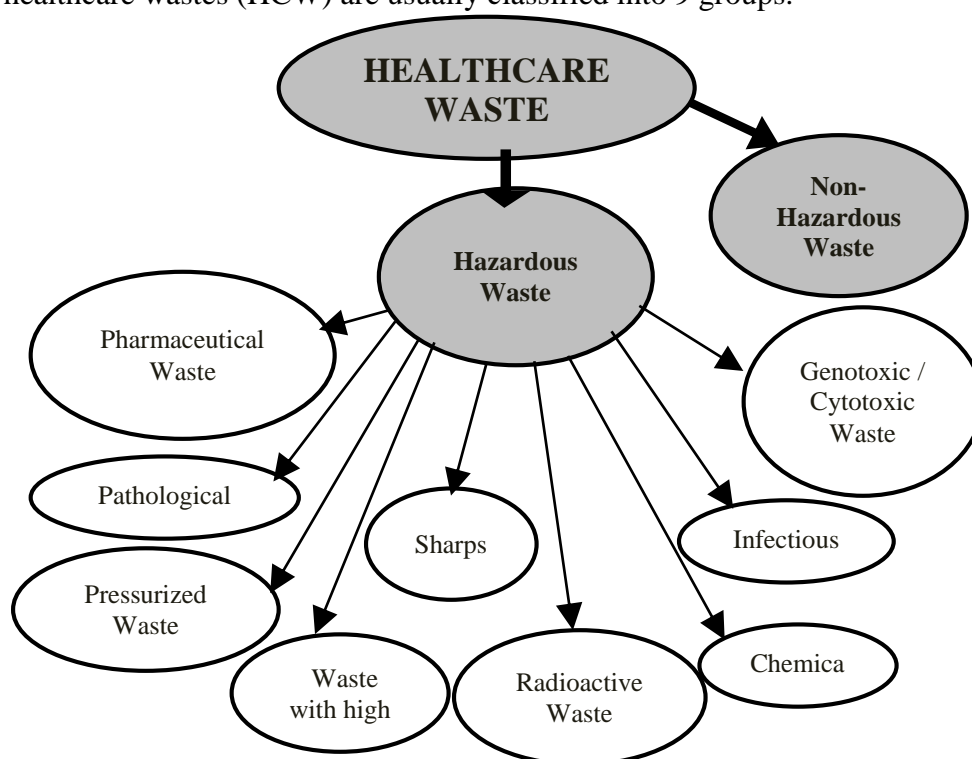


Figure 1: HCW classification system

2.3.1: Infectious waste

The infectious waste consists of discarded materials that are contaminated with communicable pathogens that have the potential of transmitting infections to humans. These wastes include Vomit, excreta, empty drainage bags, laboratory specimens, bloody or purulent bandages, and gauze, used PPEs, etc.

2.3.2: Sharp waste

Sharps are all objects and materials which pose a potential risk of physical injury (stick, cuts, etc.).

Typical items are:

- ✓ Needles
- ✓ Blades
- ✓ Broken glass or easily broken items
- ✓ Vials
- ✓ Infusion sets with butterflies, etc.
- ✓ Scissors

2.3.3: Pathological and anatomy waste

Pathological and anatomical waste includes all waste, recognizable as human body parts and placentas. Anatomical waste is not necessarily infectious but needs special requirements for ethical and religious reasons.

2.3.4: Pharmaceutical waste

Hazardous pharmaceutical waste includes expired, unused, unwanted, spilled, and contaminated pharmaceutical products.

For examples:

- ✓ Drugs
- ✓ Vaccines

It also includes all:

- ✓ Sera and bottles
- ✓ Boxes and vials (used to contain pharmaceuticals, which are no longer required)
- ✓ Vitamins
- ✓ Sugars
- ✓ Amino acid and certain salts

2.3.5: Chemical waste

Chemical waste includes the following:

- ✓ Solid
- ✓ Liquid
- ✓ Gaseous chemicals, (for example from diagnostic and experimental work, and cleaning, housekeeping, and disinfecting procedures). There is a wide variety of dangers and different procedures within this group

Special care must be taken during segregation and collection in handling chemical, as these materials can be:

- ✓ Highly toxic
- ✓ Irritant

- ✓ Corrosive
- ✓ Ignitable
- ✓ Harmful
- ✓ Explosive or
- ✓ Carcinogenic

The following recommendations should be observed:

- Chemical waste should only be handled when personal Protective Equipment (PPE) is available
- Different kinds of chemicals should be only collected if it is ensured that they will not react with each other
- If possible, chemical waste should be given back to the supplier for final disposal.

2.3.6: Pressurized containers

Many types of gases are used in health care facilities and are often stored in:

- ✓ Portable pressurized cylinders
- ✓ Cartridges
- ✓ Aerosol cans

Many of these, once empty or of no further use, are reusable; **however, the following are advised:**

- Whether inert or potentially harmful, gases in pressurized containers should always be handled with care
- Aerosol cans are single-use containers that require disposal
- Containers may explode if incinerated or accidentally punctured

2.3.7: Waste with High Heavy Metal Content

1. Mercury
2. Cadmium
3. Lead

Wastes from materials with high heavy-metal contents represent a subcategory of hazardous chemical waste and are usually highly toxic. Mercury is an example of a highly toxic yet common substance in health facilities. Mercury wastes are typically generated by spillage from broken clinical equipment but their volume is decreasing in many countries with the substitution of mercury-free instruments (e.g. digital thermometers, aneroid blood-pressure gauges).

Residues from dentistry also have high mercury contents. Another heavy metal content is cadmium, which comes mainly from discarded batteries.

Lead being another heavy metal, it has been discussed that the usage of it is very dangerous to the health care delivery system, however, Reinforced wood panels containing lead are still used in radiation proofing in X-ray and diagnostic departments.

Therefore, wastes with high heavy metals must be:

- Handled by personnel with requisite skills
- Spilled drops of mercury should be recovered, whenever possible
- Segregated, stored, and properly disposed of

2.3.8: Genotoxic and Cytotoxic waste

A highly hazardous sub-group of pharmaceutical waste is cytotoxic waste. Cytotoxic are pharmaceuticals used for cancer treatment and can be mutagenic, carcinogenic, and teratogenic. Cytotoxic waste -also known as genotoxic waste- is potentially highly hazardous if not carefully handled. For this reason, it is considered as a separate waste category and must be treated as such.

2.3.9: Radioactive waste

In tertiary health facilities, radioactive waste is generated during diagnostic, therapy, and research processes. Hazardous and radioactive waste has to be handled following the national regulations or the Public Health Law of Liberia. Reference Sections 40.4, 40.5, 40.6, 40.7, and 40.8 of the Public Health Law.

2.3.10: Non-hazardous wastes

Non-hazardous waste is comparable to the waste generated by households. Examples of this type of waste are:

Kitchen waste, office waste, packing materials, leftover food and fruit pellets, empty soft drink cans, etc.

2.4: Segregation and collection of healthcare waste

- The correct segregation of healthcare waste is the responsibility of the person who produces each waste item, whatever their position in the organization
- Segregation should be carried out by the producer of the waste as close as possible to its place of generation, which means segregation should take place in a medical area, at a bedside, in an operation theatre or laboratory by nurses, physicians, and technicians. Segregation methods should be set out in the waste-management policy of a health-care facility

The following are recommended:

- Wastes segregation materials are well labeled or color-coded
- The waste-management policy is supported and enforced by senior staff and managers at the facilitates level
- Medical staff and waste handlers must be trained/mentored on how to implement waste segregation methods
- Foresee possible problems and take preventive measures
- They should understand, spill management and report accident and injury timely
- Training should be routinely conducted to ensure that all staff is reminded of their responsibilities.

Waste segregation posters for hazardous/ medical and general wastes must be placed in every healthcare facility to help raise knowledge about segregation practices and improve the quality of waste management

2.4.1: The Three Bin System

The simplest and safest waste segregation system is to separate all hazardous waste from non-hazardous general waste (which is generally of a larger quantity) at the point of generation. However, to ensure staff and patients are protected, the hazardous waste portion is very commonly separated into two parts: used sharps and potentially infectious items. Consequently, the segregation into separate containers of general or non-hazardous waste, potentially infectious waste, and used sharps is often referred to as the “three-bin system”.

Waste containers come in many shapes and sizes and are made from different materials. They can either be plastic or metal. However, they should be sturdy and leak-proof, and (except for sharps containers) lined with a sturdy plastic bag. The recommended thickness of bags for infectious waste is 70 µm (ISO 7765 2004). Plastics used for either containers or bags should be chlorine-free. In case the waste is autoclaved

the plastic bags must withstand temperatures of 121 °C / 134 C to ensure that the bags are not melting. The waste container should be equipped with well-fitting lids, either removable by hand or preferably operated by a foot pedal.

waste containers should be **Color-Coded!**

2.4.2: Color Coding

Color coding of waste containers and plastic bags should be used to facilitate efficient segregation of waste.

The recommended color coding scheme for Liberia (adapted from WHO) is as follows:

- **Yellow** for infectious wastes
- **Black** for non-infectious/general waste
- **Red** for Pathological/anatomical waste

Note: the minimum required bin is three; however, more than three bins can be used

- **Brown** for other hazardous waste (e.g. expired drugs, vaccines, chemicals, etc.)
- **Blue** to recycle waste

Both the bin/container and the bag should be of the correct color for the waste they are intended to receive and labeled clearly. Mixing colors – such as having yellow bags in black bins – should be avoided, because it will increase the potential for confusion and poor segregation.



Figure 2: Color Puncture-proof bins/containers for HCWM

Sharps containers may be disposable or designed for disinfection and reuse. Disposable boxes are made of plasticized cardboard or plastic (Figure 2); reusable designs are plastic or metal. Since sharps can cause injuries that leave people vulnerable to infection, both contaminated and uncontaminated sharps should be collected in a puncture-proof and impermeable container that is difficult to break or open after closure (performance specifications for these containers are given in WHO recommendation (2007)). The reuse of plastic bottles or metal cans is advised. If this is to be done, the original labels should be removed or obscured, and the containers should be clearly relabeled as “Sharps containers”.

The appropriate waste receptacle (bags, bins, sharps boxes) should be available to staff in each medical and another waste-producing area in a healthcare facility and there must be posters showing the type of waste that should be disposed of in each container. For infectious and sharp waste, the international hazard symbol on each waste bag and sharp container should be applied. This permits staff to segregate waste at the point of generation and reduces the need for staff to carry waste through a medical area. Posters showing the type of waste that should be disposed of in each container should be posted on walls to guide staff and reinforce good habits.

2.4.3: Methods that improve wastes segregation successes

- The containers are large enough for the quantity of waste generated at that location during the period between collections; and disposal
- Waste management audit data are updated and can be used to assess the volume and type of waste containers necessary
- Waste managers also need to spend time with staff in medical areas identifying the type of work that is undertaken, if practical; No two areas will be the same. All waste containers/bags should be color-coded and identified according to this guideline

Examples of proper wastes disposal materials:



Proper disposal of used syringes



Sharp container



Proper cardboard/sharp box

Figure 3: Cardboard safety boxes

2.4.4 : Collection of healthcare waste

Segregated waste must be collected by the ward cleaner, and transported to the local disposal site. Containers for the collection of waste must be made from solid, relatively light, stainless, and waterproof materials. Containers for the collection of infectious and cytotoxic solid medical waste must be cleaned and disinfected before re-use.

Note, plastic bags must not be reused.

Infectious waste, pathological waste, and general waste have to be:

- Collected regularly
- Collected at least daily, but as soon as the bins are 3/4 full; while
- Other types of waste (e.g. sharps) can be collected with a lower frequency (after containers are 3/4 full)
- Pharmaceutical waste and chemical waste can be collected on demand and after notice to the responsible person
- Since wastes are infectious, and also serves as breeding sites for some disease-causing agents, it must not be allowed to accumulate at the point of production for more than twenty-four hours (24hrs), hence, a routine program for its collection should be established as part of the healthcare waste management plan

Nursing and other clinical staff must ensure that:

- Waste bags are tightly closed or sealed when it is about 3/4 full;(please insert pictorial of the ¾ of the full waste bin)
- Waste bags can be closed by tying at the neck or using a plastic sealing tag for closure
- Bags should not be closed by stapling
- Sealed sharps containers should be placed in a labeled, yellow infectious healthcare waste bag before removal from the walls of the healthcare facilities

The following recommendations should be followed by waste handlers:

- Waste should be collected daily (or as frequently as required) and transported to the designated central storage site

- No bags should be removed unless they are labeled with their point of production (hospital and ward or department) and contents
- The bags or containers should be replaced immediately with new ones of the same type
- A supply of fresh collection bags or containers should be readily available at all locations where waste is produced
- The person in charge should ensure that adequate supplies (at least 3 months) are available and that procurement is timely to ensure the facility does not run out of waste collection bags
- The waste carrier must hold the waste container appropriately at the handles or the top of the liner bags

A segregation system depends on the kind of waste generated in a specific healthcare facility. In secondary and tertiary level healthcare facilities, a much wider spectrum of hazardous wastes must be expected, the classes of medical waste generated in primary healthcare settings are limited.

In general, the following are recommended:

- Three-Bin System or more shall be introduced for all healthcare facilities from the clinic level and above.
- This shall include the provision of segregation possibilities for infectious waste, sharp waste, and non-hazardous / domestic waste throughout the medical areas of a healthcare facility.

Medical staff should be encouraged to think of waste disposal as part of a patient's treatment, so all aspects of the care process are completed at the bedside or treatment room.

With this in mind, the following shall be considered:

- If intervention at the bedside is required, a waste container should be taken to the bed. Sharps bins are also sometimes taken to a patient for drug administration or blood sampling
- A mobile trolley with infectious waste and sharps containers may be more versatile
- Establishing a limited number of alternative locations in a medical area where general waste (black bags) and infectious healthcare waste (yellow bags and sharps containers) are placed
- The locations of waste bins must be away from patients-the typical sites may include the treatment room and the nurse's station. And where the containers for segregating hazardous and non-hazardous healthcare wastes are in use, they should be located close together wherever possible

- The containers for infectious waste should not be placed in public areas (the reason is that patients and visitors may use the containers and come into contact with potentially infectious waste items)
- Static bins should be located as close as possible to sinks and washing facilities (because this is where most staff will deposit gloves and aprons after treating patients)

Note, if the general waste container is closer to the sink or under a towel dispenser, it will encourage staff to place towels into the non-infectious container.

Unless patients are known or suspected to have readily transmitted infections, the assumption should be:

- That general waste generated in a medical area is of low risk; however, if there is a known communicable infection such as methicillin-resistant staphylococcus aureus, tuberculosis, leprosy, Lassa fever, or EVD, all wastes used in and around the patient should be classified as infectious waste and should be placed in the yellow bin or potentially infectious waste container
- Note that waste from each patient should be treated according to their known infection status

This “blanket” approach to all waste being assumed to be infectious can be avoided where there is a high level of training and communication between the clinical and support staff.

Chapter 3.0: Tracking and Transportation of healthcare wastes

2.4.5 : Waste Tracking

Tracking of healthcare wastes is necessary to enable both the regulatory body and all other stakeholders to follow the movement of waste from point of generation to the final disposal. Tracking waste helps to rapidly identify the sources, facilitate segregation, and provides feedback. It provides data for learning purposes and re-planning auditing and may be used to allocate resources for health care wastes.

Therefore, the following is recommended:

- The use of tracking forms, which is necessary, and would enable both the regulatory bodies and all concerned to follow the movement of wastes from generation to the final disposal. Samples of wastes tracking forms are provided in Annex 4 for the alternative label for hazardous waste.

The illegal dumping of healthcare wastes by unscrupulous waste collectors/institutions poses a great risk to public health. Tracking the movement of wastes from the point of generation to the final disposal would guard against the malpractice of illegal dumping (see Annex 5) for Healthcare waste tracking forms.

3.1: Waste Transportation

Hazardous and non-hazardous wastes must be collected from the point of generation and transported to the temporary storage area by designated staff. For the transport of medical wastes, appropriate transport equipment such as transport bins, wheel –barrel, or trolleys are required.

The personnel in charge of transportation must wear the appropriate personal protective equipment (PPE) which may include heavy-duty gloves, nose mask, rain boot, head-cover, and gown/coverall as there is a high level of risk involved.

Hazardous and non-hazardous wastes must be transported separately. For the transportation of hazardous waste, only specially designed trolleys that are closed and easy to be disinfected must be used and it should not be used for any other purpose.

If other hazardous materials such as chemicals or pharmaceuticals shall be transported, it must be packed in a way that no risk during transportation will be created. Please note that the construction of the storage area should follow MoH / NPHIL infrastructure guidelines. Storage areas for hazardous waste should be located near an on-site treatment facility if available. Healthcare wastes are bulky and heavy and should be transported using trolleys/bins or wheelbarrows that are not used for any other purpose (Figure 7).

To avoid injuries and infection transmission, the trolley should:

- Be easy to load and offload
- Have no sharp edges that could damage waste bags or containers during loading and offloading
- Be leak-proof and easy to clean
- Be labeled and dedicated to a particular waste type
- Be easy to push and pull
- Not too high (to avoid restricting the view of staff transporting waste)

Waste, especially hazardous waste, should never be transported by hand due to the risk of accident or injury from infectious material or incorrectly disposed sharps that may protrude from a container.

Spare trolleys should be available in case of breakdowns and maintenance. The vehicles should be cleaned and disinfected daily. At the end of transportation, all sealed waste bags should be intact.

3.2: Waste transportation equipment or materials

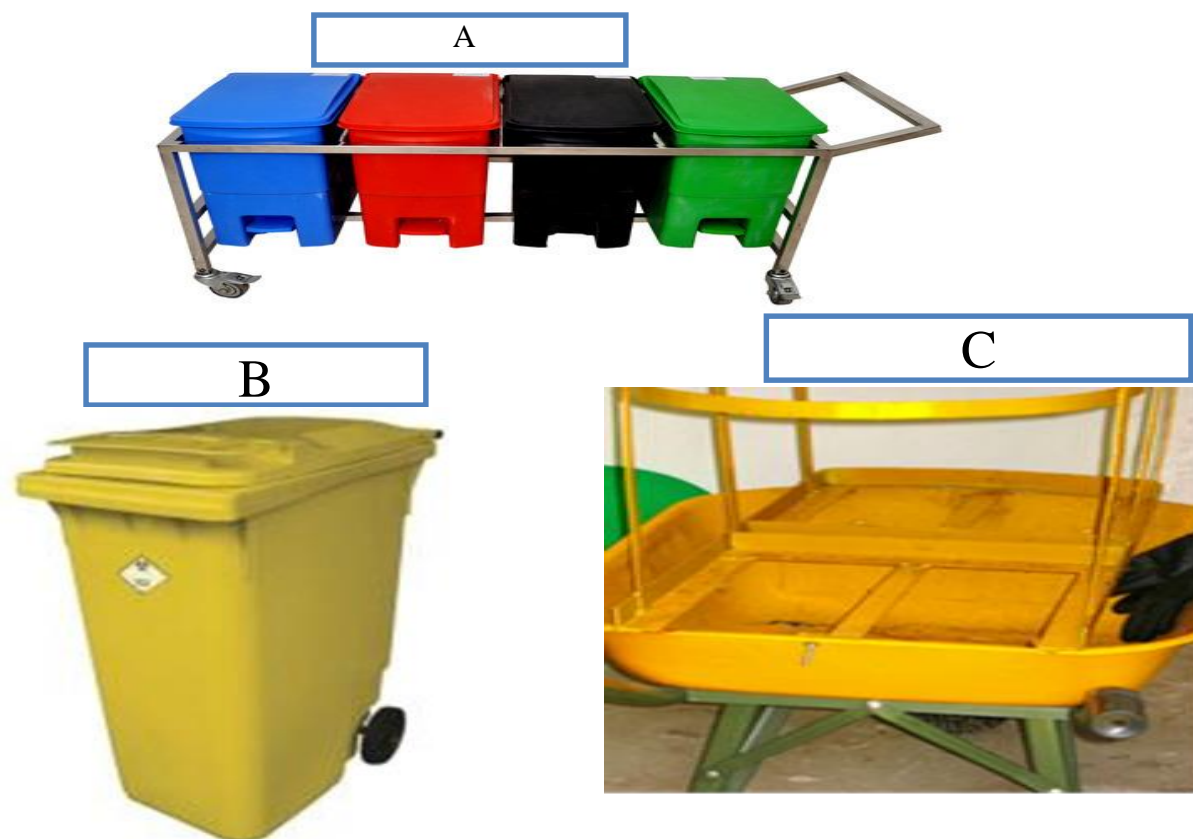


Figure 4: Transport A) trolley B) Waste bin C) wheelbarrow

3.2.1: Routing

The following are recommended during the transportation of Healthcare waste:

- Select the quickest possible route, which must be planned before the journey begins
- Every effort should be made to avoid further handling, after departure from the waste production point
- If handling cannot be avoided, it must be pre-arranged and take place inadequately designed and authorized premises by the Waste Management focal person
- Such incidents **MUST** be documented and reported to the authorities within 5 hours (either by phones and followed by written communication)
- Handling requirements must be specified in the contract established between the waste producer and the carrier
- In general, a waste route must follow the principle “from clean to dirty”

- The collection should start from the most hygienically sensitive medical areas (e.g. intensive care, dialysis, theatres) and follow a fixed route around other medical areas and temporary storage site
- The frequency of collection should be refined through experience to ensure that there are no overflowing waste containers at any time
- Biologically active waste (e.g. infectious waste) must be collected at least daily, **and the routing plan would be influenced by:**
 - ✓ Waste volume and number of waste bags or containers
 - ✓ Waste types
 - ✓ The capacity of the waste storage within medical areas and at temporary storage areas
 - ✓ The capacity of the transportation trolleys
 - ✓ Transport distances and journey times between the collection points

3.2.2: External transport of healthcare wastes

As a backup plan, it will be a duty for each healthcare facility, independent of its size, to sign an external transport and disposal arrangement for the management of its waste.

Arrangements for the collection and transport of healthcare waste should:

- Be compatible with the arrangements made for storage of the waste
- Be made, in the context of the duty of care under the sub-law on Healthcare Waste Management
- Comply with legislation and good practices, especially regarding the health and safety of patients, healthcare waste management personnel, and protection of the environment
- In the common interest of smooth operation, and indeed to assist in compliance with legal requirements, there should be standing arrangements for monitoring ‘‘ duty of care’’ at regular frequencies, to include operational performance and liaison with all designated points of contact

Arrangements for transport by road, rail, or sea must ensure that:

- The medical solid waste container must be stored in a strong, closed container before transferred to the transport vehicle
- The waste carrier is registered with regulatory authority for national healthcare waste management
- Medical solid waste container shall be safe and out of reach from people or animals
- Transport personnel shall wear necessary PPE, consisting of Helmet, mask, eye protector, coverall, apron, foot protector/boots, and special gloves, as the risk may depict

Required vehicles used to transport healthcare waste:

- Any vehicle used for transportation of waste or any other means of conveyance shall be appropriately labeled
- Must Permit safe and easy loading, securing, and unloading of waste
- Must Not contain any leakage from damaged containers
- Be constructed to avoid entrapment of particles of waste and harborage of insects or vermin
- Permit, where appropriate, the use of secondary containment of the waste
- Allow ready disinfection or steam cleaning
- Be subject to regular inspection for cleanliness and a program of cleaning appropriate to the extent and nature of usage

Where a vehicle, that is not solely designated, is used to transport waste (for example general-purpose vans or cars), particular care must be taken to avoid contamination of personnel of the vehicle itself or subsequent loads. That care might well involve special arrangements for extra containment and for regular examination of the vehicle and cleaning as required.

All transporters of hazardous/biomedical waste must be authorized by the National Public Health Institute of Liberia (NPHIL) and must obtain a transportation license from the regulatory authority.

The transporter shall collect waste from the designated area of operations or storage areas and shall deliver such waste to the designated storage site, disposal site, or plant.

The National Public Health Institute of Liberia (NPHIL) shall ensure the following:

- The collection and transportation of such waste is conducted in such a manner that will not cause scattering, escaping, and/or flowing out of the waste
- The vehicles for transportation and other means of conveyance of waste shall follow the scheduled routes approved by the Regulatory Authority from the point of collection to the disposal site or plant
- During the transportation of waste, the transporter must possess at all times a duly filled tracking document and shall produce the same on-demand to any Environmental Health Officer

Hazardous/Biomedical waste must be:

- Transported in a specially designed vehicle or other means of conveyance to prevent scattering, escaping, flowing, spillage, or leakage of the waste
- It is recommended that the vehicle is closely lockable, covered, labeled, leak-proof, and corrosion-proof preferably internally lined with aluminum or stainless steel

Chapter 4.0: Storage of healthcare wastes**4.1: Storage area**

A storage location for healthcare waste must be designated within the compound of the healthcare facility. Space for storing wastes must be incorporated into a building design when new construction is undertaken; for example, see the Guidelines for design and construction of hospitals and healthcare facilities (Facility Guidelines Institute, 2010). These storage areas should be sized according to the Ministry of Health (MOH) infrastructural standard on waste storage. The areas must be enclosed totally, and separated from supply rooms or food preparation areas. Loading docks, space for compactors and balers for cardboard, staging areas for sharps boxes, recycling containers, and secure storage should all be provided.

Storage area specification

The storage area should:

- Have an impermeable, hard-standing floor with good drainage (away from watercourses); the floor should be easy to clean and disinfect
- Include the facility to keep general waste separated from infectious and other hazardous waste
- Have a water supply for cleaning purposes
- Have easy access for staff in charge of handling the waste
- Be lockable to prevent access by unauthorized persons
- Have easy access to waste-collection vehicles
- Have protection from the sun and rain
- Be inaccessible to animals, insects, and birds
- Have good lighting and at least good ventilation
- Not be situated in the proximity of fresh food stores and food preparation areas
- Have a supply of cleaning equipment, protective clothing, and waste bags or containers located conveniently close to the storage area and must be used exclusively for the storage facilities
- Have a washing basin with running tap water and soap that is readily available for the staff
- Be cleaned regularly (at least once per week or when observed soiled)
- Have spillage containment equipment
- Be appropriate to the volumes of waste generated from each health-care facility

4.2: Waste Storage Time

Storage times for Health care waste (i.e. the delay between production and treatment) **should not exceed the following:**

- ✓ 48 hours during the rainy season
- ✓ 24 hours during the dry season

4.3: Healthcare waste storage facilities

Storage facilities should be labeled following the hazard level of the stored waste.

In general, there are four different kinds of waste-storage areas:

- ✓ Non-hazardous or general waste
- ✓ Infectious and sharps waste
- ✓ Chemical and hazardous pharmaceutical waste
- ✓ Radioactive waste

Liquid and solid waste should be stored separately. If possible, the original packaging should be taken for storage too. The packaging used to store and transport solid and liquid wastes offsite should also be labeled. This label should have the following information: hazard symbol(s), waste classification, date, and point of generation (if applicable).

4.3.1: Infectious and sharp waste storage

The storage place must be:

- Identified as an infectious waste area by using the biohazard sign (see annex 3)
- Sealed or tiled on the floors and walls to allow easy disinfection
- Connected to a special sewage system for infectious hospital wastewater if the storage room is present
- Sharps shall be stored without problems, but other infectious waste should be kept cool or refrigerated at a temperature preferably not higher than 3 °C to 8 °C if stored for more than a week

There must **never** be the compacting of untreated infectious waste or waste with a high content of blood or other body fluids destined for offsite disposal (for which there is a risk of spilling).

4.3.2 : Pathological waste storage

Pathological waste is considered as biologically active waste, and gas formation during storage should be expected. To minimize these possibilities, the storage places must have the same conditions as those for infectious and sharps wastes.

4.3.3 : Pharmaceutical waste storage

Pharmaceutical waste should be segregated from other wastes and local regulations followed for final disposal (reference guidelines, inertization (mixing waste with cement and other substances before disposal) or encapsulation method can be used).

In general, pharmaceutical wastes can be hazardous or non-hazardous, and liquid or solid, and each must be handled differently.

The pharmaceutical waste streams that are listed below can be distinguished (WHO, 1999):

- Pharmaceutical waste with non-hazardous characteristics that can be stored in non-hazardous storage are: ampoules with non-hazardous content (e.g. vitamins)
- Fluids with non-hazardous contents, such as vitamins, salts (sodium chloride), amino salts
- Solids or semi-solids, such as tablets, capsules, granules, powders for injection, mixtures, creams, lotions, gels, and suppositories
- Aerosol cans, including propellant-driven sprays and inhalers

4.3.4: Hazardous waste storage

Hazardous waste must be stored per their chemical characteristics (e.g. Genotoxic drugs) **or specific requirements for disposal (e.g. controlled drugs or antibiotics):**

- Controlled drugs (should be stored under government supervision); disinfectants and antiseptics
- Anti-infective drugs (e.g. antibiotics); Genotoxic drugs (Genotoxic waste)
- Ampoules with, for example, antibiotics

4.3.5: Genotoxic and Cytotoxic waste storage

Genotoxic and cytotoxic waste is highly toxic and should be:

- Identified and stored carefully away from other healthcare wastes in a designated secure location

- Stored in the same manner as toxic chemical waste, although some cytotoxic waste may also carry a risk of infection

4.3.6: Chemical waste storage

When planning storage places for hazardous chemical waste, the characteristics of the different chemicals to be stored and disposed of must be considered (flammable, corrosive, explosive).

The storage place should be:

- An enclosed area and separated from other waste storage areas
- Equipped with a liquid- and chemical-proof sump, for liquid chemicals
- Designed with catch-containers to collect leaked liquids should be placed under the storage containers if no sump is present
- Available are the following items Spillage kits, protective equipment, and first-aid equipment (e.g. eye showers) in the central storage area, at all times
- Adequately lighted and good ventilation to prevent the accumulation of toxic fumes

To ensure the safe storage of chemical wastes, the following separate storage zones should be available to prevent dangerous chemical reactions.

Labeling of storage zones

Storage zone must be labeled according to their hazard classes. If more than one hazard class is defined for a specific waste, **use the most hazardous classification:**

- ✓ Explosive waste
- ✓ Corrosive acid waste
- ✓ Corrosive alkali waste (bases)
- ✓ Toxic waste
- ✓ Flammable waste
- ✓ Oxidative waste
- ✓ Halogenated solvents (containing chlorine, bromine, iodine, or fluorine)
- ✓ Non-halogenated solvents

4.3.7: Liquid and solid waste storage

Liquid and solid waste should be stored separately. If possible, the original packaging should be taken for storage too. The packaging used to store and transport solid and liquid wastes offsite should also be labeled. This label should have the following information: hazard symbol(s), waste classification, date, and point of generation (if applicable).

4.3.8: Storage of Radioactive waste

Radioactive waste must be stored in (contact the EPA):

Containers that prevent dispersion of radiation and behind lead shielding. **Waste that is to be stored during radioactive decay must be:**

Labeled with the type of radionuclide, date, the period before full decay, and details of required storage conditions.

The decay storage time for radioactive waste differs from other waste storage because the main target will be to store the waste until the radioactivity is substantially reduced and the waste can be safely disposed of as normal waste.

Therefore:

- A minimum storage time of 10 half-life times for radioisotopes in wastes with a half-life of fewer than 90 days is a common practice
- Infectious radioactive waste should be decontaminated before disposal
- Sharp objects such as needles, Pasteur pipettes, and broken glass should be placed into a sharps container
- Liquids associated with solid materials, such as assay tube contents, should be decanted or removed by the decay time
- All radioactive labeling should be removed on any items to be disposed

On the other hand, radioactive waste with a half-life of more than 90 days must be:

- Collected and stored externally following the national regulations
- Brought to the attention of the regulatory authority notice

Note that, in many countries, this type of waste would be taken to a national disposal site by a government agency or its specialist contractor.

The storage places must be:

- Equipped with sufficient shielding material, either in the walls or as movable shielding screens
- Marked with “**RADIOACTIVE WASTE**”, and the international hazard label should be placed on the door (see annex 3); Constructed in a manner that renders it flame-proof
- Designed with surfaces on floors, benches, and walls that allow proper decontamination an air-extraction system and radioactive monitoring system

The Public Health Law of Liberia and the International Atomic Energy Agency provides comprehensive guidance on all aspects of the safety of radioactive/hazardous waste management.

Chapter 5.0: Treatment and Safe Disposal of Healthcare Wastes

General Recommendations for treatment and disposal:

- Infectious waste must be disposed of by an approved method
- Recognizable anatomical parts should be safely buried in a cemetery, combust in a crematory, or dispose of in a placenta pit
- High-temperature incineration should be used for the disposal of cytotoxic and hazardous pharmaceutical waste. The incineration temperature in the secondary combustion chamber must be about 1100 degrees Celsius or above, with a minimum residence time for volatile gases of 1.0 second
- The waste pit shall be an alternative to incineration of infectious wastes disposal generated in areas where approved incineration facilities are not readily, available, and accessible
- Where landfill disposal of health care waste is intended, recognizable pathological waste, pharmaceuticals, and cytotoxic waste should be excluded at the source and the landfill site should be confirmed as suitable
- The performance of treatment facilities for healthcare wastes must be monitored
- All healthcare waste treatment facilities must meet the standards for flue gas emissions
- Radioactive waste must be handled, stored, and disposed of following relevant legislation
- Non-hazardous waste generated in healthcare facilities can be disposed of in the same manner as domestic waste
- Appropriate waste collection bags and containers should be placed in locations precisely where categories of health care wastes are generated

- Instructions on waste separation and identification should be posted at each waste generation and collection points to remind staff of the procedures
- Staff should never try to correct the error of segregation by removing items from a bag or container after disposal, or by placing one bag inside another bag of a different color
- If general and hazardous wastes are mixed, the mixture must be treated as hazardous waste

The treatment of hazardous (Pharmaceutical and chemical) waste is a complicated and often costly process. If possible, it only should be carried out at the secondary hospital level and above. Pharmaceutical waste and chemical waste shall be only collected, stored, and regularly transported for final treatment to facilities at the national level. Certified companies and healthcare institutions will be responsible for the regular collection, treatment, and disposal while the NPHIL/ MOH will conduct direct monitoring, supervision, and the enforcement of best practices as mentioned in these guidelines. Other hazardous waste can be collected, stored, and regularly transported for final treatment to facilities at the county and national level.

5.1: Treatment of infectious wastes and sharps

Overriding the rule for the treatment and disposal of generated waste shall be the responsibility of the waste producer. (See polluter pays principle).

Hazardous healthcare wastes should be treated before disposal, to ensure protection from potential hazards posed by these wastes.

5.1.1: Treatment by incineration

De-Montfort Incinerator—is the most commonly used treatment technology for healthcare waste in Liberia. If the incinerator is properly designed, maintained, and operated, they are effective in killing organisms present in infectious waste and also helps to reduce the volume of the waste.

The currently used incinerators (Addfield, Madi Burn, Inciner8 Limited, and Rotary Kilm incinerators) are also used in Liberia and are environmentally friendly, designed, and constructed for effective waste disposal (see MoH standards on incinerators).

Although all types of infectious waste can be disposed of by incineration. Infectious waste containing anti-neoplastic drugs will require an incinerator that provides high temperature and must be given sufficient time for the destruction of these compounds, completely. The incinerator's effectiveness in disposing chemical wastes should be documented before such use.

Gasification of the waste takes place in the first chamber, then the gas is combusted in the second chamber at a temperature of 800 – 1200°C where pathogens are destroyed. If incinerators shall be

operated, they must be installed and operated following installation manuals and permits issued by the regulatory authority.

The principal factors to consider when incinerating infectious waste are as follows:

- Variation in waste composition
- The waste feed rate
- The combustion temperature

If incineration is chosen for the treatment of waste, the parameters recommended by WHO, and the Stockholm Convention must be followed

5.1.2: Treatment of infectious waste by steam

Infectious waste and sharps might be treated at the Health Centre and or (preferably) at the county hospital level. No regular treatment of hazardous waste shall be carried out in Clinics with the exemption of the disinfection of generated infectious waste on a case by case basis. In the following, the general system for the treatment of hazardous waste in Liberia is displayed.

Different kinds of thermal (steam-based) treatment systems are today available. All these technologies have one thing in common which is steam. As heat is applied to water, its temperature rises until it reaches its boiling point or saturation temperature at which point water is turned into steam. At atmospheric pressure, the saturation temperature of the water is 100°C. At higher pressures (e.g. in the pressure vessel of an autoclave), the saturation temperature is higher. For example, at a pressure of 3.2 bar, water boils at 134°C.

Steam-based systems are inactivating microorganisms by heat (coagulation of the proteins). The inactivation process, however, combines the effects of moisture, heat, and pressure. If steam treatment is chosen for the treatment of waste, the parameters recommended by WHO, and the Basel Convention must be followed.

Note: The sterilization of infectious waste and sharps by chemicals or by hot air is not common in Liberia. All treatment and disposal facilities require a license from the regulatory authority.

5.1.3: Treatment of other hazardous waste

The treatment of other hazardous waste like pathological, chemical, heavy metal waste, etc. **should be in line with the following requirements:**

- Where applicable, treated in crematories or buried in cemeteries, burial pits; for pathological waste (reference the National Cremation Policy, of the National Public Health Institute of Liberia)

- Fixing baths used for the photo-graphical processes in radiology shall be de-silvered (recovery of silver) before disposal
- The residues of treated infectious waste (recovery) shall either be carried out in the one premise or the fixing bath shall be sold to specialized companies (kindly consult the EPA or the concerned authority)
- Liquid hazardous waste shall be neutralized before it is disposed of via the wastewater system
- Liquid hazardous waste that cannot be neutralized, such as solvents or halogenated liquids, shall be stored and then transported to more specialized treatment facilities (Please consult with the EPA)
- Non-infectious but hazardous waste such as heavy metal-containing waste, pharmaceutical waste, or chemical waste shall be stored in the hazardous waste store of the county hospital and shall be regularly transported to central/recommended collection points for further treatment (consult the regulatory authority)

Healthcare workers or waste managers must ensure the following:

- Hazardous healthcare waste should be treated before disposal to ensure protection from potential hazards posed by this waste
- The risk present in the waste must be reduced or eliminated so that it no longer poses a hazard to the persons who may be exposed to it
- The common methods of treatment are incineration, steam sterilization, chemical disinfection, autoclaving and microwaving irradiation
- Other methods that can be used include encapsulation and inertization, shredding, maceration, and grinding
- However, other treatment methods can be chosen according to the type of waste (kindly consult with regulatory authority)
- In the case of infectious and sharp waste, follow the treatment methods herein (Annex 7)

5.2: Disposal of hazardous waste

5.2.1 Inertization

The process of inertization involves mixing waste with cement and other substances before disposal to minimize the risk of toxic substances contained in the waste migrating into surface water or groundwater.

It is suitable especially for pharmaceuticals and for incineration ashes with high metal content (in this case the process is also termed as stabilization).

For the inertization of pharmaceuticals waste, the packaging should be removed, the pharmaceuticals ground, and a mixture of water, lime, and cement added.

A homogeneous mass is formed and cubes or pellets are produced on-site and then can be transported to a suitable storage site.

Alternatively, the homogeneous mixture can be transported in a liquid state to a landfill and poured into designated national waste disposal sites.

The following are the proportions for the mixture:

65% pharmaceuticals

15% lime

15% cement

5% of water

5.2.2: Hazardous Waste Disposal Options

Hazardous waste should be safely disposed of at a central point on a national level. As in Liberia, the opportunity is insufficient, the following options may be implemented but should be considered transitional, and an interim solution.

5.2.3: Pathological Waste Disposal

In places where pathological waste cannot be treated in a crematory or buried in a cemetery, the following measures are recommended:

- Placentas can be disposed of in placenta pits, located within the designated area of the health facility, locked and fenced for security and to prevent recyclers or scavengers from coming into contact with the waste. Waste should also be covered as quickly as possible
- Pathological waste may also be disposed of at a landfill in the case where there are no other disposal options

5.2.4: Disposal of hazardous ash

Fly and bottom ash from incineration are generally considered to be hazardous because of the possibility of heavy metal content and contain dioxins and furans. It is preferable to be disposed of

in sites designed for hazardous waste, e.g. designated cell at engineered landfills, encapsulated and place in specialized sites or ash pits built in the ground.

5.2.5 : Sharp waste disposal

Decontaminated sharp waste can be disposed of safely in designated sharps disposal pits within the healthcare facility or premises and by encapsulation (see below).

These procedures are only recommended in cases where the waste is handled manually. **NEVER** dispose of sharps at a general landfill; it is not secured.

5.2.6 : Disposal by Encapsulation

In case pharmaceutical waste is not taking by the manufacturer and no safe treatment and disposal method on the national level is **NOT** available, the following is recommended; place pharmaceutical waste in hard containers, (metal drums), add immobilizing material (cement, bituminous sand, or clay). When dry, the drum or container must be sealed and buried at a local landfill/Disco Hill or a pit at the healthcare facility.

Note: Encapsulation should only be conducted under the supervision of the proper authority (NPHIL/EPA/MoH).

5.2.7: Disposal of domestic/ non-hazardous waste

In healthcare facilities where general or non-hazardous waste cannot be disposed of at a public disposal site and there is sufficient space in the compound of the facility, as an interim (transitional) solution, and to limit the risk, **the followings are recommended:**

- A disposal site on the premises of the healthcare facility might be established, **and must meet the below criteria:**
 - ✓ Fenced to prevent unauthorized access (scavengers, humans, and/or animals)
 - ✓ The sites (burial and/or burning) should be lined with a material of low permeability (such as clay), if available
 - ✓ Locked after use by staff, every time
- The Selected site should be at least 50 m away from any water source to prevent contamination of the water table
- Ensure that the site has proper drainage, is located downhill from any wells, is free of standing water, and is not in an area that floods

Chapter 6.0: Sanitation and fecal sludge disposal

This section primarily focuses on excreta management. Human excreta are a conduit for disease transmission and spread. Patients' excreta from hospitals and health facilities are expected to highly be concentrated in disease pathogens, and therefore far more infectious as compared to other sources.

The following precautions are recommended:

- Provision of adequate sanitation facilities within the health facilities
- The recommended minimum is one toilet per 20 users for inpatient medical areas, and at least 4 toilets per outpatient medical service areas (strictly, one toilet for males' staff, one for females' staff, one for female visitors and patients, and one for male visitors and patients) (WHO, 2008)
- Establishment of handwashing stations near latrines
- That before any construction of a septic tank, clearance to be obtained from the regulatory authorities
- Toilets are connected to a sewerage system
- A ventilated flush and pour-flush latrine (built-in line with national standards) is in place
- A technically effective onsite (conventional septic system) be provided
- Sludge is immediately removed when $\frac{3}{4}$ (75%) the septic tank is filled

6.1: Sludge Treatment

The sludge from the sewage treatment plant requires anaerobic digestion to ensure the thermal elimination of most pathogens. Alternatively, it may be dried in natural drying beds and then incinerated together with solid infectious healthcare waste.

6.2: Minimum Safety Requirements for Sewage Treatment

For health facilities that are unable to afford any sewage treatment, the following measures **should be implemented to minimize health risks**:

- No chemicals or pharmaceuticals should be discharged into the sewer
- Sludge from hospital cesspools should be dehydrated on natural drying beds and disinfected chemically (e.g. with sodium hypochlorite, chlorine gas, or preferably chlorine dioxide)
- Sewage should never be used for agricultural or aquaculture purposes

- Hospital sewage should not be discharged into natural water bodies that are used to irrigate fruit or vegetable crops, to produce drinking water, or for recreational purposes
- Contact the responsible authority (Liberia Water and Sewerage Corporation (LWSC), private entities, etc.)

Chapter 7.0: Safe Management of Waste from Health Facilities

The regulatory authority must ensure the followings:

- All health facilities are connected to a functional sewerage system
- In areas where there is no public sewerage system, the health facility (hf) should be connected to an on-site treatment system (with a functional septic tank and soak away), that should be pour-flush or ventilated latrines
- During outbreaks of communicable diseases (Ebola, Lassa, etc.) temporary field treatment units (ETUs, etc.) Should be equipped with chemical or specially designed toilets for public health protection as may be seen appropriate for the prevailing conditions
- Also, triage should be equipped with handwashing facilities (warm water and soap) for use by staff, visitors, and patients
- There should be tissue/paper towel available for wiping hands, and waste bins for infectious waste, into which the towel/tissues are placed at the triage

Chapter 8.0: Healthcare Waste Management Planning

8.1: Preliminary Planning for Healthcare Waste Management

The safe management of healthcare waste in Liberia requires both human and financial capital. The success of this national agenda depends on adequate planning at all levels.

Therefore, planning for the safe management of healthcare waste shall include:

- Setting healthcare/medical waste management objectives
- Identifying a strategy that facilitates the smooth implementation of plans
- Defining source(s) of resources according to the identified priorities (collection, transportation, recycling, treatment, and disposal)

- Conducting surveys at every level that generate healthcare waste, to have baseline information, and conduct a regular assessment that will inform decision making
- Setting the targets for waste minimization, reuse, recycling, and cost reduction
- Promoting good organizational and proactive administrative measures for proper waste management at healthcare facilities
- Standard operating procedures (SOPs), planning, training, and educational instruments
- Conduct regular monitoring and evaluation of the health care waste management system at the facility level
- Contingency plan for emergency (preparedness & response) to healthcare waste management crisis for every healthcare facility

8.2: Implementation of the Waste Management Plan

Management of healthcare waste in Liberia requires more than one sector. It should involve all government ministries, agencies, and commissions with statutory responsibility for environmental health and safety, water, and sanitation. Civil societies, community dwellers, and business communities must be a part of the implementation.

8.3: General Duties and Responsibilities of Implementing the Waste Management Plan

The heads of all healthcare facilities are responsible for the safe disposal of healthcare waste generated within their facilities at all times.

They should institute practical measures to:

- Ensure that staff are trained in the safe handling of healthcare waste
- Prevent or minimize/reduce healthcare waste generated at their facilities
- Prevent the waste from causing environmental pollution or adverse effects on public health
- Ensure that healthcare waste is adequately segregated, color-coded, and safely packed, especially in the case of sharps and infectious waste which should be packed in puncture-proof containers
- Ensure that bags or containers of healthcare waste are handled only by trained and designated personnel for internal collection and transport/disposal, while for external transport, only an officially licensed individual shall collect the waste
- Ensure that a note describing the composition and quantity of the waste is handed over to the collector (external) during collection

- Check for proof that the driver of the vehicle collecting the waste is aware of the procedures governing the transport of hazardous waste or products. Proof shall include an authorization letter/certificate from the relevant government entity
- Where onsite disposal is not possible, conducive storage facilities should be provided and waste must be regularly collected by a licensed vendor for safe disposal offsite
- Where home treatment (service) is provided, the service provider is responsible to collect and safely dispose of all waste generated
- Ensure that ambulances are equipped with a puncture-proof container of appropriate size, especially for sharps and infectious waste
- Ensure that any activities (including research) by outsiders at your facilities, which shall generate waste, shall include a plan and strategy for the safe disposal of such waste

8.4: Roles and Responsibilities of Heads of Healthcare Facilities (including Counties' Referral Hospitals)

The responsibility of implementing the management plan lies with the head of every institution/facility.

The followings are recommended:

- A chart should be developed showing the facility waste management plan (to include an emergency plan for the healthcare waste at the facility)
- Provision for future waste storage should be made
- The WASH /IPC Officers/EHTs with a requisite profile should assess and monitor the ability of the personnel to the post, before deployment
- The WASH/IPC Officers/EHTs in collaboration with the hygienist should organize and conduct periodic training programs for all staff on health care waste management
- The WASH/IPC Officers/EHTs /Hygienist (WASH and Environmental Health Committee) should biannually (every 6 months) review and update the facility waste management plan
- The WASH/IPC Officers/EHTs /Hygienist should conduct monitoring and evaluation (M&E) quarterly (every 3 months)
- A verbal report should be made during the facility's management meeting followed by a written report to be submitted to the facility management, with DHOs and CHOs copied

Roles and Responsibilities of the Heads of District Health Teams (DHOs/DEHT)

The District Health Officer (DHO) shall be the supervisor through committees on HCWM for all the facilities in the district, generating healthcare and related waste.

- Create awareness on the risk of healthcare and related waste including strategy for collecting and safe disposal
- Ensure Standard Operating procedures (SOPs) are developed for all facilities in the districts
- Advocate for financial and technical resources for the safe management of healthcare waste throughout the entire district, especially the most needed facilities
- Encourage and engage with periodic monitoring and supportive supervision at all facilities within your district
- Ensure and promote the public-private partnership model for providing the best, affordable, and sustainable alternative for managing healthcare waste, within your district

Roles and Responsibilities of the Heads of the County Health Teams (CHOs)

The County Health Officer (CHO) shall be the supervisor through district committees on HCWM for all districts in the county.

He/she must:

- Support DHO in creating- awareness on the risk of healthcare and related waste including strategy for collecting and safe disposal
- Work closely with the DHO and advocate for financial and technical resources for the safe management of health care waste throughout the entire district, especially the most needed facilities
- Ensure Standard Operating procedures (SOPs) are in place at all facilities in these districts
- Encourage and engage with periodic monitoring and supportive supervision at all facilities within your county, and ensure safe healthcare waste management is promoted
- Work closely with DHOs and promote public-private partnership models for providing the best, affordable, and sustainable alternative for managing healthcare waste, within the county

Roles and Responsibilities at Central Level

You must ensure the followings:

- Practical policies, guidelines, job aids, and SOPs are in place and adhered to at all times
- Waste management supplies and consumables are always in stock (at least 4 months supplies in Remote rural and 2 months supplies for facilities urban areas)
- Periodic supportive supervision and mentorship are conducted
- Training and education opportunities for staff at all levels, and merit base
- Resources mobilized to support waste management initiatives at all levels

Roles and Responsibilities of other technicians

Roles and Responsibilities of the Environmental Health Technician/Technical/WASH Officers

You must ensure the followings:

- Obtain and be familiar with national waste management programs, policies, and guidelines
- Directly supervise the collection, segregation, storage, transportation, treatment, and safe disposal of health care waste
- Work with all facilities and department heads to ensure waste management practices are enhanced
- Enforce facility waste management plan (goal, budget, staff, roles, supervision, training, reporting, supplies, and practices)
- Access, identify and recommend training needs for staff
- Organize and supervise training for staff on the safe management of health wastes
- Conduct a periodic survey on the quantity of waste generated at facilities adherence to SOP and National Guidelines
- Monitor and report the incidence of injuries related to health care wastes

8.5: Roles and Responsibilities of WASH/IPC Focal Person/Hygienists/Waste Managers in health care facilities

They are to ensure the followings:

- Waste management policy and protocols are adhered to at all times
- Standards and practices using SOPs, including the wearing of PPE are adhered to at all times
- Adequate supplies HCWM consumables at always in stock at the facilities
- Color-coding in the waste segregation system is adhered to at all times
- The cleaners (the assigned staff) are notified and waste containers that are $\frac{3}{4}$ full are replaced
- If there are waste management issues at the health care facility levels, the above is to be responsible

Roles and Responsibilities of the Facility Management Team

The Facility Management Team are to:

- Ensure that staff is trained in the safe handling of health care waste
- Prevent or minimize/reduce huge health care waste generation at their facilities
- Prevent waste from causing environmental pollution or adverse effects on public health
- Support technical staff to enforce facility waste management plan (goal, budget, staff, roles, supervision, training, reporting, supplies, and practices)
- Ensure that health care waste is adequately segregated and safely packed, especially in the case of hazardous wastes and sharps which should be packed in puncture-proof containers
- Ensure that bags or containers of health care waste are handled only by trained and designated personnel for internal collection and transport/disposal, while for external transport, only an officially licensed individual can collect the waste
- Monitor and report the incidence of injuries related to health care wastes to technical staff, and keep a record of such

- Ensure standards and practices using SOPs, including wearing of PPE are adhered to at all times
- Ensure adequate supplies HCWM consumable at always in stock at the facilities
- Follow and ensure that color-coding in the waste segregation system is adhered to at all times and places
- Conduct at least 2 health talks' sessions with particular reference to HCWM every wee

Management of Healthcare Waste from Supplementary Sources

Scattered or small sources generating healthcare waste facilities include but not limited to:

- Nursing homes
- Home treatment
- Ambulance services
- Veterinary centers

Options for safe collection, transportation, and disposal of healthcare waste from small sources, **which do not treat their waste, include the following:**

- An authorized contractor collects and treats the waste at the treatment facility, with an incinerator
- The Local authority (district health team, county health team, etc.) shall oversee the collection, treatment, and final disposal of HCW to ensure adherence to set guidelines and SOPs

Chapter 9.0: Waste Management Hierarchy

9.1: Waste Hierarchy



Figure 5: Waste Management Hierarchy

9.2: Waste Minimization

All facilities must aim at mitigating the impacts of health care risk, associated with poor or inadequate management of healthcare waste generated during their operation; by minimizing the volume of waste generated at every service delivery point, while at the same time encouraging recycling of recyclable materials.

This may be achieved by ensuring that the following measures are adhered to, at all times:

- Keeping every service provider waste stream segregated, in line with the 3 bins system.
- Reduce pharmaceutical, chemical, and related waste by consuming old stocks before using up new stocks
- Order drugs and chemical base on need, and avoid ordering commodities with close expiration dates (this order should take into consideration the facilities rate of consumption of items ordered)
- Co-operation with other facilities by exchanging drugs and pharmaceuticals that are getting close to the expiration date
- Recycling of general waste such as uncontaminated cardboard, glass, and plastic wares. These items must be regarded as infectious waste once they have come in contact with an infectious agent

9.3: Guiding Principles

Five principles are widely recognized as underlying the effective and controlled management of wastes.

These areas follow:

The "polluter pays" principle implies that all producers of waste are legally and financially responsible for the safe and environmentally sound disposal of the waste they produce. This principle also attempts to assign liability to the party that causes damage.

The "precautionary" principle is a persuasive principle governing health and safety protection. It was defined and adopted under the Rio Declaration as Principle 15: "Where there are threats of serious or irreversible damage to the environment, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

The "duty of care" principle stipulates that any person handling or managing hazardous substances or wastes or related equipment is ethically responsible for using the utmost care in that task. This

principle is best achieved when all parties involved in the production, storage, transport, treatment, and final disposal of hazardous wastes (including health care waste) are appropriately registered or licensed to produce, receive and handle named categories of waste.

The "**proximity**" principle recommends that the treatment and disposal of hazardous waste take place at the closest possible location to its source to minimize the risks involved in its transport. Similarly, every community should be encouraged to recycle or dispose of the waste it produces, inside its territorial limits unless it is unsafe to do so.

The "**prior informed consent principle**" as embodied in various international treaties is designed to protect public health and the environment from hazardous waste. It requires that affected communities and other stakeholders be apprised of the hazards and risks and that their consent be obtained. In the context of health care waste, the principle could apply to the transport of waste and the siting and operation of waste treatment and disposal facilities.

9.4: Safe Reuse and Recycling

You must ensure that:

- Every reusable piece of equipment is sterilized before reuse. Therefore, all facilities' equipment designated for reuse purposes must be designed to withstand the process of sterilization
- Proper disinfection and sterilization is carried on, to ensure the safe use of invasive and non-invasive medical devices
- Reusable items which may include certain sharps, such as scalpels, syringes, glass bottles, and containers, etc., after use, are collected separately from non-reusable items and are carefully washed
- Are sterilized by either thermal or chemical sterilization, before reuse
- Plastic syringes and catheters are **NOT** thermally or chemically sterilized; they should be discarded
- Other non-infectious wastes such as paper, glass, polythene, food remains should be recycled and reused

Other types of wastes not mentioned here are not recommended for recycling or re-use unless recommended by the authority.

9.5: Monitoring and Control

For regular monitoring, the following procedures are recommended:

- Standard Operation Procedures (SOPs) constitute part of these guidelines (for example minimization, segregation of waste, storage, transportation, and final disposal) for persons handling the waste be made available and monitored
- The minimum environmental performance requirement for controlled combustion treatment facilities like incineration should be carried out at the onset of use of the facilities and at least once yearly, by the regulatory authorities

Besides:

- Any vehicle used for transportation of waste or any other means of conveyance shall be appropriately labeled
- If the transport order does or is suspected to contain dangerous goods, the consignor should be reminded of the need to label the goods according to regulations and to prepare documents that include instructions in the local language in case of emergency or spillage
- Authorized transport companies shall develop checklists of different aspects of information, which the consignor can use to describe the load to facilitate the communication between different stages of the transport chain
- If the cargo is transported as bulk transport, a special check should be made that the vehicle is properly equipped, that proper placards are chosen, that the vehicle and its pipes and connections are empty and clean, and that the protective equipment is intended for those hazards the transported goods can cause (such as the provision of the right type of filter for the carrier's gas mask)

The control of the transport of dangerous goods sensitive to public health for disposal must be conducted by the National Public Health Institute, Ministry of Health, Justice, and National WASH Commission following the national legal regulations.

The head of these institutions shall be held liable for ensuring the safety of the public while transporting the consignment.

Employees Education and Training on Guidelines Application:

All employees should be made aware of these Guidelines, which contain details of the procedures for the safe management of healthcare waste.

Therefore:

All healthcare waste management personnel shall be technically trained and certified in healthcare waste management and implementation of these national guidelines.

The following training and education are recommended:

- Health facility management training
- WASH in HCF (for example, the Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT), by WHO and UNICEF)
- Operational training
- Waste handlers training (generator, handlers, collectors, transporters, and disposers)
- Public awareness and behavioral change communication (BCC)

The regulatory authority in collaboration with partners and relevant agencies shall develop and regularly update training modules and facilitate training processes.

Continuous training on HCWM should be organized to address the performance gap identified from monitoring exercises.

Chapter 10.0: Occupational Health and Safety

The safety of the healthcare facilities staff is the main responsibility of the management of those facilities, including visitors and patients (both in-patients and out-patients). Therefore, all facilities must institute appropriate measures within the workplace to ensure the health and safety of all, including the environment. The healthcare worker is obliged to follow instructions regarding safe work practices.

10.1: Occupational Health and Safety provisions

Healthcare waste management policies and plans should include provisions for the continuous monitoring of workers' health and safety to ensure that correct handling during segregation, storage, collection, transportation, treatment and safe disposal procedures of waste are being followed.

The following measures must be implemented:

- Training of workers on infection prevention and control (IPC), Water, Sanitation, and Hygiene (WASH) standards and practices in HCF including cross-transmission
- Provision of appropriate personal protective equipment (PPE), specifically including those for highly infectious diseases (Ebola, Lassa fever, etc.)
- Establishment of effective occupational health and safety programs that include immunization (e.g. Hepatitis B), post-exposure prophylactic treatment, and medical surveillance, and timely reporting
- Training in occupational health and safety must ensure that workers are aware of and understand the potential risks associated with healthcare waste, the value of immunization against viral hepatitis B among other diseases, and the importance of consistent use of PPE

10.2: Employer Responsibilities

HCF management is responsible under the Decent Work Act, of 2017 to provide appropriate information, training, education, and ensuring that safe systems of work are developed, implemented and sustained, at all-time and workplaces.

Key among these responsibilities are:

- To provide information on hepatitis B and the vaccines for staff, among other required vaccinations and a roster of vaccinated personnel maintained
- Approved work practices from all technical areas in the healthcare facilities should be documented and promoted
- Multilingual translations should be provided to all workers where appropriate
- Standard Operating Procedures (SOPs) should be made available
- Specify accepted waste management practices, collection, segregation, treatment, and safe disposal, and including cleaning and disinfection procedures
- Detail the necessary steps required for waste generators and handlers
- Specify personal protective equipment required for required waste handling and management tasks

- Detail spill management strategies and designate trained personnel for spills (like in the case of vomitus from an Ebola suspected/confirmed patient) management on-site
- Identify first-aid resources and needle stick injury treatment protocols; and specify how to operate the information, education, training, and safe working system

10.2.1: Employees Education and Training on Guidelines Application

All employees must be aware of these Guidelines, which contain details of the procedures for the safe management of healthcare waste.

Therefore, all healthcare waste management personnel must be technically trained and certified in healthcare waste management and implementation of these national guidelines.

The following training and education are recommended:

- Health facility management training as it relates to occupational health and safety
- WASH in HCF (Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT) by WHO and UNICEF)
- Waste handlers training (generator, handlers, collectors, transporters, and disposers)
- Public awareness and behavioral change communication (BCC)

The regulatory authority in collaboration with partners and relevant agencies must develop and regularly update training modules and facilitate training processes.

Continuous training on HCWM must be organized to address the performance gaps identified from monitoring exercises.

10.3: Personal Protective Equipment (PPE)

WASH and IPC committees must assess risks and recommend appropriate PPE for the nature and degree of the hazards/risks the HCFs staff is likely to be exposed to.

The following measures must be implemented:

- PPE **MUST** be always available, risk-appropriate, and used when necessary
- Waste collectors are under obligation to wear PPE at all times, during the collection and transportation, disposal including all other steps, of the waste management cycle must be ahead to

- The risk of spills or splash exposure necessitates the wearing of the face and eye protection, including other body parts ((EVD and Lassa fever)

All employees must comply with the healthcare waste management guidelines and SOPs, including the correct use of PPE for the protection of their health and safety and the health and safety of others.

10.4: Responsibilities of WASH and IPC Committees

Incident and accident reporting and recording are essential management information systems for identifying causative, factors of injuries relating to waste handling.

Therefore, the committee has the responsibilities to review, recommend, and report:

- Incidents and accidents monitored must be reported to the appropriate authorities with recommendations
- Monitoring and evaluation, availability of IPC commodities, and employee practices relative to hygiene promotion
- WASH and IPC Committees must monitor the installation of WASH facilities and equipment
- Monitor and evaluate incident and accident investigations
- Assess the status of IPC/WASH-related educational and training information for all staff
- Establish the availability and accuracy of relevant records

10.5: Hygiene Practices

There must be:

- Regular handwashing procedures
- Maintenance of equipment used to contain and transport waste
- Hand-washing facilities must be provided (with running water and soap) for employees and other people in the facility
- Regular hygiene promotion that complies with IPC and WASH policies, specifically at storage and incineration facilities
- Specific areas for equipment maintenance must be designated

- The workplace must be equipped with proper equipment, including an emergency shower and drainage connected to a functional septic system
- An emergency shower should be provided in all healthcare facilities

10.6: Precaution for sharps, blood and body fluid exposures

Precautionary measures must be instituted to protect against exposure to sharps, blood, and body fluids.

These precautions include:

- Provision of appropriate sharps containers as close as practicable (arm's length) to the point of generation
- Providing appropriate PPE for potential blood and body substance exposures
- Conduct periodic compliance checks to confirm that people wear protective clothing
- Investigating all incidents to identify causes of exposure
- Taking remedial action to eliminate risks
- WASH and IPC committees must review incident reports and ensure that appropriate actions/corrective measures are taken
- Train staff in first aid and injury management procedures for sharps injury and body substances exposure
- Reinforce the need for staff to report all incidents and injuries
- Analyze reports/records to identify any risk exposure and trends for necessary interventions

10.7: Response to injury and exposure

All personnel who handle healthcare waste must be trained to deal with injuries and exposures.

The program must include the following elements:

- Immediate first aid measures, cleaning of wounds and skin, and irritation (splashing) of eyes with clean water
- An immediate report of the incident to the appropriate authorities

- The item involved in the incident must be documented and retained for evidence
- Detailed information on the source of the incident for proper identification of possible infection
- Additional medical attention in accident and emergency cases
- Alerting the WASH and or IPC Committees as soon as possible
- Medical surveillance, blood or other tests, and recording of all incidents

Chapter 11.0: Training, Capacity Building, and Research

Education of the people is a core component for the success of any national program, and so the National Healthcare Waste Management Program. Taking from the experience of the Ebola Crisis, it has been more evidence that the more aware the citizens are concerning risk associated with some practices, they become conscious in taking appropriate measures that mitigate the rate of spread. Therefore, if every health practitioner and community people are educated on the safe management of healthcare waste, and the associated danger of poor management and care, we can now be confident about the reduction in the level of risk it poses to the health and wellbeing of the people and environment.

Therefore:

- Every health facility must have an information communication and education plan
- The relevant aspect of the education must be incorporated into the curricula of basic school and adult education programs (as been mentioned in advocacy)
- The public health, as well as clinical care units, must be inclusive of the program
- Incorporation of information on healthcare waste management into outreach education programs must be promoted
- Importantly, at the facility level, signs, posters must be strategically placed to guide and educate people, as they visit the health facility

The relevance of training healthcare workers and/or staff in the correct management of healthcare waste for their personal safety and that of the patients and visitors cannot be overemphasized.

The adoption of the following strategies by health facility is essential:

- Pre-service and post-basic training for healthcare workers must include healthcare waste management and occupational health and safety methodologies. There is a need to review and update health training institutions' curricula to incorporate waste management and occupational health & safety standards and practices
- Healthcare waste management (WASH in HCF) must also be incorporated into in-service training curricula. This training must be tailored to the need of healthcare providers
- Health managers must ensure that all their staff undergo in-service training in health care waste management
- Training curricula, guidelines, and manuals on healthcare waste management must be developed to facilitate pre-service, in-services post-basic training
- Standard Operating Procedures (based on national guidelines) must be developed and communicated to all persons involved (direct and indirect) in any step of the waste management cycle
- These guidelines and standards must form the basis for the in-service training to be provided for managers and staff involved in the day to day collection and disposal of healthcare waste. Their training must also cover contingency management of incidents involving healthcare waste management
- The responsible agencies within the health sector must coordinate and develop the training curricula which must be adaptable for counties and district level training in healthcare waste management and must be budgeted for in the annual budget of all health and related facilities, at all levels. Funding for this must be considered as a priority for all facilities (private/religious-based and public)
- Collaboration between the health sector and universities, vocational and technical institutions, as well as other research institutions, must be strengthened to facilitate the development of, and adaptation of technologies available for healthcare waste management
- Public awareness and behavioral change communication (BCC).

The overall goals of the training are to:

- Prevent occupational and public health exposures to the hazards associated with healthcare waste
- Raise awareness of the health, safety, and environmental issues relating to health-care waste
- Ensure that healthcare staff are knowledgeable about health and environmental risks, best practices, and technologies for Healthcare waste management and can apply them in their daily work
- Foster responsibility among all healthcare workers for healthcare waste management

Healthcare institutions must have a clear duty to designate at least one qualified staff to be responsible for HCW. In Liberia, this duty is defined in the National Policy and the National Guidelines for Healthcare Waste Management. Typically, environmental technicians must be responsible for HCW management in health facilities within their district.

As mentioned above, the training duration, content, as well as the implemented responsibilities, must be adjusted depending on the level of the hospital.

Healthcare Waste Officers and Healthcare Waste Managers must act as an in-house trainer and also as support trainer/supervisor for clinics and healthcare centers.

It is the duty of each healthcare facility and CHTs to encourage and send staff for the training. It is further a clear duty for healthcare institutions to identify/employ at least one qualified and registered responsible person for HCWM Programs.

The following level based training system is recommended:

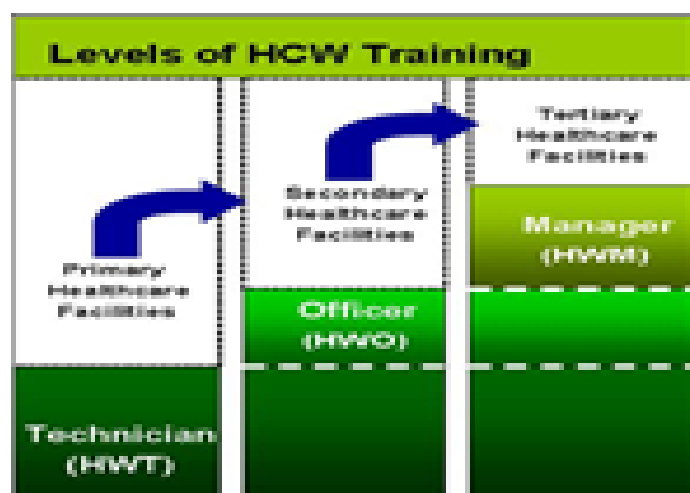


Figure 6: Level Based Training System

Chapter 12 Physical Assets Management (Maintenance)

12.1: Physical assets management (Maintenance)

Healthcare waste management must be a part of the physical assets management system of the healthcare facility, especially concerning the maintenance of the infrastructure of the healthcare facility. It must be the task of the Healthcare Waste Management Officer to develop in close consultation with the engineering/maintenance department a maintenance plan which **must include the below items:**

1. Maintenance of the infrastructure

- Waste management/cleaning system for the healthcare facility compound
- Preventive maintenance strategy for waste management related buildings

2. Maintenance of the equipment

- Operation Plan for healthcare waste logistic and treatment equipment.
- Preventive maintenance strategy for waste logistic and treatment equipment (including cleaning planning for waste segregation equipment).
- Strategy for the regular replacement of low-cost products with limited life-time (such as color-coded waste bins, etc.).
- All healthcare waste-related assets must be included in the inventory of the healthcare facility, and regularly reviewed and updated.

Chapter 13.0: Economics of healthcare waste management

Every healthcare activity generates waste. If financial resources are not allocated sufficiently to manage healthcare waste in the short term, there will be an even greater financial cost in the medium and long term on morbidity, mortality, and environmental damage.

The management of healthcare waste may vary in different parts of a healthcare facility, but each part requires adequate financing to function well. Consequently, each healthcare facility must be financially responsible for the safe management of any waste generated.

This is following the widely accepted “polluter pays” principle and the obligation of the duty of care. The World Health Organization’s (WHO’s) core principles for achieving safe and sustainable management of healthcare waste require that all associated with financing and supporting healthcare activities must provide for the costs of managing healthcare waste (WHO, 2007).

To achieve these, the following should be considered:

- The government should allocate a budget to cover the costs of establishing and maintaining sound healthcare waste-management systems
- Donors, partners, and other sources of external financing for healthcare programs must consider a provision in their program assistance to cover the costs of managing wastes associated with their healthcare interventions
- Manufacturers share take responsibility for the management of waste generated as a result of the development and sale of their medical products and services

Some basic principles must always be respected to minimize these costs; they include the following: **waste minimization, segregation, and recycling** may **reduce disposal costs** if they lead to an overall reduction in waste-related expenditure.

13.1: Economics of healthcare waste management

The management of healthcare waste has huge financial implications and economic benefits. Therefore, it is encouraged to produce less waste and avoid the overburden of segregation and unnecessary waste treatment by doing the following:

- Planning and careful design are needed to ensure that the elements of a healthcare waste system are sized to have adequate capacity. The efficient handling, storage, and treatment of wastes will avoid the need for subsequent costly modifications
- The number of financial resources available to a healthcare facility will influence the choice of a waste-treatment system and the standards of operations that can be sustained

Like other secondary sectors, healthcare waste management needs a separate budget line that is specific to healthcare waste.

The following items must be considered for budgeting and financing:

- Consumable items (e.g. fuel for the incinerator, color-coded plastic bags, sharp containers, electricity, monitoring equipment, etc.)
- Services (e.g. disposal cost for general waste, service contracts with transport companies, treatment cost for hazardous waste, etc.)
- The regular replacement of minor investment goods (e.g. bins, trolleys, etc.)
- Replacement of major investment goods (e.g. incinerator, sterilizer, etc.). The depreciation of investment goods is recommended

13.2: New installations financed by external sources

In case, new healthcare waste systems are being installed that are financed by external resources (e.g. aid programs, special programs by NPHIL/MoH, etc.), the healthcare facility must only accept this if a comprehensive, full system will be installed. The new system must be following these guidelines.

The minimum requirements for a new system must include but must not be limited to:

- A complete solution for the treatment/disposal of generated hazardous waste including infrastructure (interim storage places, treatment areas, etc.) and the financing of the operation cost and consumables for not less than one year
- The logical solution for non-hazardous, hazardous waste, including necessary infrastructure, equipment, and financing of service cost for not less than one year
- Full package of waste logistic equipment including a sufficient number of different kinds of bins, trolleys, transportation containers, scales, bags, etc.). Security for future financing (e.g. financing and budget concept) and the human resources for the proposed concept
- Capacity building and training concepts and costs for the staff of the healthcare facilities
- The proposal must be presented to the County Health Team for approval and acceptance. The CHT will inform the NPHIL and MoH about the planned activities and will provide a copy of the proposal

If the proposal is accepted, the healthcare facility needs to prepare an application for a permit to Environment Protection Agency as required by Sections 6, 7, 8, 64, and Annex I of the Environment Protection & Management Law. This will be followed by the final approval of the plan by the regulatory authorities.

Chapter 14.0: Records & Documentation and Advocacy

14.1: Records & Documentation

Records and documentation of the facility must straightly be confidential and protect the interest of patients, while at the same time protecting the health and safety of the public.

There must always be a functional plan for document handling and control. The record must be kept and released to the appropriate authorities when required. The facility must have both the hard and soft versions of records and documents for easy access and safe storage for future references.

14.2: Advocacy

Advocacy in waste management is very cardinal to the success of the program, especially for policy action and the inclusion of all stakeholders.

Therefore, the following measures must be considered to achieve:

- The findings obtained from the audits and supportive supervisions of healthcare waste management practices at the facilities must be disseminated to all the stakeholders, agencies, and departments involved at the highest possible levels
- The attention of the development partners and all civil society and community-based organizations should be drawn to the prevailing situation to obtain the widest possible support including financial commitment for the sustainable implementation of this and the development of all required legal frameworks
- Feature articles in the print media drawing key messages from the findings of the policy should be published. This will help promote the multi-sectoral collaboration and financial support that is required for the success of the program
- In Liberia, like anywhere in the world, health institutions should be safe places to acquire cure not infections, therefore, every means of communicating and advocating safe health care waste management must also be explored
- The private-public partnership is inevitable in the success of this program, therefore, to secure the commitment of private health institutions, the authorities should involve them through their respective trade associations, in programs meant to implement the policy
- Besides, the private facilities and health institutions should be encouraged to have a memorandum of understanding with other entities for cost-sharing arrangements, since safe management of HCW comes with a cost
- The advocacy program should also encourage health care training institutions to include health care waste management in their curricula. All effort should be made to inform and educate key stakeholders to achieve unity of purpose and action
- Robust standards should be maintained in the audits and monitoring program for new and old existing institutions and sanctions should include the withdrawal of certificates until the relevant shortfalls are corrected

Chapter 15.0: Monitoring, Control, and Supportive Supervision and Audits

15.1: Monitoring and Supportive Supervision

- Monitoring and supervision must be scheduled and or conducted as much as frequent
- Monitoring and supervision can be undertaken by each level of management (facility, district, county, and or national) or may be integrated
- Must be done at least once a week at the facility; at least twice every month for the district, once every month for the county, once every four months for national, at every facility
- Written reports must be shared with every level of the management structure (to the facility where the activity is performed, district, county, and national)

15.2: Monitoring and Control

For regular monitoring, the following procedures are recommended:

- Standard Operation Procedures (SOPs) which constitute part of these guidelines (for examples minimization, segregation of waste, storage, transportation, treatment, and final disposal) for persons handling the waste be made available and monitored
- The minimum environmental performance requirement for controlled combustion treatment facilities like incineration should be carried out at the onset of use of the facilities and at least once yearly, by the regulatory authorities

Transport of hazardous waste on public roads:

The control of the transport of dangerous goods sensitive to public health for disposal must be conducted by the National Public Health Institute, Ministry of Health, Justice, and National WASH Commission following the national legal regulations.

- If the transport order does or is suspected to contain dangerous goods, the consignor should be reminded of the need to label the goods according to regulations and to prepare documents which include instructions in the local language in case of emergency or spillage
- Authorized transport companies shall develop checklists of different aspects of information, which the consignor can use to describe the load to facilitate the communication between different stages of the transport chain

- If the cargo is transported as bulk transport, a special check should be made that the vehicle is properly equipped, that proper placards are chosen, that the vehicle and its pipes and connections are empty and clean, and that the protective equipment is intended for those hazards the transported goods can cause (such as the provision of the right type of filter for the carrier's gas mask)

The head of these institutions shall be held liable for ensuring the safety of the public while transporting the consignment.

15.3: Technical and Environmental Audits

15.3.1: Technical or performance audits

- There shall be a plan for a periodic performance audit by both external and internal auditors from the regulatory authorities (NPHIL/MoH, Partners)
- The audits must be followed by onsite coaching or mentorship and sharing of findings with the facilities authorities
- Follow-up on corrective actions shall be before the next scheduled audit or as may seem necessary by auditors
- An audit can be conducted or scheduled without the notice of the facilities to be audited
- Findings of audit on public health threats not recorded and reported by auditors to the regulatory authorities is equivalence to administrative action as may seem necessary by the authorities

15.3.2: Periodic Audit

- Each facility should schedule and periodically conduct an internal audit on healthcare waste management standards and practices
- follow up on all recommendations especially ones needing urgent attention
- Audit reports and corrective actions taken should be documented
- Reports should be shared with authorities
- Weekly update at facility levels
- These activities should be supported by the district, county, and national levels of healthcare waste management teams

15.3.3: Regulatory Authorities Roles and Responsibilities in Healthcare Waste Management

The regulatory authorities shall be:

- Responsible for training of all medical institutions and companies involved in the generation and collection of healthcare waste (cost attached will be undertaken by the institution to be trained)
- All Medical Wastes companies will sign a contractual agreement with the facility offering the contract for waste collection
- There should be another MoU between the disposal company and the management at the disposal site
- The regulatory authorities shall enforce the Public Health Law on the disposal of both medical and general wastes
- There should be a review of the performance of the HCWM programs a year after the launch of this guidelines document
- Compliance monitoring and impact reporting begin within the second year of this revised document implementation.

15.4: Requirements for Implementation

- Sanitary Standards License (SSL) should be issued every year
- Quarterly monitoring and supervision should be carried out to all institutions involved with health care waste production and waste companies
- Renewal of SSL shall be based on performance before reopening
- The inspection team shall assess the institution/facilities
- If qualified for renewal, written documentation will be issued to the healthcare institutions/companies
- Standard Operating Procedures (SOPs), and job aids shall be provided by the regulatory authority, to help in achieving the best results
- All health facilities must be trained and periodically mentored to implement these guidelines

15.5: Penalty for violating provisions on Healthcare Wastes

All persons and institutions must take all steps necessary to ensure that wastes are handled without adverse effects on human health and the environment. A person or institution violating provisions of this Chapter or regulations made thereunder shall be subject to penalties as established under sections 40.8(b) and 40.8(c) or regulations of the Public Health Laws, whichever is more specific.

Failure to comply with the terms and conditions in this guideline

- Healthcare institutions and companies will receive a verbal warning on notice of non-compliance to the guidelines on healthcare waste management
- In the event of a continuous violation, the institutions shall be served a written notice of non-compliance to the guideline on waste management within a given period by the technicians, based on the nature of the said violation
- Failure to comply, institutions, and companies shall be given a STOP order Legal Action shall be taken against institutions and companies as prescribed in this guideline and the Public Health Law of Liberia



Annexes


The below audit tools **must be made available** to monitor and track compliance with HCWM procedures, and other waste management purposes, as may be required by the authorities.

Annex 1: Sample sheet for waste assessment









[illegible]

Annex 2: Color codes for biomedical waste

No.	Type of waste	Color of containers and markings	Types of containers
1	Infectious	Yellow with the biohazard sign 	Strong leak proof-plastic bag with the biohazard symbol
2	Pathological/anatomical	Red with the biohazard sign 	
3	Sharps	Yellow (marked sharps)	
4	Chemicals	Brown (marked chemical)	
5	Pharmaceutical	Brown	
6	General waste/non-infectious/non-hazardous (non-clinical)		

7	Radioactive waste	The symbol for radioactive waste 	
8	Genotoxic/cytotoxic waste	purple	
9	Electronic-waste	Refer to the E-waste guideline	

Annex 3: Label for hazardous waste

			
Potentially explosive waste	Radioactive Waste	Potentially corrosive waste	
			
Label for infectious waste	Waste containing flammable material	Label for waste containing oxidizing chemicals	
			
Waste containing toxic material	Highly infectious waste		

Annex 4: National Alternative label for hazardous waste and forms**Annex 4.1: National Alternative label for hazardous waste**

HAZARDOUS WASTE: CYTOSTATIC Institution/Hospital..... Department/Ward..... Signature of waste manager/supervisor..... Comment, Signature of OIC/Head nurse..... Comment..... Date.....	HAZARDOUS WASTE: SHARPS/INFECTIOUS Institution/Hospital..... Department/Ward..... Signature of waste manager/supervisor..... Comment, Signature of OIC/Head nurse..... Comment..... Date.....
HAZARDOUS WASTE: BIOLOGICAL Institution/Hospital..... Department/Ward..... Signature of waste manager/supervisor..... Signature of OIC..... Comment..... Comment..... Date.....	HAZARDOUS WASTE: CHEMICAL Institution/Hospital..... Department/Ward..... Signature of waste manager/supervisor..... Comment..... Signature of OIC..... Comment..... Date.....
HAZARDOUS WASTE: INFECTIOUS Institution/Hospital..... Department/Ward..... Signature of waste manager/supervisor..... Comment, Signature of OIC..... Comment..... Date.....	HAZARDOUS WASTE: PHARMACEUTICAL Institution/Hospital..... Department/Ward..... Signature of waste manager/supervisor..... Comment..... Signature of OIC..... Comment..... Date.....

Annex 4.2: Form 1 Healthcare Waste Tracking for External Waste Disposal

HEALTH CARE WASTE TRACKING FORM	
Date of transport to disposal site: DD/MM/YYYY	
Source of the Waste (Name of the facility)	
Physical Address	
Postal Address	
Tel:	Email address
TRANSPORTER	
Name (collector/Company)	
Physical Address	
Postal Address/NA	

Tel:	Email address
------	---------------

Annex 4.3: Form 2: Healthcare Waste Tracking Form for External Waste Disposal

Name, address, and phone # of producer:	Facility's registration number from the Regulatory Agency:
Consignment note for the carriage and disposal of hazardous waste	Waste Collector's Reference Number:
Producer's Certificate	Materials described in B below is to be collected from (Location)..... and taken to..... Name of collector..... signed..... On behalf of (entity's name) Designation..... Address.....cell #: Date.....Time of collection.....
Description of the waste	General description and physical nature of waste..... Relevant chemical and biological component and maximum Concentration----- Quantity of waste/weight..... Type of waste.....# of containers..... State processes from which waste was generated.....
Carrier's collection certificate	
Producer's collection certificate	
Disposer's certificate	
For use by Producer/carrier/disposer	

Annex 5: Treatment Methods

Infectious Waste	Treatment Method
Culture and stock	Steam sterilization /autoclave/microwave
Contaminated bedding /patient care waste	Steam sterilization, autoclave, or incineration
Contaminated small equipment	Steam sterilization or incineration
Contaminated large equipment	Formaldehyde decontamination
Biological waste	Steam sterilization, autoclaves, or incineration/microwave
Contaminated laboratory equipment	Steam sterilization /microwave
Dialysis unit waste	Steam sterilization
Pathological Waste	

Anatomical Wastes	Placenta pit burial, Steam sterilization, or incineration/grinding
Surgery Waste	Steam sterilization, or incineration
Human blood and blood products	Steam sterilization or incineration
Contaminated animal carcasses	incineration
Autopsy Waste	Incineration
Sharp	
Contaminated and unused sharps (needles, broken glass, and bottles, etc.)	Steam sterilization or incineration/grinding
Pharmaceutical waste	
Pharmaceutical waste	Microwave (reference separate pharmaceutical guidelines, if available)
Anti-neo-plastic drugs waste	Incineration
Low-level radioactive waste	Consult the EPA

Annex 6: Management of spillages (A general procedure for dealing with spills)

1. Evacuate the contaminated area
2. Decontaminate the eyes and skin of personnel immediately
3. Inform the designated person (usually the waste management officer), who should coordinate the necessary actions.
4. Determine the nature of the spill
5. Evacuate all the people not involved in cleaning up if the spillage involves a particular hazardous substance.
6. Provide first aid and medical attention to an injured person, relative to the risk and injury incurred.
7. Secure the area and ensure no individual entry to prevent further injuries.
8. Provide appropriate PPE (as to be necessary or require by level or risk) to personnel involved with the cleaning
9. Limit the spread of the spill

10. Neutralize or disinfect the contaminated materials
11. Collect all spills and contaminated material (Never use a bared hand, and staff performing this function **MUST** be trained personnel), using appropriate PPEs (heavy-duty Gloves, boots, aprons, goggles). The waste must be placed in the appropriate waste bin.
12. Decontaminate or disinfect the area, wiping up with absorbent cloth (or other absorbent materials). The decontamination process should be carried out starting with the least contaminated area to the most contaminated parts; with a change of cloth at each stage. In case of dry spill used a wet cloth impregnated with either (acid, basic or neutral, as might be appropriate). Remember to always clean before disinfection.
13. All tools and PPEs used must always be decontaminated and disinfected, either before been discarded or stored for reuse.
14. **Immediately, report and seek medical attention** if contact or injury occurred during the spillage clean-up process.

Annex 7: Recycling index

Contaminated papers and cardboards			
Category	Action	Outcome	Additional comment
Cardboard	Flatten & bundle Cartons	Recycled	
Confidential documents	Shred	Recycled paper	
Office papers	Separate & Bundle	Recycled paper	
Metals			
Aluminum	Contact a scrap merchant	Reprocessed cans	
Dental Amalgam	Contact a silver recovery contractor	Recovered silver	
Mercury	Contact a recovery contractor	Recovered mercury	
Scrap steel	Contact a scrap merchant	Reprocessed steel	

Silver x-ray films and processor	Contact a silver recovery contractor	Recovered silver	
Glass			
Bottles & jars	Separate, reused and contact a recycler	Reused item or reprocessed glass	
Broken glass	Separate, store in rigid containers and contact a recycler	Reprocessed glass	

OILS			
Category	Action	Outcome	Additional comment
Waste oil	Separate and contact a recycler	Refined or used as fuel	
Food remains/leftovers and green waste			
Food remains/leftovers	Separate from other types of waste into the appropriate color-coded bin	Garden compost Pig swill	
Plastics			
High and low-density polyethylene		Return to suppliers	
PET Polyethylene Terephthalate soft drinks bottle	Separate and arrange the collection	Recycled bottles	
PP Polypropylene Car battery Casings	Separate and arrange the collection	Reprocessed	
PPVC Plasticized Polyvinyl Chloride Plastic Tubing	Separate and arrange the collection	Reprocessed	

PS Polystyrene foam cups and packaging	Separate and arrange the collection	Reprocessed or reused	
UPVC Unplasticized Polyvinyl Chloride	Separate and arrange the collection	Reprocessed	

Annex 8: A sample tag for shipment

GENERATOR

Date of

Physical

Address_____

Shipment ____/____/____

Name of Health

Facility_____

_____ Driver License

Postal

#:_____

Address_____ Tel:

Name of

Entity_____

Email

Address_____

Physical

Address_____

TRANSPORTER

Name of

Transporter_____

Postal Address_____ Tel:_____

Email Address_____

Annex 9: Facility Healthcare waste management plan**Annex 9.1: Define the Waste Management Focus Person**

Name of Facility:	Date:	
Who is responsible for the overall supervision of HCWM at your facility		
Does your facility has a supervision structure/ organogram, kindly attach		
Who is responsible for performing waste disposal at your facility		
Do your staff have Job descriptions?		
Kindly attach, including cadres		
Kindly outline the current status of HCWM at your facility		

Annex 9.2: Define the type and amount of waste generated

Type	
Non-infectious waste	
Infectious waste	
Highly infectious waste	

Annex 9.3: Outline HCWM practices used currently

Concept	Current Practice
Is waste classified and properly (color-coded bins) segregated Briefly describe how.	
How are sharps (needles) disposed of Briefly describe how safety boxes are used.	
Are the weights of safety boxes recorded? Where are they stored Briefly describe how they are transported to the final disposal site	
What are the different categories of waste disposal? Briefly describe the disposal process.	

Concept	Current Practice
Segregating Waste according to different types and corresponding colors	
Prioritizing sharps (use of safety boxes or needle removers, if applicable)	
Recording, handling, and transportation of safety boxes	
Final waste disposal for each category of waste (including sharps barriers, if applicable)	
Hepatitis B and tetanus toxoid immunization for all cadres or staff	

Annex 9.4: Waste Disposal Checklist

Name of HCF.....Ward/Dept.....Date... ..Time.....

No.	Criteria	Yes	No	N/A	comments	Remedial Action
1	The waste management policy is available to all staff at HCF or unit					
2	Staff capacity building on how to apply the National Guidelines for the Safe Management of Health Care Waste					
3	Standard Operating Procedure for safe disposal of HCW is available to all staff					
4	Job aids are on display at worksites					
5	Sharps including broken glass is disposed of safely, according to guidelines					
6	The waste bin is foot-operated and in good working condition and lined with correct color bags					
7	Waste bins are in clean condition					

8	The waste bin is correctly labeled, and display additional information to users, where appropriate					
9	Contents in waste bins do not exceed the required limit					
10	Waste bags are securely sealed when $\frac{3}{4}$ full and correctly labeled					
11	Waste bags awaiting collection are stored in a safe and secure location					

Annex 10: Sharp Waste Disposal Checklist

Name of HCF.....Ward/Dept.....Date.....Time.....

No.	Criteria	Yes	No	N/A	comments	Remedial Action
1	HCFs Staff are trained especially for handling sharp waste					
2	The box used as specified in these guidelines					
3	Standard Operating Procedures (SOPs) for collection and safe disposal of sharps are available to all staff					
4	Job aids relative to sharps are on display at all worksites of generation					
5	The sharp box is assembled according to the manufacturer instructions					
6	Sharp boxes are at a convenient position (but inaccessible by children and visitors) for use by the service provider					

7	Boxes are filled according to the manufacturer instructions					
8	Content in sharp boxes are as recommended					
9	Contents in waste bins do not exceed the required limit					
10	The sharp containers are free from protruding sharp waste					
11	Waste bags are securely sealed when $\frac{3}{4}$ full and correctly labeled					
12	Waste bags awaiting collection are stored in a safe and secure location					
13	Sharp Boxes are available when needed and at least 2-month supplies in stock					
14	Full sharp containers are safely fastened, as per manufacturer instruction					
15	Does ward/ department recapped needles					

Annex 10.1: List of needed Improvements

What supplies needed for the next 6 months? (Safety boxes, cleaning supplies, protective clothing, waste bins)

Supplies	Quantity	Total cost	Comment

What training is needed at your facility for each cadre staff?

Name of Cadre or Staff	Training Topics	Propose starts date	Propose completed date

--	--	--	--

Annex 11: Minimum Safety Requirements for Dead Body Management

All dead bodies are potentially infectious and Standard Precautions must be implemented for every case. The regulatory authority/environmental health Technicians / professional (EHTs) must ensure that corpse(s) is/are properly buried, cremated, or exhumed by:

- Issuing a burial permit before such burial
- That the corpse last place of abode is disinfected and deodorized
- That the grave is disinfected and deodorized after burial
- That the place of burial is demarcated and decorated
- That the distance from the grave to the drinking water source is not less than 100 feet

Annex 12: COVID-19 and Safety Protocols

COVID-19 is the disease caused by a new coronavirus called SARS-CoV-2. WHO first learned of this new virus on 31 December 2019, following a report of a cluster of cases of ‘viral pneumonia’ in Wuhan, People’s Republic of China. The first index case of this new disease was reported on 16 March 2020, in Liberia; and was imported from Europe.

The most common symptoms of COVID-19 are:

- Fever
- Dry cough
- Fatigue

Other symptoms that are less common and may affect some patients include:

- Loss of taste or smell,
- Nasal congestion,
- Conjunctivitis (also known as red eyes)
- Sore throat,
- Headache,
- Muscle or joint pain,
- Different types of skin rash,
- Nausea or vomiting,
- Diarrhea,
- Chills or dizziness.

Symptoms of severe COVID-19 disease include:

- Shortness of breath,
- Loss of appetite,
- Confusion,
- Persistent pain or pressure in the chest,
- High temperature (above 38 °C).

Other less common symptoms are:

- Irritability,
- Confusion,
- Reduced consciousness (sometimes associated with seizures),
- Anxiety,
- Depression,
- Sleep disorders,
- More severe and rare neurological complications such as strokes, brain inflammation, delirium and nerve damage.

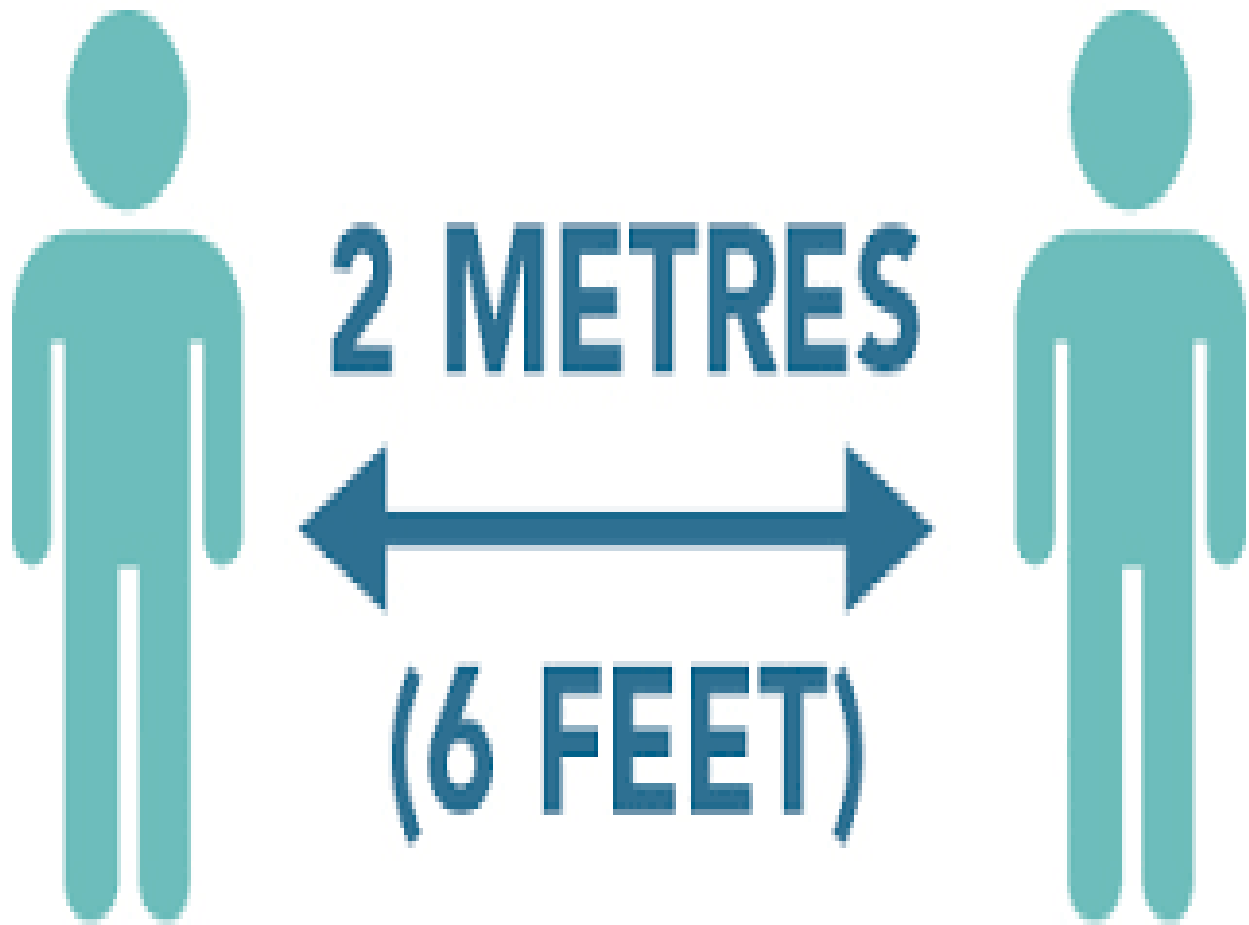
People of all ages who experience fever and/or cough associated with difficulty breathing or shortness of breath, chest pain or pressure, or loss of speech or movement should seek medical care immediately. If possible, call your health care provider, hotline or health facility first, so you can be directed to the right clinic.

Who is most at risk of severe illness from COVID-19?

People aged 60 years and over, and those with underlying medical problems like high blood pressure, heart and lung problems, diabetes, obesity or cancer, are at higher risk of developing serious illness.

However, anyone can get sick with COVID-19 and become seriously ill or die at any age (for more check the WHO website: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19>).

Annex 12.1: Observing Physical Distance, at all times



Annex 12.2: How to wear Medical Masks



Annex 12.3: How to Wear a Non-Medical Mask



Annex 12.4: The Don'ts of Wearing a Non-Medical Mask



Annex 12.5: Order for putting on PPEs

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

- 1. GOWN**
 - Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
 - Fasten in back of neck and waist
- 2. MASK OR RESPIRATOR**
 - Secure ties or elastic bands at middle of head and neck
 - Fit flexible band to nose bridge
 - Fit snug to face and below chin
 - Fit-check respirator
- 3. GOGGLES OR FACE SHIELD**
 - Place over face and eyes and adjust to fit
- 4. GLOVES**
 - Extend to cover wrist of isolation gown

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



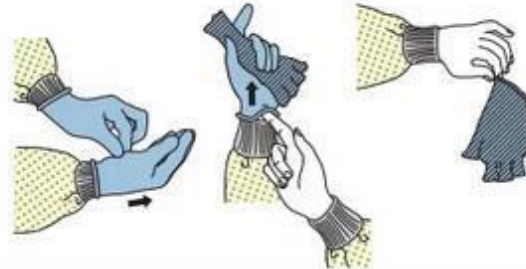
Annex 12.6: Order for Removing on PPEs

**HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE)
EXAMPLE 1**

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in an infectious* waste container

**2. GOGGLES OR FACE SHIELD**

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container

**3. GOWN**

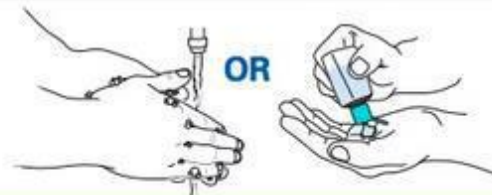
- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in an infectious* waste container

**4. MASK OR RESPIRATOR**

- Front of mask/respirator is contaminated — **DO NOT TOUCH!**
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container

**5. WASH HANDS OR USE AN
ALCOHOL-BASED HAND SANITIZER
IMMEDIATELY AFTER REMOVING
ALL PPE**

* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.




**PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS
BECOME CONTAMINATED AND IMMEDIATELY AFTER
REMOVING ALL PPE**



Annex 12.7: Hand WASH Protocol

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

 **Duration of the entire procedure: 40-60 seconds**



Wet hands with water;



Apply enough soap to cover all hand surfaces;



Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



Palm to palm with fingers interlaced;



Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



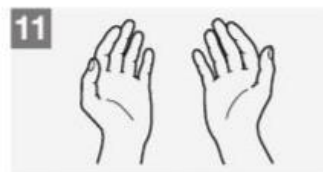
Rinse hands with water;



Dry hands thoroughly with a single use towel;



Use towel to turn off faucet;



Your hands are now safe.



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SAVE LIVES

Clean Your Hands

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May 2009

Annex 12.8: Hand rub Protocol

How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds

1a



Apply a palmful of the product in a cupped hand, covering all surfaces;

1b



2



Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

4



Palm to palm with fingers interlaced;

5



Backs of fingers to opposing palms with fingers interlocked;

6



Rotational rubbing of left thumb clasped in right palm and vice versa;

7



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8



Once dry, your hands are safe.



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