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Hygiene and Environmental Health Department,

Health Care Waste Management National Guidelines

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Abbreviations

DACA : Drug Administration and Control Authority

DHEH : Department of Hygiene & Environmental Health

EPA : Environment Protection Authority

HAPCO: HIV/AIDS Prevention and Control Office

HBV : Hepatitis B virus

HCV : Hepatitis C virus

HCF : Health-Care Facility

HCW : Health-Care Waste

HCWM : Health-Care Waste Management

HIV/AIDS : Human Immunodeficiency virus/Acquired Immunodeficiency syndrome

IP : Infection Prevention

JHPIEGO : John Hopkins Program for Information and Education in Gynaecology and Obstetrics.

MOH : Ministry of Health

MOE : Ministry of Education

MOU : Memorandum of Understanding

NGO : Non-governmental organization.

OGA : Other governmental Agency.

PPE : Personal Protective Equipment

PVC : Poly Vinyl Chloride

RHB : Regional Health Bureau

UNICEF : United Nations Children's Fund

WHO : World Health Organization

PREFACE

The purpose of the national health-care waste management guidelines is to ensure safe and healthful working conditions for every working man and woman in the health-care facility by providing guidelines that will ensure, insofar as practicable, that no workers will suffer diminished health, functional capacity, or decreased life expectancy as a result of poor management of health care wastes.

Proper health care waste management procedures can reduce the injury and disease among workers of health care facilities and the population at large. Hence, in this guideline every effort was made to address all major health and safety hazards that might be encountered in hospitals or other health care facilities attached to waste management.

This document is intended to indirectly improve health care service quality by improving the management of hazardous health care wastes and hence, implementing the guidelines will generally benefit patient care.

Forward

Waste produced in the course of health-care activities carries a higher potential for infection and injury than any other type of waste and its poor management directly or indirectly poses health risk to medical staff, patients, caretakers, waste handlers, support staff of health institutions,. the community, and the environment at large.

At present, the magnitude and damages inflicted as a result of improper handling of waste is not known, however it is speculated that many health care related infections such as HIV/AIDS, Hepatitis A and Hepatitis B viruses and other infectious diseases can be transmitted by mishandling of infectious waste. This highlights the need for efficient health care waste management systems including the sensitization of health care managers, providers, and their support staffs at all level of health service delivery in both private and public institutions.

Ethiopia is no exception to these phenomena. Health Care Waste Management was a neglected activity by health service providers and lacked the attention it deserves. Hence no data and records are available, and it is difficult to estimate the damages it has inflicted on human health and the environment. However, practices from daily observation indicate that prior to the beginning of the JSI/ MMIS project, most health facilities had not put in place an organized management system to address HCWM properly and if such a system was present, it did not meet the minimum requirements.

Recognizing the need to address the problem, and for immediate action, Hygiene and Environmental Health Department of the Ministry of Health in collaboration with JSI-MMIS has developed this Health Care Waste Management guideline. In this guideline information about managing the most pertinent health care wastes—the segregation, collection, storage, transportation, treatment and disposal at different levels of health institutions from health post to referral hospitals—is included. It is prepared in simple terms which may be easily understood and implemented by any health worker or support staff at all level of health institutions. It is a necessary tool to combat the risks that come from mishandling of health care waste and may be used by anyone outside the health setting. Hence it is comprehensive; users of this guideline may apply it at different levels of the facility, resources, type of waste generated, and level of commitment.

It should be well understood that HCWM is the responsibility of everyone serving in the health care facilities; However the Health Care Management Team has to take the lead for successful implementation.

Mulu Araya

A/Head, Department of Hygiene and Environmental Health

Federal Ministry of Health

1.1 Overview of possible hazards and infections attached to health care waste in health care facilities

Safe management of health care waste (HCW) is a key issue to control and reduce nosocomial infections (health facility acquired infections) inside a hospital, health centres, clinics, and health posts, and to ensure that the environment outside is well protected. Health care waste management (HCWM) should be part of the overall management system of a health care facility (HCF) and reflect the quality of the services provided by the facilities.

Ethiopia has poor health status relative to other low-income countries, even within Sub-Saharan Africa. This is largely attributed to preventable infections and nutritional problems. Infectious and communicable diseases account for about 60–80% of the health problems in the country. Therefore, the recommendations contained in this document should be applied in all HCFs in Ethiopia. In case these recommendations cannot be rapidly applied in certain HCFs due to financial or institutional constraints, a minimum HCWM program should always be set up (see Annex IV for definition of minimum requirements).

According to the Ethiopian Federal Ministry of Health (MOH) report of 2006–07, there are a total of 143 hospitals, 690 health centers, 1,376 health stations and nucleus health centers, and 9,914 health posts run by the

government. Likewise, 2,153 private clinics are run by private institutions and non-governmental organizations (NGOs). In addition, there are 2,489 pharmaceutical retail outlets owned by the government, private owners, OGA and NGOs. Health care services inevitably generate waste that may be hazardous to human health and the environment. Some types of waste—such as sharps and pathogenics—carry a higher potential for infection and injury than any other type of waste. An integrated effort is necessary in Ethiopia to set up safe health care waste management practices.

1.2 Overview of HCWM programs

Health care waste is not only a technical issue but also a management issue, and its safe treatment/management should become an integral feature of health care services. It is essential that:

- Awareness and training programmes for medical and ancillary staff be strengthened in health care establishments.

- Appropriate, environmentally friendly, affordable technologies should be selected for the treatment and the disposal of health care waste, taking into consideration the resources of each health care facility.

- Specific administrative procedures should be defined.

- Resources should be allocated at all levels to ensure a proper management of health care waste.

- Clear individual and group responsibilities and monitoring procedures should be established at each level of health care facilities.

A policy statement on general waste management exists at the national level (by the Environmental Protection Agency (EPA) and MOH); however, specifics that deal with hazardous waste management in general and health care waste in particular do not exist at the national level. Given the rapid expansion of health-related infrastructure, which implies a rapid growth of hazardous waste generation, the development and implementation of guidelines, directives, and a strategic plan is a forthcoming challenge.

To oversee all injection safety activities, including HCWM, a national injection safety taskforce and within it a national health care waste management technical committee—have been established.

Major stakeholders in the national injection safety taskforce include: the MOH, HIV/AIDS prevention and control office (HAPCO), Environmental Protection Authority (EPA), World Health Organization (WHO), United Nations Children's Fund, Joint United Nations Programme on HIV/AIDS, World Bank; NGOs and cooperating agencies such as INTRA-HEALTH and JHPIEGO; and Professional Associations like Ethiopian Nurses Association (ENA), Ethiopian Public Health Association (EPHA), Private

Practitioners Association, Ethiopian Pharmacy Association, and Ethiopian Medical Association.

This document is prepared to provide guidelines for the persons involved in health-care waste management at central, regional, district and local levels. Some HCFs have started to establish Infection prevention (IP)/safety and health care waste management committees. The committees have made important contributions by identifying safety and health problems and by educating the workforce about safety and health issues. Such committees can help to ensure safe work environments in HCFs.

1.3 Objectives

The overall aim of the national guideline is to define procedures that will help to reduce or control possible health risks and hazards due to improper management of HCW. The specific objectives are:

- Provide a better knowledge of the fundamentals of HCWM planning and a better understanding of the hazards linked to HCW.

- Help to design cost-effective HCWM plans and standards which are protective for both human health and the environment, and are in compliance with the current environmental and public health legislations of Ethiopia.

- Set priority actions in order to tackle the most dangerous problems related to HCWM (e.g., disposal of sharps) as part of a global framework.

- Identify appropriate and sustainable technologies to treat and dispose of HCW (see Annex IV for a list of minimum health care waste management options/standards for various health care facilities).

- Provide detailed information on the implementation of HCWM.

These guidelines are intended for use by:

- Medical staff members having a "duty of care" at all levels in public or private HCFs, namely: medical directors in charge, heads of all hospital departments, administrators, doctors, health officers, matrons, nurses, environmental health experts (sanitarians), cleaners or waste handlers, medical attendants, and all other staff.

- Policy makers; regional and district health management teams in charge of developing, implementing and evaluating HCWM plans at central, regional and district levels; and health officers in charge of HCWM plan implementation and monitoring.

- Members of health training institutions, private health facilities, drug manufacturers and sellers, professional associations, and technical and vocational training schools (TVTS).

- International organisations or NGOs involved in the backstopping of health care services delivered in Ethiopia.

Section II: Public Health Importance, Risks, and the Management of HCW

2.1 Public health importance

Nowadays, the HCW generation rate is significantly increasing in volume, and diversifying in types or categories of waste that require proper handling and disposal. A significant proportion of HCW is hazardous and must, therefore, be packaged, transferred, and disposed of properly to protect both the persons handling it and the environment.

All individuals exposed to hazardous HCW are potentially at risk of being injured or infected. This includes:

- Medical staff such as doctors, health officers, nurses, health assistants, and students.
- In- and out-patients receiving treatment in HCFs as well as their visitors.
- Workers in support services linked to HCFs such as launders, waste handlers, maintenance workers, and those in transportation services.
- Workers in waste disposal facilities, including scavengers.

- The general public and, more specifically, children playing with items they find in the waste outside HCFs when HCW is directly accessible to them.

2.2 Risks of health care waste

2.2.1 Occupational risks

In the HCF work environment, medical and ancillary staff, as well as sanitary laborers, can be injured during handling of waste if the HCW has not been handled safely. In this respect, sharps are considered one of the most dangerous categories of waste. Many injuries occur because syringe and needles or other sharps have not been collected in safety boxes, or because the safety boxes have been overfilled.

On dumpsites during their reusing or recycling activities, scavengers may also come in contact with infectious waste if it has not been properly treated or disposed of.

Maintenance workers who serve in all patient and non-patient areas can potentially be exposed to all the health hazards found the HCF environment (e.g., drainage systems, chemical stores, etc.).

2.2.2 Risks to the patient, care takers, and population

The patient, care takers, and the general public can be infected by HCW either directly or indirectly through several routes of contamination. Dumping HCW in open areas is a practice that can have major adverse effects on the population.

The reuse of syringes is a serious problem in some developing countries. WHO estimates that 21 million Hepatitis B infections, 2 million hepatitis C infections, and 260, 000 HIV infections occur globally each year from the reuse of syringes and needles. Improper management of HCW can also indirectly result in the contamination of soil, ground and surface water, and the pollution of air through poisonous or dangerous gas emission as a result of uncontrolled or incomplete combustion of waste.

2.3. Health Care Waste Management (HCWM)

It is poorly understood why HCW should receive special management methods different from those used for other categories of wastes such as residential waste or municipal waste, and, particularly, why HCW should be segregated at its point of generation. Furthermore, the constraints related to its management as well as the funds required to set up a proper management system discourage many medical institutions from undertaking the necessary steps to improve their current HCWM practices.

HCWM is an integral part of hygiene and infection control within a HCF, and proper management should help control nosocomial infections. Proper HCWM is required not only for compliance with federal and local regulations, but should also be carefully considered in order to minimize the overall risks to HCWs. Each HCF should develop an infectious waste management plan that provides for:

1. Waste minimization
2. Designation of the categories of HCW
3. Segregation of infectious waste from noninfectious waste
4. Packaging of infectious waste to reduce contact and exposure
5. Collection, storage, and transportation of HCW
6. Treatment of infectious waste to avoid contamination
7. Disposal of infectious waste to eliminate risks
8. Measures for emergency situations
9. Staff training on HCWM

10. Sustainable supply of personal protective equipment (PPE), color-coded bins, and other waste management supplies

11. Definition of responsibilities and accountability of all staff

12. Monitoring and evaluation to ensure compliance and allow for corrections

Identifying and implementing adequate procedures to minimize the overall risks associated with HCWM remains the primary objective of these national guidelines. Waste management and treatment options should first protect the health care workers, supporting staff, and the population, while minimizing the indirect impact on the environment due to the exposure of HCW.

The instruction contained in these guidelines for the handling and disposal of sharps, and, more specifically, used syringes, attempt first to minimize the risks of needle stick injuries that may occur post-injection.

Some treatment options—such as low-cost incinerators that emit pollutants—may be used in certain situations (e.g., low density populated areas) where the overall health benefits from preventing infections are likely to outweigh the risks from exposure to toxic pollutants in the air. Nevertheless, environmentally friendly practices, like the recycling of plastics, are recommended where practical.

Section III: HCWM Principles

The implementation of safe HCWM practices aims to contain infections and reduce public health risks both within and outside the HCF. To this effect, the following key HCWM steps should be considered:

- Waste minimization
- Identification and segregation of hazardous HCW from non-hazardous HCW
- Recycling of HCW to minimize the quantity of HCW requiring treatment by the HCF
- Adequate packaging, handling, and safe storage of the different categories of HCW
- Proper treatment and disposal of the different categories of HCW

3.1 Waste minimization

Waste minimization is the first and the most important waste management step—it helps to ensure good sanitation of the health facility and the safety of workers and communities by reducing the quantity of wastes generated. Waste minimization also reduces environmental impact by decreasing air pollution and the landfill capacity needed for disposal.

Effective waste minimization practice requires that all purchases of material and supplies be made with waste reduction in mind, meaning that materials and supplies should be purchases with the intent that they produce no or minimal wastes.

3.2 Segregation of HCW

Proper segregation must follow standardized procedures to reduce the risk of infecting workers, and enable use of the most efficient treatment procedures for each waste stream. Segregation must:

1. Be simple to implement for medical and ancillary staff
2. Ensure the absence of infectious and hazardous HCW in the domestic waste flow
3. Be applied in all HCFs
4. Be regularly monitored to ensure compliance

The following guidelines should be included for HCW segregation:

1. Segregation of HCW should separate the different types of waste so that each can be handled safely and economically.
2. Health care facilities should provide colored waste receptacles specifically suited for each category of waste. The color-coding system aims at ensuring immediate and non-equivocal

identification and segregation of the hazards associated with the type of HCW that is handled or treated. In this respect, the color-coding system shall remain simple and be applied uniformly throughout the country. In the absence of color-coded bins, however, labeled waste bins with an infectious waste symbol or text can be used as an alternative to ensure safe segregation practices.

3. Segregation shall take place at the source—at the ward bedside, operation theatre, medical diagnostic laboratory, or any other place where the waste is generated.

4. The nine categories of HCW shall be segregated and color-coded as outlined in table 1 and table 2. Please refer to Annex II for further information on the nine categories of HCW.

Table 1: Three-bin system used in all hospitals, health centers, health posts, and patient wards

Segregation category	Color	Container
Non-risk waste	Black	Bag or bin
Infectious clinical waste (different type)	Yellow	Bag or bin
Sharp waste	Yellow	Safety box

Table 2: Other categories of waste used in specialty wards and laboratories

Segregation category	Color	Container
Anatomical waste and placenta (infectious)	Yellow	Bag or bin
Hazardous pharmaceutical and cytotoxic waste (hazardous)	Yellow	Bag or bin
Highly infectious waste (infectious)	Yellow	Bag or bin
Radioactive waste (hazardous)	Yellow	Secure container with radioactive symbol
Wastes with high contents of heavy metals	Red	Secure container
Effluents	Red	Flask or container

3.3 Color-coding system

The following guidelines should be included for the color-coding system:

Black: All bins or bags containing non-risk HCW.

Yellow: Any kind of container filled with infectious HCW, including safety boxes.

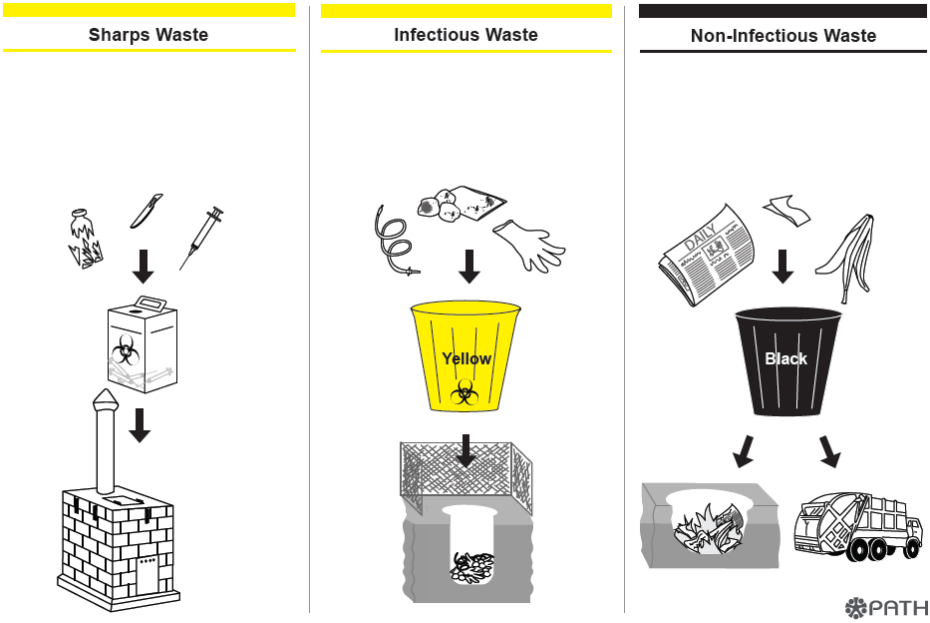
Red: Any kind of container filled with heavy metal or effluent.

White: Any container or bin filled with drug vials, ampoules, or glass bottles for glass recycling or reuse. This system is used only where a municipal glass recycling system is available.

In resource limited HCFs, red containers can be omitted and heavy metals and other effluents can be handled as any other infectious waste using yellow receptacles. However, heavy metals and other effluents should not be incinerated. Regarding the disposal of pharmaceutical wastes, please refer to the guideline document developed by Drug Administration and Control Authority of Ethiopia (DACA).

Health workers must properly segregate waste at the point of use and ensure proper segregation bins and safety boxes are available at all injection sites (Figure 1).

Figure 1



3.4 HCW recycling and reusing

Recycling procedures may complicate the overall segregation scheme by increasing the segregation criteria and by multiplying the number of waste streams in the HCF. However, to implement an environmental friendly process of HCW disposal, a simple and safe recycling practice should be implemented whenever possible. Recycling is completely different from reuse—material is recycled and used as raw material to produce new but similar goods. In the case of reuse, the material is reused as is—sometimes after being subject to cleaning and disinfection—with out changing its nature.

For the purpose of recycling or reusing drug vials, ampoules, and glass bottles in the future, it may be necessary to use a five-bin segregation system. By providing white bins in the five-bin segregation systems for the recyclable materials mentioned above, it is possible to collect them separately, easing the HCW disposal process.

If recycling and/or reusing materials, the instructions hereafter should be followed:

3.4.1. Recycling of glass

The following guidelines should be included for the recycling of glass:

1. All used glass items that have not been exposed to blood like ampoules, vials, etc., should be collected, packed, and stored in separate boxes.

2. The stored glass should be transported to or picked up by local collectors capable of recycling them.

3.4.2. Recycling of non-contaminated plastic items

The following guidelines should be included for the recycling of non-contaminated plastic items:

1. All non-contaminated plastic items (e.g., bags of IV fluids) should be collected and packed in separate boxes.
2. All non-contaminated plastic items should be delivered to or picked-up by local collectors capable of recycling them with environmental-friendly techniques.

3.4.3. Reuse of glassware inside diagnostic laboratories

The following guidelines should be included for the reuse of glassware inside diagnostic laboratories:

1. All non-contaminated and non-broken glassware (e.g., flasks of injectable penicillin) should be collected separately.
2. They should be put in a 0.5% chlorine solution for 10 minutes and carefully washed, rinsed, and dried before reuse.
3. The disinfected glassware should be reused only for specific medical diagnostic tests (e.g., blood, urine, etc.) carried out within the diagnostic laboratory.

4. After having been used once, they shall be considered contaminated and infectious.
5. Broken glassware shall always follow the stream of sharp waste, while non-broken glass flasks shall be reused only after disinfection in a disinfectant solution (0.5% chlorine solution), carefully washed with a brush and soap, rinsed.
6. During the disinfection process, hands shall always be protected with appropriate gloves. It is further recommended to autoclave the glassware at 121°C for at least 30 minutes after washing to ensure complete sterilization/disinfection.

3.4.4. Reuse of non-specific equipment

The following guidelines should be included for the reuse of non-specific equipment:

1. In general, to encourage appropriate reuse, each hospital and health center shall collect separately, wash, and sterilize (either thermally or chemically in accordance with the national infection prevention guidelines) surgical equipment and other reusable items which are designed for reuse and are resistant to the sterilization/disinfection process.

2. Pressurized materials such as cylinders shall be returned to suppliers for refilling and reuse.

3.5. Use of safety boxes and needle removers

Sharps waste must be immediately contained after use to prevent injury. There are two ways of containing sharps—safety boxes and needle removers.

3.5.1 Safety boxes

A safety box is a puncture- and leak-resistant container for the disposal of sharps. It is used for containing sharps only. Safety boxes are advantageous because they immediately confine hazardous sharps waste and prevent reuse. Proper use of a safety box can also prevent needle-stick injuries to health care workers and the community. It should be noted that a safety box is capable of meeting its intended objectives if and only if health professionals and waste handlers use it properly, starting from the time of assembly through final disposal.

The following guidelines should be included for the safe containment of sharps using safety boxes:

1. Follow assembly instructions printed on the box.

2. Keep a safety box within arms reach at each place where injections are given.

3. Dispose of the used syringes into the small opening in the safety box immediately after use.

4. Do not recap and do not collect syringes for future disposal.

5. Never place fingers inside the box.

6. Close the flap on the small opening of the box when it is ¾ full. Do not overfill.

7. Fill safety box only once and then destroy by incineration.

8. Wear utility gloves when handling the safety box.

9. Wash hands and dry using antiseptic or hand rub after handling waste.

3.5.2 Needle removal

A needle remover is a device designed to disable a syringe immediately after the injection is given. The devices are used separate the hub and needle from the syringes, thereby reducing the risk of potential infection to patients, health care workers, waste handlers, and the community through a safer sharp waste disposal system. It is, therefore, recommended to use such devices in situations where syringes are transported or not immediately destroyed onsite. Contained needles are disposed of into a protected sharps pit or barrel. A sharps barrel is recommended for facilities located in areas where the water table is high to the surface or burial space is limited. The syringe isolated from the needle can be collected in a safety box or in infectious waste bin and disposed of according to existing practice.

3.6. HCW packaging

Infectious waste should be contained from its point of origin to the point at which it is treated and no longer infectious. The packaging should be appropriate for the type of waste involved.

The following guidelines should be included for packaging sharps and other health care wastes:

1. Sharps (sharp items or items with sharp corners) should be placed in rigid, puncture-resistant containers made of glass, metal, rigid plastic, or cardboard.

2. Liquid infectious wastes should be placed in capped or tightly stopped bottles or flasks; large quantities may be placed in containment tanks.

3. Solid or semisolid wastes should be placed in tear-resistant plastic bags judged by their thickness or durability.

4. There should be special packaging characteristics for some treatment techniques: incineration requires combustible containers, and steam sterilization requires packaging materials that allow steam penetration and evacuation of air.

3.7. Waste storage

The following guidelines should be included for waste storage:

1. In each room where HCW is generated, an adequate place shall be dedicated for placing HCW bags, bins, or containers.

2. In all HCFs, separate central storage facilities shall be provided for hazardous HCW, except for radioactive waste which shall be stored specifically.

3. It shall clearly be indicated that the facility stores hazardous HCW as appropriate for packaged yellow bags, and no other materials shall be kept there.

4. No waste shall be stored for more than two days before being treated or disposed of. However, in the case of safety boxes, the filled box can be stored in a locked room for up to one week at lower-level HCFs where there is no incinerator.

5. The designated central storage facility shall be located within the hospital premises, close to the treatment unit but away from food storage or food preparation areas.

6. The designated central storage facility should be large enough to contain all the hazardous HCW produced by the hospital during one week, with spare capacity to cope with any maintenance or breakdown of the treatment unit.

7. The designated central storage facility shall be totally enclosed and secured from unauthorized access.

8. The designated central storage facility shall be inaccessible to animals, insects, and birds.

9. The designated central storage facility shall be easy to clean and disinfect with an impermeable hard-standing base, good water supply, drainage, and ventilation.

10. The universal biological hazard symbol should be posted on the storage area door and on waste containers.

3.8. Waste handling

The following guidelines should be included for waste handling:

1. All HCW shall be segregated and placed into waste bins by the person generating the waste at the point where waste is generated.
2. All the specific procedures of HCW segregation, packaging, and labeling shall be explained to the medical and ancillary staff and displayed in each department on charts located on the walls near the HCW containers.

3. Carts and recyclable containers that are used repeatedly for transport should be disinfected after each use. Single-use containers should be destroyed as part of the treatment process.

4. When handling waste, sanitary staff and sweepers shall wear protective clothing at all times including face masks, aprons, boots, and heavy duty gloves, as required (Figure 2).

Figure 2

Personal Protective Equipment for Waste Handlers PATH

Protect yourself by wearing personal protective equipment (PPE) when handling waste.

Wearing PPE reduces risk from sharps, germs, exposure to blood and other bodily fluids, and splashes from chemicals.

- Face mask
- Heavy duty, gloves
- Plastic apron
- Clothes that cover the body
- Heavy duty, boots

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3.9. Waste transportation

3.9.1. Transport to central storage/ on-site disposal site

The following guidelines should be included for waste transportation:

1. Trolleys/Carts should be used for transporting bags of infectious waste within the facility.

2. The waste collection trolley should be easy to load and unload.

3. The trolley shall not be used for any other purpose.

4. It shall be cleaned regularly, especially before any maintenance work is performed on it.
5. If possible, yellow bags of hazardous HCW and black bags of non-risk HCW shall be collected on separate trolleys that shall be painted/marked with the corresponding colors and washed regularly.
6. The collection route shall be the most direct one from the collection point to the central storage.
7. The collected waste shall not be left unattended, even temporarily, anywhere other than at the designated central storage.
8. Containers should be covered with lids during storage and transport.

3.9.2. Transportation to final disposal site

When the waste is to be moved about for treatment or storage, special handling or packaging may be necessary to keep bags intact and to ensure containment of the waste.

The following guidelines should be included for transportation to final disposal site:

1. Single-bagged waste and containers of sharps and liquids should be placed within a rigid or semi-rigid container such as a bucket, box, or carton lined with a plastic bag.

2. Containers should be covered with lids during transportation.

3. When transporting plastic bags of infectious waste, care should be taken to prevent tearing of the bags.

4. Infectious waste should not be compacted before treatment. This process could damage the packaging and disperse the contents, or it could interfere with the effectiveness of treatment.

5. Outside all HCFs, infectious waste should be transported in closed, leak-proof, rigid containers using trucks, cars, or motorcycles as appropriate.

6. In the case that off-site transportation is required to treat hazardous HCW at treatment facilities, the local government shall approve the off-site transportation plan before any transit occurs.

7. All yellow bags shall be collected and transported at least every second day.

8. The transportation shall be properly documented, and all vehicles shall carry a consignment note from the point-of-collection to the treatment facility.

9. Vehicles used for the carriage of yellow bags shall be disinfected prior to use for any other purpose.

10. The vehicles shall be free of sharp edges, easy to load and unload by hand, easy to clean and disinfect, and fully enclosed to prevent any spillage in the HCF premises or on the road during transportation.

11. The vehicles shall carry adequate supplies of plastic bags, protective clothing, cleaning tools, and disinfectants to clean and disinfect in case of any spillage.

12. Staff shall be properly trained in the handling, loading and unloading, transportation, and disposal of the yellow bags.

13. Staff shall be fully aware of emergency procedures for dealing with accidents and spillage.

3.10. Waste treatment and disposal

The following guidelines should be included for waste treatment:

1. Among all the current existing technologies for the treatment and disposal of HCW, the most appropriate technology shall be applied. This should be the most reliable, affordable, and sustainable technology in accordance with the technical, human and financial resources of each HCF. This technology should also minimize the immediate public health risks associated with HCWM with the lowest impact on the environment.

2. Several methods are appropriate for infectious waste treatment, depending on the type of waste material. These treatment methods

shall include one of the following options or combination of options: steam sterilization, incineration, thermal inactivation, gas/vapor sterilization, chemical disinfection, sterilization by irradiation, or electromagnetic radiation (Table 3). For additional waste management options please refer to Annex VII).

3. Burning and low-, medium-, and high-temperature incineration may be considered the most practical technology for disposal of hazardous waste. In densely populated areas, large quantities of hazardous HCW shall not be incinerated at temperatures lower than 850°C.

4. After treatment, the wastes or their ashes should be disposed of by discharge into sanitary sewer systems (for liquid or ground waste), or by burial in sanitary landfills or simple pit.

Table 3: Recommended treatment methods of infectious wastes

Type of infectious waste	Recommended treatment techniques				
	Steam sterilization	Incineration	Thermal inactivation	Chemical disinfection	Other
Isolation wastes*	X	X			
Cultures and stocks of infectious agents and associated biologicals	X	X	X	X	
Human blood and blood products	X			X	X
Pathological wastes	X	X			X
Contaminated sharps	X	X			
Carcasses** and parts	X	X			
Bedding		X			

* Isolation waste refers to waste that comes out of any isolation ward.

** Carcass refers to dead human or animal bodies.

3.10.1. Steam sterilization (autoclaving)

Steam sterilization in an autoclave is one of the most common forms of sterilization. It involves the use of saturated steam within a pressure vessel at temperatures high enough to kill infectious agents in the waste. Sterilization is accomplished primarily by steam penetration. Steam sterilization is most effective with low-density material such as plastics. In general, contaminated items or wastes should be sterilized for 30 minutes at 121°C with a pressure of 106 KPa. Do not begin timing until the autoclave has reached the desired temperature and pressure. Before sterilization, the items to be treated should be decontaminated, cleaned, and dried carefully.

The following guidelines should be included for steam sterilization (autoclaving):

1. Autoclaves used to disinfect waste will be used only for waste treatment—never for disinfection of instruments to be used clinically. Autoclaves used for waste must be located in a room separate from autoclaves used for clinical disinfection.

2. Containers that can be used effectively in steam sterilization include plastic bags, metal pans, bottles, and flasks. High-density

polyethylene and polypropylene plastic should not be used in this process because they prevent steam penetration to the waste load.

3. Heat-liable plastic bags allow steam penetration of the waste but may crumble and melt. If heat-labile plastic bags are used, they should be placed in another heat-stable container that allows steam penetration (e.g., strong paper bag), or they should be treated with gas/vapor sterilization.

4. The following precautions should be taken when using steam sterilization:
    (a) Plastic bags should be placed in a rigid container before steam treatment to prevent spillage and drain clogging.
    (b) To facilitate steam penetration, bags should be opened and caps and stoppers should be loosened immediately before they are place in the steam sterilizer.
    (c) Care should be taken to separate infectious waste from other hazardous waste.
    (d) Waste that contains drugs, toxic chemicals, or chemicals that would be volatilized by steam should not be steam-sterilized.
    (e) Persons involved in steam sterilizing should be trained in handling techniques to minimize personal exposure

to hazards from infectious wastes. Some of these techniques include: use of personal protective equipment/materials, minimization of aerosol formation by using disinfectant chemicals, prevention of waste spillage during autoclave loading and unloading, prevention of burns from handling hot containers, and management of spills.

5. The autoclave temperature should be checked with a recording thermometer or sterilization indicator strip to ensure that the proper temperature is being maintained for substantial periods during the cycle.

6. Steam sterilizers should be routinely inspected and serviced, and the process should be routinely monitored to ensure that the equipment is functioning properly. Autoclaves and steam sterilizers should be serviced and maintained periodically following manufacturer instruction.

7. An alternative treatment method such as incineration should be used on high-density wastes (e.g., large body parts, large quantities of animal bedding or fluids, etc.) because they inhibit direct steam penetration and require longer sterilization times.

3.10.2. Burning and Incineration

Incineration converts combustible materials into noncombustible residue or ash. Gases are ventilated through the incinerator stacks, and the residue or ash is disposed of in a sanitary landfill or a pit prepared for this purpose (i.e. ash pit). If incinerators are properly designed, maintained, and operated, they are effective in killing organisms present in infectious waste. In health care facilities without an incinerator, burning of paper waste in a protected pit can be used as an alternative short term solution. However, when using this method the area needs to be protected so as to prevent access of an authorized persons or animals.

The following guidelines should be included for incineration:

1. Incineration should be used for disposal of pathological wastes such as tissues and body parts.

2. Incineration should be used to render contaminated sharps unusable.

3. The principal factors affecting incineration such as variations in waste composition, the waste feed rate, and the combustion temperature should be considered in order to maintain efficiency of

incinerating infectious wastes. Proper operating procedures must be followed.

4. Infectious wastes containing drugs should be disposed of in an incinerator that provides high temperatures and sufficient length of cycle for the complete destruction of these compounds. Incineration of such wastes should be done following DACA's guidelines.

5. The effectiveness of the incinerator in disposing and destructing of chemical wastes should be documented and assessed before use, if applicable.

6. Persons involved in incineration must wear protective clothing and should be trained in handling techniques to minimize personal exposure to hazards from infectious wastes. Some of these techniques include the use of personal protective equipment and materials, prevention of waste spillage during incinerator loading, and the management of spills.

7. The following materials shall not be burned or incinerated due to the toxic emissions they produce: PVC plastics, photographic and x-ray materials, mercury thermometers, batteries and other items containing heavy metals, and aerosol cans or sealed vials. These

materials can, however, be safely be managed and disposed of through burial techniques.

9. All incinerators or burning areas must be fenced to prevent access by the community or animals. They should be located away from houses and crops.

10. All incinerators should be inspected and maintained by a qualified person on a regular basis.

3.10.3. Thermal inactivation

Thermal inactivation involves the treatment of waste with high temperatures to eliminate the presence of infectious agents. This method is usually used for large volumes of infectious waste.

Liquid waste is collected in a vessel and heated by heat exchangers or a steam jacket that surrounds the vessel. The types of pathogens in the waste determine the temperature and duration of treatment. This method requires higher temperatures and longer treatment cycles than steam treatment.

The following guidelines should be included for thermal inactivation:

1. After treatment, the contents should be discharged into the sewer or landfills in a manner that complies with federal and local requirements.

2. Solid infectious waste should be treated with dry heat in an oven, which is usually electric.

3. Persons involved in thermal inactivation should be trained in handling techniques to minimize personal exposure to hazards from infectious wastes. Some of these techniques include the use of personal protective equipment/materials, prevention of waste spillage during thermal inactivation loading and unloading, the prevention of burns from handling hot containers, and the management of spills.

3.10.4. Gas/vapor sterilization

Gas/vapor sterilization uses gaseous or vaporized chemicals as the sterilizing agents—ethylene oxide is the most commonly used agent.

The following guidelines should be included in gas/vapor sterilization:

1. Gas/vapor sterilization should be used with caution since it is a suspected human carcinogen, because ethylene oxide may be adsorbed on the surface of treated materials, and because the

potential exists for worker exposure when sterilized materials are handled.

2. Persons involved in gas/vapor sterilization should be trained in handling techniques to minimize personal exposure to hazards from infectious wastes and handling of sterilized materials. Some of these techniques include the use of personal protective equipment and materials, the prevention of waste spillage during gas/vapor sterilization loading and unloading, the prevention of burns from handling hot containers, and the management of spills.

3.10.5. Chemical disinfection/high-level disinfection (HLD)

Chemical disinfection is the preferred treatment for liquid infectious wastes, but can also be used for treating solid infectious waste. Disinfectants are often hazardous and toxic, and many are harmful to the skin and mucous membranes. Users should therefore wear protective clothes including gloves and goggles. Small amounts of disinfectants can be discharged into sewers without pretreatment, provided there is an adequate sewage treatment process; large amounts of disinfectants should never be discharged into sewers. No disinfectants should be discharged into natural water bodies.[6]

The following guidelines should be included for chemical disinfection:

1. The type of microorganism and disinfectant should be considered when using chemical disinfection. The best chemicals appropriate for disinfection are chlorine and glutaraldehyde. It is advisable to follow manufacturer instruction for concentration of the chemicals and contact time. Different concentration and contact time is recommended for different chemicals by different manufacturers. However, the best and most common disinfectant is the use of 0.5% chlorine solution for 10 minutes. Other relevant factors such as temperature, pH, mixing requirements, and the biology of the microorganism should be considered.

2. Ultimate disposal of chemical waste should be in accordance with scientific technical procedures suggested by WHO so as to protect users, the community, and the environment.

3. Persons involved in chemical disinfection should be trained in handling techniques to minimize personal exposure to hazards from infectious wastes and handling of sterilized materials. Some of these techniques include the use of personal protective equipment and materials, the revention of exposure to pathogenic organism, the prevention of waste spillage during chemical disinfection loading and unloading, the prevention of burns from handling hot containers, the management of spills, and methods of handling sterilized materials.

3.11. Final disposal

The following guidelines should be included for final disposal:

1. The recommended types of final disposal methods are: conventional sewer system for discharge of treated liquids and grounded solids; or landfill disposal of treated solids and incinerator ash.

2. EPA and MOH at all levels shall ensure that only treated infectious wastes are buried in landfills.

3. Burial sites should be fenced to prevent access by community members or animals. Only hazardous health care waste should be buried. Burial should not be used in areas with high water tables. The bottom of the pit should be at least 1.5 meters higher than the groundwater level.

4. Facilities should secure the services of reputable waste handlers to ensure, to the extent possible, that final disposal of hazardous waste is performed according to applicable federal and local regulations.

3.11.1 Burial pits

Protected burial pits are an acceptable—and perhaps the most appropriate—disposal option for infectious wastes in rural health care facilities.

3.12. Accidents (emergency) and spillage

The following guidelines should be included for accidents and spillage:

1. All HCF staff members shall be properly trained and prepared for emergency response including procedures for treatment of injuries, cleanup of the contaminated area, and prompt reporting of all incidents of accidents.

2. The following actions shall be taken:
    (a) Evacuation of the contaminated area if required.
    (b) Decontamination or disinfection, rinsing, and wiping dry of the spillage area with an absorbent cloth by personnel wearing adequate protective clothing.
    (c) Decontamination or disinfection of the protective clothing if necessary.
    (d) Accident shall be reported to the infection control officer/staff or to HCWM committee if available.

(e) All cases shall be registered by the management team of the HCF and annually reported to the district health authorities.

It is highly recommended to perform blood tests following such an injury to ensure that the injured staff has not been contaminated by pathogens like HIV, HBV, and HCV. Post exposure prophylaxis (PEP) policy and guidelines were developed for Ethiopia, and readers are kindly requested to see the documents for proper management of such cases. Each HCF should maintain a written manual accessible to staff that includes procedures for each type of spill that could be expected in the HCF to help guide appropriate response.

3.13. Maintenance workers and waste handlers

The following guidelines should be included for maintenance workers and waste handlers:

1. Workers should be instructed to use gloves and other personal protective equipment while working in contaminated areas and with contaminated materials, and wash their hands thoroughly after removing work gloves.

2. Workers should be aware that other persons may not have followed proper procedures for disposal of needles, knives, surgical blades,

and glassware, and, therefore, should take great care in handling waste bags and containers.

3.14. Prevention and control of occupational risks

The following guidelines should be included in HCWM plans for: central stores; food, laundry, and other services; and office workers:

1. Desks and countertops should be free of sharps.

2. Needles and other sharp instruments should be discarded in designated puncture-resistant containers and not in trash cans or plastic bags.

3. There should be no recapping of needles.

4. Rules for safe disposal and collection of sharp instruments or other hazardous materials should be reviewed regularly.

5. Workers should examine and handle soiled linens and similar items as if they contained hazardous items.

6. Workers should receive periodic instruction at least once annually to keep them aware of the specific hazards of HCW.

7. Workers should follow instructions issued by the infection control personnel for reporting infections.

8. Workers should take appropriate measures to limit further contagion from HCW by practicing universal precautions of self protection from exposure to infectious wastes.

3.15. Training needs

All workers who handle infectious waste should receive infectious waste management training that includes:

1. Introduction to HCW (definitions, impact of unsafe HCWM practices).

2. Explanation of management of HCW, giving due emphasis to key steps like waste minimization, segregation, handling, transport, treatment, and disposal options.

3. Explanation of the infectious waste management plan.

4. Assignment of roles and responsibilities for implementation of the plan.

5. Refresher courses given periodically—at least once annually

Section IV: Specific Guidelines for Management of Each Class of HCW

Class 1: Non-risk HCW

1. Class 1 non-risk HCW (see annex I) shall be placed in black containers.

2. Containers should be placed in all rooms, wards, and in all public areas.

3. All non-risk HCW not designated for recycling shall be collected with the other municipal waste.

4. Non-contaminated items that are designated for recycling shall be packed in specific black containers marked “Non-contaminated plastic, to be recycled” or white containers marked “Non-contaminated glassware, to be recycled.”

5. Non-risk health care waste should be disposed of similarly to domestic garbage and food waste (burning, municipal waste collection, land fill, etc).

Class 2: Clinical waste (non-sharp infectious waste)

1. All class 2 clinical waste shall be placed in yellow polyethylene bags (minimum 300 micron gauge) marked “Danger! Hazardous medical waste” and indicated with the international biohazard symbol.

2. Bags shall be sealed with appropriate adhesive tape, removed, and replaced immediately when they are no more than three-quarters full.

3. If available, yellow bins or containers shall be used—they must be systematically disinfected in a solution of 0.5% of sodium hypochlorite or Lysol every time they are emptied.

4. All class 2 clinical HCW shall be buried in a protected pit or incinerated in double-chamber incinerators.

5. In highly densely populated areas, centralized pyrolytic incinerators reaching 850°C and above shall be used.

6. In minor HCFs in rural areas, class 2 clinical HCW should be buried in a simple protected pit when there is no risk of

contaminating underground water. All pits must be fenced to prevent authorized access.

7. Yellow containers for infectious clinical waste should be located in all wards and rooms where infectious waste could be produced.

8. Infectious waste containers should never be placed in public areas.

Class 3: Sharps

1. Safety boxes must be located in all rooms and wards within an arms reach from where injections may be given.

2. All class 3 sharps shall be placed in specific cardboard boxes called safety boxes, which are resistant to punctures and leak-proof, designed so that items can be dropped in using one hand and so that no item can be removed.

3. The safety box shall be colored yellow and marked “Danger!” or “Contaminated sharps.” Yellow is conventionally accepted color and it is advisable to stick to this color. However, in the absence of yellow colored safety box, white ones can be used.

4. The safety box shall be closed when three-quarters full.

5. All disposable syringes and needles shall be discarded immediately following use.

6. The needle shall not be recapped or removed from the syringe; the whole combination shall be inserted in to the safety box. In field situation where there is no safety box, one-hand recapping may be acceptable. However, this does not mean that one-hand recapping is recommended.

7. Under no circumstances are used syringes, needles, or safety boxes to be disposed of in normal garbage or dumped without prior treatment.

8. The method of choice for destruction of full safety boxes is incineration, preferably in an appropriate double-chamber (>850°C) incinerator.

9. If such an incinerator is unavailable, alternative methods of sharp disposal may be used such as needle removers and sharps pits.
10. Under exceptional circumstances, full safety boxes may be incinerated in small numbers by open burning in a fenced hole.

Class 4: Anatomical waste and placentas

1. In operation theatres, all class 4 anatomical waste and placentas shall be collected separately in a plastic or galvanized metal container with a tight-fitting cover.

2. They should be transported using dedicated trolleys or carts. If transportation and disposal cannot be immediately ensured, anatomical waste should be stored in the mortuary.

3. When a centralized incinerator is available they shall be incinerated. When low-temperature incinerators are used, anatomical waste, or large amounts of placentas, can be difficult to incinerate and will drastically reduce the performance of the system.

4. If incineration cannot be performed, class 4 anatomical waste and placentas shall be buried at a sufficient depth (> 1m) inside the HCF compound .

5. Wear utility gloves when handling and transporting anatomical waste and placenta.

6. Remove utility gloves after handling waste. Wash and dry them daily and when visibly soiled.

7. Wash and dry hands or use an antiseptic hand rub.

Class 5: Hazardous pharmaceutical and cytotoxic waste

1. Hazardous pharmaceutical waste and cytotoxic waste shall be repacked in specific bags marked "Danger! Hazardous pharmaceutical and cytotoxic waste" and they shall be sent to the medical store department that shall ensure their disposal at the central level.

2. Class 5 waste shall be incinerated in a pyrolytic incinerator at a minimum of 1,200°C, or it should be encapsulated and safely buried in a deep pit depending on the depth of local water tables. The bottom of the pit should be 1.5m away from the ground water table.

3. Class 5 hazardous pharmaceutical wastes and cytotoxic waste containing heavy metals shall not be incinerated. For disposal of pharmaceutical wastes please refer to DACA's guidelines.

4. For this specific category of waste, inertization may be foreseen. In this case the residue can be disposed using landfill.

5. Cytotoxic waste should never be discharged into the environment or natural water bodies like river, lakes, or landfills.

Class 6: Highly infectious waste

1. Highly infectious waste from the medical diagnostic laboratory of the HCF—such as media and culture plates—shall be collected, preferably in leak-proof yellow bags suitable for autoclaving and properly sealed. It shall be autoclaved at a temperature of 121°C for at least 20 minutes at source, i.e. in the medical Diagnostic laboratory itself.

2. Disinfected waste shall be collected and treated with class 2 hazardous HCW.

3. If a distinct autoclave is not available at the medical diagnostic laboratory, highly infectious waste shall be disinfected in 0.5% solution of sodium hypochlorite and left overnight. It shall than be discarded in a specific yellow bag properly and sealed and discarded with class 2 hazardous HCW.

4. If none of the above treatment options can be ensured, highly infectious waste should, at minimum, be packed in a specific yellow bag that shall be sealed and directly discarded with class 2 hazardous HCW—this option shall remain exceptional.

5. Class 6 wastes from isolation wards or permanent treatment centers (e.g., cholera) shall always be incinerated onsite.

Class 7: Radioactive waste

1. All radioactive waste of class 7 shall be stored to allow decay or decomposition to diminish their radioactive nature. Length of storage varies by radioactive waste type depending on their chemical nature and half-life.

2. They shall be placed in a large container or drum and labeled with the radiation symbol showing the radio-nuclide's activity on a given date, the period of storage required, and marked “Caution! Radioactive waste.”

3. Containers or tanks with radioactive waste that have not decayed to background level shall be stored in a specific marked area, with concrete walls at least 25 cm thick.

4. Noninfectious radioactive waste, which has decayed to background level, shall follow the class 1 non-risk HCM stream, while infectious radioactive waste which has decayed to background level shall follow the class 2 clinical HCW stream.
5. Liquid radioactive waste shall be discharged into the sewage system or into a septic tank only after it has decayed to background level in adequate tanks.

Class 8: Waste with high contents of heavy metals (special hazardous waste)

1. Wastes with high contents of heavy metal should normally be treated in specific recovering industries. Alternatively, as for chemical waste, it should be encapsulated for handling and disposal.

2. Wastes with high contents of mercury or cadmium shall never be incinerated because of the risk of atmospheric pollution with toxic vapors.

3. In case of a spill from a broken thermometer or blood pressure equipment the following procedure is recommended: put examination gloves on both hands; collect all droplets of mercury with a spoon and place it in a small, closed container for disposal

or reuse; disinfect and clean the area where the equipment was broken.

Mercury is a potent neurotoxin, especially during fetal and infant development. Please follow appropriate guidelines for mercury disposal—it enters the environment when released in to water bodies and air, and thereby contaminating lakes, rivers, and streams, and polluting the ambient air.

Class 9: Effluents

1. All effluents in HCFs shall be drained to a septic tank or cesspool for both storage and treatment in the compound of the HCF.

2. If it is necessary to discharge the waste through municipal sewer line, all liquid infectious waste shall be discharged only after being treated according to WHO standards.

Waste water from HCFs should not be released into the environment without treatment because they may contain various potentially hazardous components such as microbiological pathogens, hazardous chemicals, pharmaceuticals and radioactive isotopes.

The proper treatment of wastewater from HCFs is very expensive and cannot be currently foreseen in every HCF of Ethiopia. However, the basic steps described above should be applied to contribute to the reduction of the public health risk associated with liquid waste and waste water.

Annex I: Definition of Terms

The definitions and the classification hereafter were adapted from the international classification provided by the World Health Organization (WHO). According to WHO, health care waste (HCW) includes all the waste, hazardous or not, generated during medical activities. It encompasses activities of diagnosis as well as preventive, curative and palliative treatments in the field of human medicine.

1. Non-risk HCW

Non-risk HCW comprises all the waste that has not been infected or contaminated with blood and body fluids. It is similar to normal household or municipal waste and can be managed by the municipal waste services. It includes paper, cardboard, non-contaminated plastic or metal, cans or glass, leftover food, etc.

2. Infectious waste (clinical waste)

Infectious waste is comprised of all biomedical and health care waste known to have the potential of transmitting infectious agents to humans or animals. This includes material contaminated with blood or body fluids.

3. Sharps

Sharps are all objects and materials that pose a potential risk of injury and infection due to their puncture or cutting properties (e.g., syringes with needles, blades, broken glass). For this reason, sharps are considered one of the most hazardous categories of waste generated during medical activities.

4. Pathological and anatomical wastes

Pathological waste groups all organs and tissues (including placentas), as well as blood and body fluids, and it is handled according to the precautionary principle stipulated by WHO.

Anatomical waste consists of recognizable body parts. It is primarily for ethical reasons that special requirements must be placed on the management of human body parts. They can be considered a subcategory of pathological waste.

5. Pharmaceutical and cytotoxic waste

Pharmaceutical waste includes a multitude of active ingredients and types of preparations. This category of waste comprises expired pharmaceuticals or pharmaceuticals that are unusable for other reasons. Cytotoxic waste may be considered a subgroup of hazardous pharmaceutical waste, due to its high degree of toxicity. The potential health risks for people who handle

cytotoxic pharmaceuticals results, above all, from the mutagenic, carcinogenic and teratogenic properties of these substances.

6. Highly infectious waste

Highly infectious waste includes all viable biological and pathological agents artificially cultivated in significant elevated numbers. Cultures and stocks, dishes and devices used to transfer, inoculate and mix cultures of infectious agents belong to this category of waste.

7. Radioactive waste

Radioactive waste includes liquids, gas and solids contaminated with radio nuclides whose ionizing radiations have genotoxic effects. These are found in the waste products from patients who are undergoing radiation treatment.

8. Special hazardous waste (waste with high contents of heavy metals)

Special hazardous waste refers to chemical wastes that can pose health problems when they come in contact with people by accidental inhalation, skin contact and/or ingestion. This includes gaseous, liquid and solid chemicals, waste with a high contents of heavy metals such as batteries,

pressurized containers, broken thermometers, blood pressure gauges, photographic fixing and developing solutions in X-ray departments, and halogenated or non-halogenated solvents.

9. Effluents

Effluents are a non-chemical liquid wastes that comes out of laundry, kitchen, toilet, shower and laboratory rooms which may be contaminated by pathogenic microorganisms. Effluents and, more particularly, effluents from isolation wards and medical diagnostic laboratories should be considered as hazardous liquid waste that should receive specific treatment before being discharged into the sewer/drainage system, if such a system exists.

Annex II: Guidelines for Development and Implementation of a HCWM Plan

I. Guidelines for facility waste management plan

Each health care waste (HCW)-generating facility should have a comprehensive health care waste management (HCWM) plan as part of an overall health care strategy. The following planning steps should be considered in developing a HCWM plan:

1. Document the situation analysis
2. Set priority actions and determine objectives
3. Identify potential obstacles
4. Develop strategies and monitoring and evaluation (M&E) tools
5. Determine resource requirements
6. Write up the plan
7. Implement the plan

The following guidelines should be included in the implementation of each facility's plan:

1. Implementation of the HCWM plan shall be coordinated by the ministry of health (MOH) Regional/Zonal/District-Hygiene and Environmental Health section (DHEH) in concordance with other stakeholders who will participate in a range of HCWM activities.

2. At each facility there should be a designated individual and/or infection prevention/waste management committee responsible for HCWM plan implementation.

3. Each facility's HCWM implementation plan shall contain:

    (a) Duties and responsibilities for each of management level and different categories of health care facility (HCF) staff members.

    (b) An estimation of the quantities of HCW generated and the annual budgets for the implementation of the HCWM procedures/plan.

    (c) A manual describing all the procedures for the management of HCW in the premises including segregation, handling, transport, treatment, and disposal.

    (d) Monitoring procedures to track day-to-day activities inside the HCF and ensure that HCWM rules are respected.

    (e) Information on working procedures displayed at strategic points.

(f) Training courses and programs for all categories of HCF staff members including refresher training at least once annually.

(g) Procedures for training new workers.

(h) A plan for storage and disposal of hazardous HCW in cases of emergency and in the event of a breakdown of incinerator or autoclave, and emergency procedures.

II. Duties and responsibilities:

HCWM plans shall clarify who is responsible for what functions and identify the fields of competencies of each person involved in the process.

National level:

1. The federal MOH Department of Hygiene and Environmental Health (DHEH) shall take the lead in coordinating implementation of the HCWM plan.
2. The federal government and DHEH, shall ensure that Regional Health Bureaus (RHBs) prepare and implement a proper HCWM plan.
3. The DHEH shall support the RHB in the definition and the implementation of the HCWM plan by providing technical advice.

4. The DHEH shall develop a standardized HCWM training package and set up periodic training program reviews in all the training institutions to ensure that adequate training on HCWM is given.
5. The DHEH shall be responsible to give supportive supervision on HCWM activities at all levels and at local landfills to ensure that treatment and disposal facilities comply with guidance and regulations.
6. The federal MOH DHEH and Federal EPA shall plan, implement, and control the means of collection, transportation, destruction, and disposal of the waste.
7. The federal MOH Health Extension and Education Department shall play a role with activities of public information and awareness-raising on HCWM.
8. Environmental Protection Agency (EPA) shall watch over the respect of environmental norms and procedures, particularly as they are contained in the Environmental Impact Assessment guidelines for hazardous wastes and health care wastes.
9. EPA shall develop norms and standards for soil, water, and air pollution, mainly as they relate to the use of landfill sites for HCW disposal. In these conditions, the EPA should develop norms and standards for landfills so that they can receive HCW in a safe manner.
10. The MOH DHEH shall compile HCWM activity reports from RHBs.

Regional/district level:

1. Regional capital municipality being with regional health bureau and regional EPA shall:

    (a) Design landfills according to the norms and standards defined by Federal EPA, in order to avoid soil, water, and air pollution in case of reception of HCW.

    (b) Ensure safe disposal of HCW by reserving specific areas for disposal sites.

    (c) Enact regulations to refuse receiving mixed HCW with noninfectious wastes at local landfills, forbid uncontrolled HCW disposal, and set up strong waste management controls in their landfills (materials for covering, restriction of non-authorized public access, equipment protection, etc.).

2. The regional/district health and environmental bureaus/offices shall:

    (a) Prepare and implement a proper regional/district HCWM plan.

    (b) Give their opinion about the HCWM plan activities proposed for health facilities in their jurisdiction in case some may have negative impacts on the health of the local population.

(c) Support the HCFs in the definition and the implementation of the HCWM plan by providing technical advice.

(d) Set up periodic training programs in all the HCFs to ensure that adequate training on HCWM is given to their staff.

(e) Ensure that coordination of the monitoring and reporting on implementation of the HCWM will be exercised by the HCWM committee.

Health facility level:

1. Chief Executive Officer/head of the health facility shall:

(a) Ensure that a HCWM plan is prepared, then watch to ensure that procedures and regulations are respected.

(b) Designate an IP/HCWM committee in charge of supervising HCW segregation, storage, collection, transportation, treatment, and disposal.

(c) Assign duties and responsibilities to all medical and non-medical staff.

(d) Allocate sufficient financial and human resources for the implementation of the HCWM plan.

(e) Ensure that adequate training and refresher courses are given for the concerned HCF staff members.

2. The IP/HCWM committees shall:

(a) Make important contributions by identifying safety and health problems and by educating the workforce about safety and health issues.

(b) Get a full commitment from the hospital's/health center's/health post's CEO/facility head to support effective HCWM in the HCFs.

(c) Be a committee with no informal tasks for the members but a regular part of their job responsibilities.

(d) Represent workers and supervisors from all departments in the HCFs.

(e) Comprise the following members:

i. CEO/medical director or deputy, who shall be the chairperson

ii. Head of administration and finance

iii. Head of units/nurses

iv. Matron

v. Environmental health officer/expert

vi. Head of laboratory department

vii. Head of operation and maintenance/head of cleaners and laundry staff

viii. Head of pharmacy

(f) Include the following major functions:

i. Inspect workplaces regularly to identify safety and health hazards and infections.

ii. Regularly review sharp and needle-stick injury rates, results from prevention activities, and other relevant workplace data.

iii. Identify gaps and possible interventions that could be supported by stakeholders.

iv. Develop implementation plans with clearly defined strategies for identified interventions.

v. Establish procedures and systems for HCWM.

vi. Create high-level awareness and prioritization of HCWM.

vii. Monitor HCWM implementation and refine strategies as needed.

viii. Prepare information for workers on identified hazards and infections.

ix. Review safety and health aspects when planning new construction or renovating facilities.

x. Establish motivational programs (e.g., recognition, awards, and dinners) to stimulate worker participation in HCWM activities.

3. The environmental health officer/sanitarian shall:

(a) Be responsible for the daily implementation and monitoring of the HCWM plan.

(b) Liaise with the medical and supply units to ensure that an adequate supply of waste bags, containers, PPEs and collection trolleys are available at all levels.

(c) Ensure the availability and proper placement of bags/containers.

(d) Provide technical support to all concerned and perform waste auditing activities.

(e) Ensure that cleaners and sweepers are not involved in waste segregation and that they only handle waste bags and containers, in the correct manner.

(f) Ensure internal collection of bags and waste containers and their transport to the central storage facility of the HCF on a daily basis or more frequently if needed.

(g) Ensure correct use of the central storage facility and that it is kept secured from unauthorized access. He/She should also prevent unsupervised dumping of waste bags and waste containers on the hospital premises, even for short periods of time.

(h) Coordinate and monitor all disposal operations, and for this purpose meet regularly with the concerned representative of IP/HCWM committee in case of on-site disposal and the local administrative council (municipality) for off-site disposal.

(i) Ensure that the correct methods of transportation and disposal of waste are used.

(j) Ensure the emergency procedures exist and can be implemented. He shall investigate, record, and review all incidents reported regarding hospital waste management.

4. The head of administration and finance shall:

(a) Ensure that all the logistics and human resources needs are adequately fulfilled to implement the HCWM plan.

(b) Ensure that proper funding exists to implement the HCWM plan.

(c) Liaise with the medical director and the HCWM officer/expert to estimate the specific costs and to request the proper budget

for waste storage, treatment, and disposal facilities and health services.

5. The matron shall:

   (a) Liaise with the CEO/medical director and HCWM committee.

   (b) Be responsible for the application of HCWM procedures by the nursing and the cleaning staffs.

   (c) Be responsible for the recording and the reporting of all needlestick injuries of medical and non-medical staff members and create an environment where workers feel safe and supported when they report sharps injuries.

   (d) Ensure that staff members know the immediate disinfection measures to be taken during spills.

6. The head of units/nurses shall:

   (a) Be responsible for the proper management of the HCW generated in their respective units.

   (b) Ensure that all the medical and ancillary staff working in their unit respect the HCWM procedures.

   (c) Ensure that the HCWM procedures are clearly displayed at strategic locations.

(d) Liaise with the environmental health officer/expert for effective monitoring and reporting of mistakes and errors in the implementation of the HCWM plan in order to improve communication and reinforce training.

(e) Be responsible for keeping records of needle-stick injury and reporting to all concerned in the HCF. This information should be used to improve injury-reduction plans.

7. The head of operation and waste handlers/cleaners shall:

(a) Liaise with the head administration and HCWM or environmental health officer/expert.

(b) Be responsible for the application of HCWM procedures by maintenance staff.

(c) Ensure that the maintenance staff members know the procedure for immediate reporting of all cuts or puncture wounds associated with sharps and needlestick injuries. Create an environment where workers feel safe and supported when they report sharp injuries.

(d) Ensure that maintenance staff members know the immediate corrective maintenance measures to be taken during spills.

(e) Know about the installation, maintenance, and safe operation of waste storage facilities as well as the waste handling and treatment equipment.

(f) Ensure the availability and proper utilization of PPE.

8. The pharmacist/pharmacy technician shall:

(a) Ensure that all logistics and pharmaceutical commodities are stored properly to minimize wastage due to mishandling.

(b) Ensure that a proper record exists for safety boxes and other injection commodities and bin (stock) cards are filled regularly.

(c) Ensure the application of first-in first-out dispensary for pharmaceutical commodities.

(d) Liaise with the medical director and the HCWM officer/expert to handle expired pharmaceutical commodities and to request the proper method of their handling and disposal.

(e) Liaise with all concerned to keep the optimum stock level for safety boxes and other injection commodities.

9. The head of the medical laboratory department shall:

(a) Ensure safe utilization and storage of laboratory chemicals and equipment

(b) Be responsible for the sound management of laboratory waste generated in their respective units.

(c) Ensure that personnel involved in laboratory waste handling and disposal receive adequate training that includes instruction on waste disposal practices.

(d) Be responsible for recording and reporting of accidental sharp injuries.

(e) Ensure the availability and proper utilization of PPE.

III. Guidelines for waste audits and needs estimate

1. A waste management baseline audit and needs estimate should be conducted before developing a waste management plan for the HCF.
2. The following information on HCW for waste audits should be collected and assessed in accordance with the guidelines:

    (a) Types, volume and/or weight, quantities, and composition of waste generated

    (b) Frequency and severity of waste handling injuries

    (c) Frequency and nature of spills and leakages of hazardous wastes

    (d) Sources of solid and liquid wastes

(e) Points of generation, collection, and storage sites

(f) Types and number of waste containers

(g) Loading, transport, and disposal methods

(h) Transportation and disposal records

(i) Costs of waste handling, transport, treatment, and disposal

3. The number of safety boxes, yellow, black, and red bags as well as bag-holders, containers, collection trolleys, and protective clothing annually required for HCW handling shall be estimated.

4. A contingency margin of 5% shall always be applied for safety boxes, yellow, black, and red bags.

5. The quantities of disinfectants and necessary spare parts for HCW treatment and disposal shall be estimated.

6. The number of staff members required for HCW collection and disposal shall be estimated.

IV. Guidelines for allocation of resources and provision of equipment

1. Equipment and materials (e.g., safety boxes, bags, disinfectants, PPE) should be supplied regularly without any shortage in stock.

2. Health facility heads should promote safe material recovery for reusable/recyclable ones under strict supervision.
3. Sufficient annual running costs shall be dedicated in the budget for the safe management of the HCW.

V. Guidelines for awareness and training

Training and awareness efforts with regards to HCWM shall be made at all levels:

1. To raise public awareness about the health care risks associated with HCW and safe practices.
2. To make sure that medical staff is given refresher training on HCWM at least annually.
3. To make sure that new staff members are familiarized with the HCWM system of their HCF.
4. To ensure that HCWM is included in the curricula of health care personnel training institutions at all level.
5. To ensure that waste management operators (e.g., transporters, treatment plant and landfill operators) get appropriate training and support.

6. To educate the public on waste segregation and waste disposal practices by using the following methods:

   (a) Display posters giving instructions on waste segregation at strategic points in HCFs such as waste bin locations. Posters should be explicit and contain diagrams and illustrations to convey the message to a broad audience, including those who are illiterate.

   (b) Convey simple messages outside HCFs through schools and radio or television programs, raising awareness about the risks involved in scavenging for discarded syringes and hypodermic needles and the importance of receiving injections with a new syringe and needle.

   (c) Ensure all information is displayed or communicated in an attractive manner in order to achieve maximum effectiveness.

VI. Guidelines for monitoring systems and reporting procedures for HCWM at all levels:

1. A monitoring system shall be set up to track hazardous HCW and sharps waste along the waste stream to the point of final disposal.
2. Monitoring should include incident and accident reporting and recording.

3. Monitoring data should be analyzed and reviewed at regular intervals and compared with the host country regulatory limits so that any necessary corrective actions can be taken.
4. Records of monitoring results should be kept in an acceptable format.
5. Periodic surveys shall be performed in waste generation, storage and transportation, and treatment and disposal facilities.
6. All responsible bodies should submit annual HCWM performance monitoring reports to their respective bodies.
7. The annual reports shall contain quantitative data describing the performance of each facility with regard to the HCWM national guidelines.

VII. Guidelines for private sector involvement

1. All contracts with private contractors for collection, on-site or off-site transportation, treatment, or disposal of HCW shall be approved by regional health and environment bureaus.
2. Private contractors shall be licensed for HCWM operation by regional health bureaus for competency and regional environment bureaus for operation.

3. The memorandums of understanding with private contractors shall include duties and responsibilities of each party regarding HCWM procedures and handling, transportation, and final disposal of HCW.
4. All workers of the private enterprise dealing with HCW should be supplied with adequate protective clothes and equipment by the company.

Annex III: Categories of Health Care Waste

Class 1: *Non-risk waste* comprises the non-hazardous waste generated within the medical institutions as defined in Annex I, as well as the non-hazardous pharmaceutical waste.

Class 2: *Clinical waste* comprises pathological waste and infectious waste as defined in Annex I. It also includes all items that are visually contaminated with blood or body fluids.

Class 3: *Sharps waste* includes all items that can cause cuts or puncture wounds as defined in Annex I. Sharps shall be considered highly hazardous waste and collected in rigid safety boxes or in a health care facility (HCF) where needle removal is used. Sharps should be collected in a small plastic container attached to the needle remover and, when three quarters full, the box should be transported carefully and disposed in a secured needle pit.

Class 4: *Anatomical waste and placenta* comprises recognizable body parts as specified in Annex I. Due to their physical characteristics, similar to anatomical waste, placentas are grouped in the same class.

Class 5: *Hazardous pharmaceutical and cytotoxic waste* include: pharmaceuticals (cytotoxic drugs and toxic chemicals), which pose a potential hazard when used improperly by unauthorized persons; unidentifiable pharmaceuticals and heavy-metal-containing disinfectants, which owing to their composition, require special management; and cytotoxic waste, as defined in Annex I.

Class 6: *Highly infections waste* comprises waste as defined in Annex I. This category of waste is generated in medical diagnostic laboratories or in isolation wards.

Class 7: *Radioactive waste* includes waste as defined in Annex I.

Class 8: *Wastes with high contents of heavy metals* include wastes such as mercury or cadmium as defined in Annex I.

Class 9: *Effluents* comprises waste as defined in Annex I. This category of waste is non-solid waste of all liquid infectious waste.

Annex IV: Minimum Health Care Waste Management (HCWM) Standards/Options

Health Facility: District Hospital (Rural):

Activities	Short term Solution	Long term solution
1. Segregation	• Waste Labeling • Color-coded Three bin System • Safety boxes at all injectionsites	• Four/Five bin system (This is to add red bin for highly infectious or anatomical waste and white bin for vials, ampoules and glass bottles recycling or reuse)
2. Collection	• Health Facility based collection system • Protective equipment for waste handlers	• Centralized urban waste collection system • Hospital based collection system • Protective equipment for waste handlers
3. Storage	• Onsite locked storage room • Storage containers	• Onsite locked storage room • Centralized storage facilities • Large metal waste container
4. Transportation • On-site Transport • Offsite	• Wheel barrow/trolley • Bucket	• Trolley/onsite/ • Cars /motor cycle
5. Treatment (**For sharps & non-sharp infectious waste**)	• Incinerator o Single chamber (brick)	• Incinerator o Centralized high temperature o Double Chamber

	o Double chamber (DeMontfort) • Chemical sterilizer • Autoclave/steam sterilizer for re-usable items • Protective equipment for incinerator operators	• Auto clave/steam sterilizer for re-usable items • Protective equipment for waste handlers
6. Disposal (**For all category of wastes**)	• Secured pit burial • Ash pit • Needle pit • Placenta pit	• Encapsulation • *Waste immobilization centralized • Placenta pit

* Waste immobilization is a technique of containing hazardous wastes in a sealed container and buried in well-plastered pit to prevent the possible movement of wastes out of the container and/or pit.

Health Facility: Specialized, General and Primary Hospital.

Activities	**Short term Solution**	**Long term solution**
1. Segregation	• Waste Labeling • Three bin System • Safety boxes at all injectionsites	• Four/Five bin system (This is to add red bin for highly infectious or anatomical waste and white bin for vials, ampoules and glass bottles)
2. Collection	• Health Facility based collection system • Protective equipment for waste handlers	• Centralizes urban waste collection system • Hospital based collection system • Protective equipment for waste handlers

3. Storage	• Onsite locked storage room • Storage containers	• Onsite locked storage room • Centralized storage facilities • Large metal waste container
4. Transportation • On-site Transport • Offsite	• Wheel barrow/trolley • Bucket	• Trolley/onsite/ • Cars /motorcycle/truck
5. Treatment	• Incinerator o Single chamber (Brick) o Double chamber (Demon Fort) • Chemical sterilizer • Autoclave/steam sterilizer for re-usable item • Protective equipment for Incinerator operator	• Incinerator • Centralized high temperature • Double chamber • Autoclave/steam sterilizer for re-usable item • Protective equipment for waste handlers
6. Disposal (**For all category of wastes**)	• Secured water tight pit • Ash pit • Needle pit • Secured pit burial • Placenta pit	• Encapsulation • Waste immobilization /centralized • Sanitary land fill • Secured pit burial • Placenta pit

Health Facility: Health Center (Rural)

Activities	**Short term Solution**	**Long term solution**
1. Segregation	• Waste Labeling • Three bin System • Safety boxes at all	• Four bin system(This is to add red bin for

	injectionsites	highly infectious or anatomical waste)
2. Collection	• Health Facility based • Protective equipment for waste handlers	• Health Facility based • Protective equipment for waste handlers
3. Storage	• Onsite locked storage room • Protective equipment for waste handlers	• Onsite locked storage room • Protective equipment for waste handlers
4.Transportation • On-site Transport	• Wheel barrow/trolley • Bucket • Protective equipment for waste handlers	• Trolley/onsite • Protective equipment for waste handlers
5. Treatment	• Brick Type incinerator (SSI) • HLD (Chemical disinfection) • Autoclave/Steam for re-usable items • Protective equipment for Incinerator operator	• Demont fort Incinerator • Double Chamber brick Incinerator • Auto clave/steam sterilizer for re-usable items • Protective equipment for waste handlers
6. Disposal (**For all category of wastes**)	• Encapsulation • Ash Pit • Pit Burial • Placenta pit • Needle pit	• Needle pit • Ash Pit • Secured pit burial • Placenta pit

Health Facility: Health Center (Urban)

Activities	**Short term Solution**	**Long term solution**
1. Segregation	• Waste Labeling • Color-coded	• Four bin system (This is to add red bin

	Three bin System • Safety boxes at all injectionsites	for highly infectious or anatomical waste)
2. Collection	• Health Facility based collection system • Protective equipment for waste handlers	• Centralized urban noninfectious waste collection system • Health facility based collection system • Protective equipment for waste handlers
3. Storage	• Onsite storage room • Puncture resistant & leak proof container)	• Onsite storage room • Centralized storage facilities • Puncture resistant & leak proof container
4.Transportation • On-site Transport • Offsite	• Wheel barrow/trolley • Bucket	• Wheel Barrow • Trolley • Truck/Cars/Motorcycle
5. Treatment	• Small scale incinerator (SSI) • Drum Incinerator • Autoclave/steam sterilizer for re-usable items • Protective equipment for waste handlers	• Demontfort Incinerator • Transport to Centralized high temperature incinerator • Autoclave/steam sterilizer for re-usable items • Protective equipment for waste handlers
6. Disposal (**For all category of wastes**)	• Encapsulation • Ash pit • Needle pit • Pit burial • Placenta pit	• Needle Pit • Ash pit • Sanitary land fill • Placenta pit

Health Facility: Health Post (Rural)

Activities	Short term Solution	Long term solution
1. Segregation	• Waste Labeling • Safety box at all injection sites	• Three bin system • Safety box at all injection sites • Garbage bin- special order
2. Collection	• SSI based collection • Health facility based collection • Protective equipment for waste handlers	• Health facility based • SSI based collection • Protective equipment for waste handlers
3. Storage	• Puncture resistant container	• Metallic or plastic receptacle
4.Transportation • On-site Transport • Offsite	• Wheel barrow • Buckets • Motorcycle/truck	• Wheel Barrow • Trolley • Motorcycle/truck
5. Treatment	• SSI at nearby HC or Hosp. • Drum Incinerator • Autoclave/Steam sterilizer	• SSI at nearby HC or Hosp. • Demont Fort Incinerator at nearby HC or Hosp.
6. Disposal (**For all category of wastes**)	• Ash pit • Needle pit • Pit burial • Placenta pit	• Needle Pit • Pit Burial • Placenta pit

Health Facility: Health Post (Urban)

Activities	Short term Solution	Long term solution
1. Segregation	• Waste Labeling • Safety box at all injection sites	• Three bin System • Safety box at all injection sites
2. Collection	• Needle Box/Needle Cutter • Health facility based collection • Protective equipment for waste handlers	• Health facility based • SSI based collection • Protective equipment for waste handlers
3. Storage	• Puncture resistant container	• Metallic or plastic receptacle • Interim storage room
4.Transportation • On-site Transport • Offsite	• Wheel barrow • Buckets • Motorcycle/car • Protective equipment for waste handlers	• Wheel barrow • Trolley • Motorcycle/car • Protective equipment for waste handlers
5. Treatment	• SSI at nearby HC or Hospital • Drum Incinerator • Chemical sterilizer • Protective equipment for waste handlers	• SSI at nearby HC or Hosp. • Drum Incinerator at nearby HC or Hosp. • Protective equipment for waste handlers
6. Disposal (**For all category of wastes**)	• Ash pit • Needle pit • Pit burial • Placenta pit	• Ash pit • Pit Burial • Placenta pit

Annex V: HCWM guidelines and standard operating procedures for healthcare facilities

Introduction

The disposal of waste originating from health facilities can have an effect on human health and the environment. Nevertheless, experience has proven that waste originating from health care establishments, when properly managed, generally poses no greater risks than that of properly treated municipal or industrial wastes.

The major rationale for proper disposal of waste produced in health care facilities is to prevent health facility-associated infection that puts the wellbeing of health care personnel, patients, the general public, and the environment at risk. Proper handling, treatment, and disposal of waste by type protects public health. Hence, handling and disposal procedures should be strictly pursued as part of organized approach to the facility hygiene and infection control.

I. Waste management procedures

Segregation

Segregation denotes the separation of waste into a range of classes according to its character. Waste segregation reduces the quantity of waste that requires specialized treatment and care.

Segregation of hospital waste into a minimum of 3 streams is necessary to reduce the risks of the waste. Since most hospital waste is noninfectious/non-risk waste, it can be handled as typical domestic waste. Segregation procedures are required to assure it remains non-risk. Segregation must take place immediately and at the source where the waste is generated and waste must never be resorted. Segregation must also guarante the absence of infectious HCW in the noninfectious waste stream.

The three categories of hospital-generated waste are:

- Sharps waste—syringes, needles, lancets, blades, scalpels, broken glass, etc.
- Infectious waste—any materials containing blood or body fluids such as gauze, dressings, cultures, IV lines, gloves, anatomical waste, etc.
- Noninfectious/general waste—paper, packaging, food, boxes, glass, plastic, etc.

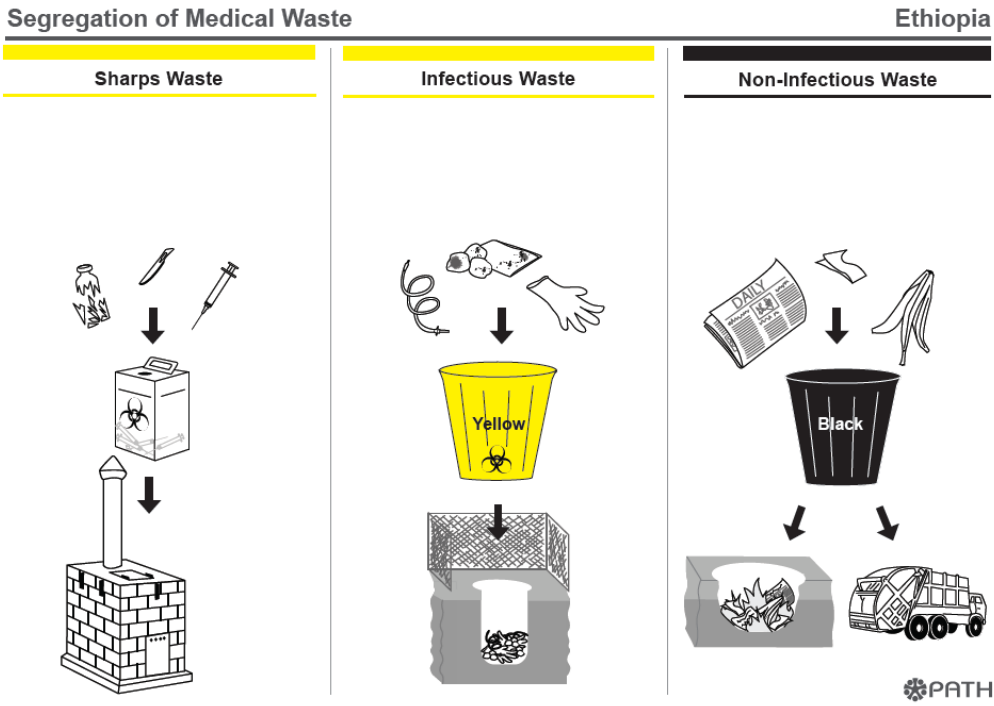
The 3 categories of HCW shall be segregated into color-coded containers as follows:

Segregation category	Color-coded container
Non-risk waste	Black bin
Infectious clinical waste	Yellow bin
Sharp waste	Yellow safety box

Location of segregation containers:

- Safety boxes—a safety box will always be located within arm's reach of any place an injection is given. Safety boxes may be transported on a trolley with injection equipment in patient wards.
- Infectious waste bins—yellow infectious waste bins will be located in all rooms where infectious waste is generated. Infectious waste bins shall not be located in public areas.
- Garbage bins—black garbage bins will be located in all rooms where waste may be generated. Garbage bins will be located in all public areas.
- In the absence of color-coded bins, the same segregation of waste can be achieved using labeled bins.

Figure 1


Segregation of Medical Waste
Ethiopia
Sharps Waste
Infectious Waste
Non-Infectious Waste
Yellow
Black
PATH

Handling

When handling waste, sanitary staff and sweepers shall wear protective clothing at all times including face masks, aprons, boots, and heavy duty gloves, as required.

Figure 2

Personal Protective Equipment for **Waste Handlers**

PATH

Protect yourself by wearing personal protective equipment (PPE) when handling waste.

Wearing PPE reduces risk from sharps, germs, exposure to blood and other bodily fluids, and splashes from chemicals.

- Face mask
- Heavy duty, gloves
- Plastic apron
- Clothes that cover the body
- Heavy duty, boots

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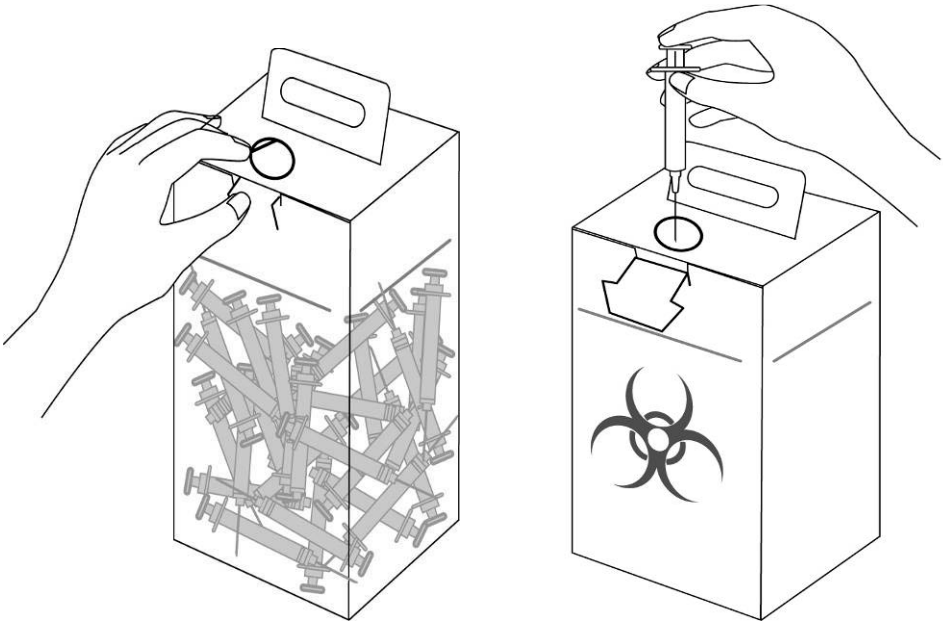
Sharps:

- When handling sharps, do not recap or bend needles attached to the syringe.
- Immediately place the syringe in a safety box.
- If needle removers are used, needle removal must take place immediately after the injection.

Figure 3 Safety boxes for collection of sharps



Safety boxes:

- Safety boxes must be fully and properly assembled before use.
- Safety boxes must be sealed and collected when they are ¾ full, and must never be emptied or opened.
- Place sharps containers (i.e., safety boxes) as close to the point of use as possible and practical, ideally within arm's reach.
- Mark or label safety boxes so that people will not unknowingly use them as a garbage container for discarding other items.
- Do not shake safety box to settle their contents and make room for more sharps.
- Do not place safety boxes in high traffic areas (corridors outside patient rooms or procedure rooms) where people could bump into them or be stuck by someone carrying sharps to be disposed of.
- Do not place containers on the floor or anywhere they could be knocked over or easily reached by a child.

In the absence of the standard cardboard safety box, it is possible for health workers to use innovative approaches to prepare sharps containers from readily available "throw away" items such as carton, metal food containers made of aluminum, tin, or heavy plastics. However, in all cases the material should be puncture-proof, and the box needs to be properly labeled and include a ¾ level fill-line.

Infectious waste bins:

Infectious waste bins should be covered before collection. Bins should be cleaned and disinfected with 0.5% chlorine solution after emptying and before reuse.

Collection

Schedule:

- Infectious waste bins will be collected each day.
- Safety boxes will be collected when ¾ full.
- Garbage bins will be collected each day.
- No infectious bag or bin shall be collected unless they are labeled with their point of production and content.

Rotating bins:

A rotating bin system must be used if bins are collected during patient hours. When a bin or safety box is collected, an empty bin or safety box must immediately be put in its place. This practice is not necessary if bins are collected when the facility is closed, however emptied bins and new safety boxes must be in place when the facility opens.

Storage

- Each hospital should have a room specially designated for waste storage.
- The room will be used only for safety boxes and infectious waste.
- No infectious waste shall be stored for more than two days before being treated or disposed of.
- Safety boxes may be stored for up to one week before incineration or transport.
- The storage room shall be totally enclosed and locked.
- The storage room shall be inaccessible to the public, animals, and birds.
- There should be good lighting and ventilation of storage room.

Transportation

On-site transport:

- A trolley, bin, or wheelbarrow may be used for transporting safety boxes and bins.
- The collected waste shall not be left even temporarily anywhere other than at the designated storage room.

- Containers should be covered with lids during storage and transport.
- Carts should be used for transporting bags of infectious waste within the facility.

Off-site transport:

If off-site disposal of infectious waste is available, the following guidelines are recommended:

- The waste should be placed in rigid, leak-proof containers before being loaded.
- Containers should be covered with lids during transportation.
- When transporting plastic bags of infectious waste, care should be taken to prevent tearing the bags.
- Vehicles used for transporting infectious waste shall be disinfected prior to use for any other purpose.
- The vehicles shall carry adequate supplies of plastic bags, protective clothing, cleaning tools, and disinfectants to clean and disinfect in case of any spills.
- Records must be kept to document all transport of medical waste.

Treatment and Disposal

- Sharps waste options in order of decreasing preference:
    - Incineration
    - Transport to off-site incinerators (if available)
    - On-site burial
- Infectious waste options in order of decreasing preference:
    - On-site burial
    - On-site incineration
    - Transport to off site treatment (if available)
- Non-risk waste options in order of decreasing preference:
    - Collection by municipal truck for landfill (if municipal collection and disposal service is available)
    - Onsite burning

Incineration:

When using incinerator, the following points should be considered for maximum operation and safety of workers:

- Incinerator operators must wear protective equipment when loading and operating the incinerator. Proper equipment includes gloves, boots, aprons, and goggles. Protective equipment should be made of materials that do not easily burn or melt.

- Incineration must follow standard operating procedures, including proper loading, preheating, and control, according to the design of the incinerator.
- Dangerous materials must not be incinerated, including PVC plastics, mercury thermometers, batteries, x-ray materials, aerosol cans, and glass vials. Such materials can be disposed of by burial technique or transported for offsite burial where available.
- Incinerator operators must remove ash from the ash chamber and grate before using the incinerator. Ash must be put in an ash pit or waste pit.
- All incinerators should be inspected and maintained by an Environmental Health professional (EHP) on a regular basis, and report of the inspection should be given to all concerned. In the absence of EHP, regular inspections can be performed by public health professionals, health center heads, or another qualified person.

Burial of infectious waste:

- Burial of infectious and sharps waste will occur only in properly constructed and protected burial pits.

- Burial pits must be above the water table (the bottom of the pit should at least be 1.5 meter away from the ground water table), and fenced to prevent access by animals and the community.
- Non-risk waste must not be dumped into infectious waste burial pits as this reduces the capacity of the pit for the infectious waste.
- If needle removers are used, needles will be dumped into a needle pit or barrel.
- When pits are full, they will be capped with concrete and marked to prevent future excavation.

II. Summary of procedures for handling and disposal of health care waste

General waste

General waste is non-hazardous and under normal circumstances poses no health risk. It includes paper, packaging, leftover foods, boxes, glass, plastics, etc.

- General waste is immediately placed in the general waste bin (black) by the person generating it.
- Waste handlers collect general waste daily, using a wheelbarrow/cart designated for general waste.

- If offsite disposal is available, the waste is stored until the scheduled collection day.
- If incinerated onsite, the general waste is taken directly to the incinerator on days when the incinerator is being operated.
- If the incinerator is not operating on that day, the waste handler stores general waste in a covered, secure location until final disposal (*waste should not be stored for more than 2 days*).
- Incinerator operator destroys general waste according to schedule.
- Incinerator operator removes ash after the incinerator has cooled down completely, and disposes of it in an ash pit.

Food waste

Food waste is part of general and non-risk waste that refers to leftover foods and food products.

- Food waste is immediately placed in the designated bin.
- Waste handler collects and disposes of food waste immediately after meal times.
- If offsite disposal is practiced, food waste should only be stored for up to 1 day.

- If no on-site disposal, waste handler buries food waste daily. It is highly recommended that food waste should be composted. (When burying, strictly follow the guidelines on burying waste)

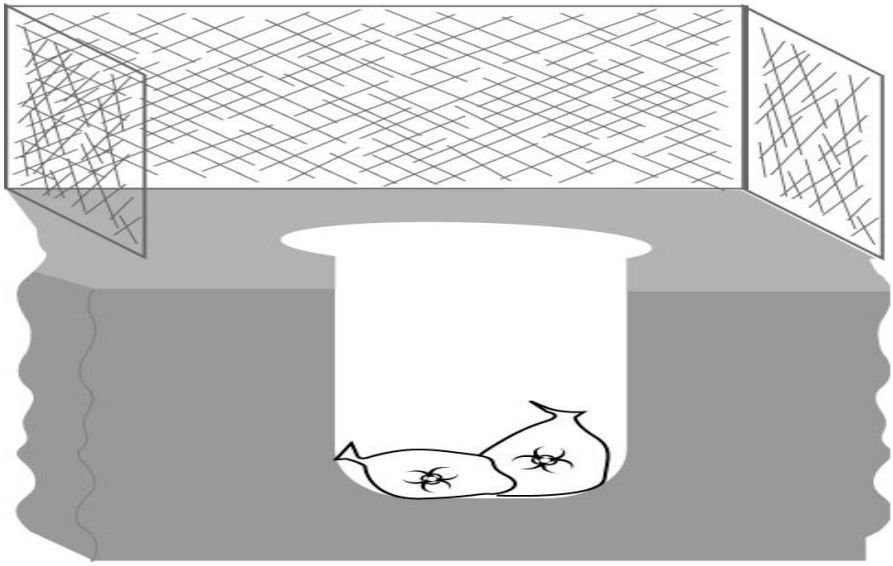
Infectious Waste

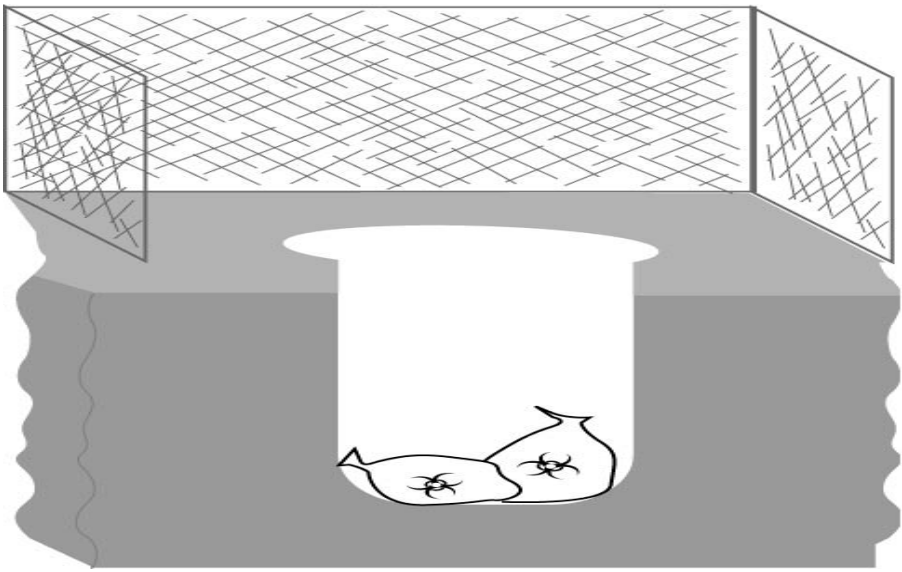
Infectious waste is a waste material that has been in contact with blood and/or body fluids. Due to the presence of blood and blood products, such wastes are regarded as infectious waste and can have and transmit microorganisms to susceptible person. It includes contaminated gauze, dressings, cultures, IV lines, used gloves, anatomical wastes, placenta, tissues, etc.

- Health care provider immediately places infectious waste in the infectious waste bin with liner bag. (yellow)
- Waste handlers collects waste every day or when the liner bag is full using a wheelbarrow/cart designated for infectious waste
- On days when the incinerator is being operated, the infectious waste is taken directly to the incinerator or it shall be disposed using burial technique.
- If the incinerator is not operating on that day, the waste handler stores infectious waste in a covered secure location until final disposal. *(Infectious waste should be disposed of within 2 days, but placenta and anatomical waste should be disposed on daily basis).*

- Incinerator operator destroys infectious waste according to schedule.
- Incinerator operator removes ash after the incinerator has cooled down completely, and disposes of it in an ash pit
- In settings where an incinerator is not available, waste handlers take infectious waste to the facility disposal site and bury it in a secured waste pit.
- In settings where an incinerator is not available, waste handlers take anatomical waste like placentas to a placenta pit for disposal.
- Waste handlers decontaminate the container and return it to be reused.

Figure 4 Placenta pit/needle pit/Infectious waste pit





Sharps

Sharps are sharp material and equipment that are disposed after being used (e.g., used syringes, needles, lancets, blades, scalpels, broken glasses, etc.).

- Injection providers immediately places used syringe in a safety box.
- Injection providers closes safety box when it is ¾ full and obtains a new safety box.
- Waste handlers collect filled safety boxes for storage in a secure, covered, dry location awaiting final disposal.

- Waste handlers transports safety boxes to incineration sites using a wheelbarrow/cart designated for transport of infectious waste.
- Incinerator operators destroy safety boxes according to schedule (safety boxes should be destroyed within one week).
- Incinerator operators remove ash after the incinerator has cooled down completely, and disposes of it in an ash pit.

Table 1: Summary of procedures

Category of waste	Segregation	Collection	Storage	Disposal
Sharps	Immediately in safety boxes	Collected when ¾ full	Dry, covered, secure area; destroyed within 1 week	Incineration
Infectious waste	Immediately in a yellow bin	Daily	Dry, covered, secure area; destroyed within 2 days (except for placenta and other anatomical waste which	Incineration or pit burial

			require daily disposal)	
General waste	Immediately in a black bin	Daily	Dry, covered, area; destroyed within 2 weeks	Incineration, burial, or landfill
Food waste	Immediately in a food waste bin (black bin)	Immediately after meal times	Food waste can be stored for up to 1 day	Offsite disposal, compost, or burial

Supplies

Safety Boxes:

Cardboard safety boxes should be used to safely contain used syringes and other sharps waste.

Color-coded bins:

Color-coded bins should be used for segregation of health care waste. If no color-coded bins are available, label waste bins with type of waste (i.e., infectious, highly infectious, general).

Color-coded bin liner bags:

Match bins with color-coded bin liner bags. If no color-coded liner bags are available, waste liner bags must be labeled with the type of waste they contain to ensure proper handling once the bags are closed.

Designated wheel barrow/cart for infectious waste:

Designate and identify wheel barrows for collection of infectious waste. These wheel barrows should be washed daily when collection is complete.

HCWM schedule

Establish a schedule for collection and disposal of healthcare waste (Table 2). Post the schedule at all service delivery points, storage, and disposal areas.

Table 2: Sample schedule for collection and incineration/disposal of waste onsite

Day	Collection of general waste	Collection of infectious waste	Incineration/ burning of waste
Monday	x	x	
Tuesday	x	x	x
Wednesday	x	x	
Thursday	x	x	x
Friday	x	x	
Saturday	x	x	x
Sunday	x	x	

Health worker safety

Practices to reduce disease transmission:

- Wear protective clothing when handling waste.
- Wash hands after working with waste.
- Handle sharps with care.
- Do not sort through waste.
- Keep facility clean inside and out.
- Report any injuries immediately to your supervisor.
- Needle stick injuries should be followed up by post-exposure prevention (PEP) treatment.

Critical steps to take following a needle stick injury:

- Immediately allow the wound to bleed without squeezing the wound.
- Wash the wound with soap and water.
- Report injury to supervisor.
- Seek care and treatment.

Protective clothing for waste handlers:

- Gloves protect any cuts on hands and help protect against needle sticks.
- Boots or closed-toe shoes protect feet from sharps and accidental spills.
- Aprons (rubber or plastic) keep germs off of clothes.
- Goggles (plastic) protect eyes from accidental splashes.
- Face mask with mouth cover protect the face from accidental splashes and prevent possible inhalation of poisonous gases.

Protective clothing for Incinerator Operators:

- Gloves protect any cuts on hands and help protect against needle sticks.

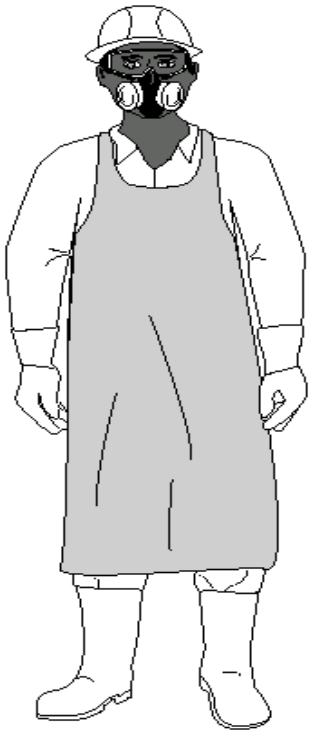


Figure 5: Protective clothing for incinerator operators

- Boots or closed-toe shoes protect feet from sharps and accidental spills.
- Aprons (rubber or plastic) keep germs off of clothes.
- Goggles (plastic) protect eyes from accidental splashes.

When to wear protective clothing:

- At all times when working with HCW.

Keeping protective clothing in good condition:

- Clean clothing after each use.
- Leave at facility; do not take home.

Managing Waste Spills

Managing infectious waste spills:

- Wear protective equipment.
- Pour bleach (sodium hypochlorite) solution over waste and allow to sit for 15 minutes.
- Using a dustpan and broom, carefully brush the waste off the ground and empty them into an infectious waste bag.
- Take special care to ensure that no waste remains in the broom.

- After the waste has been removed, cover the area with a bleach solution.

Managing spills from broken thermometer and blood pressure equipment:

- Put examination gloves on both hands.
- Collect all droplets of mercury with a spoon.
- Place in a small, closed container for disposal or reuse.
- Wash or clean the area with a bleach solution.
- Remove used gloves carefully and wash hands properly.

Managing sharps waste spills:

- Wear protective equipment.
- Pour bleach solution over sharps and allow to sit for 15 minutes.
- Using a dustpan and broom, carefully brush the sharps off the ground and empty them into a puncture proof container.
- Do not allow fingers or hands to come in contact with sharps.
- Take special care to ensure that no sharps fragments remain embedded in the broom.
- After the sharps have been removed, cover the area with a bleach solution or 0.5% chlorine solution for 10 minutes.

III. HCWM Responsibilities

Health Center Head

- Overall responsibility for ensuring proper HCWM procedures in health center
- Ensure that the health center HCWM plan is prepared and that sufficient staff and equipment are available to implement the plan
- Designate health center environmental health professional /sanitarian to be in charge of supervising HCW segregation, storage, collection, transportation, treatment and disposal.
- Assign HCWM duties and responsibilities to all medical and non-medical staff.
- Allocate sufficient financial and manpower resources for the implementation of HCWM plan.
- Ensure HCWM training and refresher courses for staff.

Health Center Environmental Health Professional /Sanitarian

- Oversight of daily implementation and monitoring of the HCWM plan.
- Ensure internal collection of bags and waste containers and their transport to the disposal site or storage room on a daily basis.

- Ensure that an adequate supply of safety boxes, waste bins, protective clothing, and collection trolleys are available and in proper locations
- Initiate ordering of supplies when minimum levels are reached.
- Ensure that waste handlers immediately replace used bags/containers with a new bag/ container of the same type and where a waste bin is removed from one container, that the container is properly cleaned before a new bag is fitted in.
- Ensure that injection providers and clinical staff follow proper segregation procedures.
- Ensure that waste handlers are not involved in waste segregation and that they handle waste bags and containers properly.
- Coordinate and monitor all disposal operations, and for this purpose meet regularly with the concerned representative of the local council.
- Ensure that the correct methods of transportation and disposal of waste are followed.
- Ensure the emergency procedures exist and can be taken.
- Investigate record and review all incidents reported regarding hospital waste management.
- Conduct or organize HCWM training and retraining.

- Ensure that new staff are trained on HCWM procedures
- Facilitate or do maintenance of treatment and disposal facilities.

Injection providers

- Follow waste management procedure and guidelines,
- Follow color-coded waste segregation system,
- Locate safety boxes within arm's reach of all injection sites
- Immediately dispose of sharps in safety box
- Immediately report missing safety boxes or segregation bins
- Report needle stick injuries

Waste Handlers/ Cleaners

- Know color-coding system
- Place safety boxes and waste bins in proper locations
- Collect waste bins daily and safety boxes when ¾ full
- Ensure waste is securely stored until disposal
- Use protective equipment when handling infectious and sharps waste
- Maintain segregation
- Ensure a clean environment at the facility

- Safely transport waste to treatment and disposal sites
- Treat and dispose waste properly, according to health center guidelines
- Report needle stick injuries
- Follow procedures to manage spills

Incinerator operators

- Follow incinerator operations procedures
- Use protective equipment when loading and operating incinerator
- Ensure supply of fuel(optional)
- Record amount and type of waste received and incinerated
- Follow maintenance schedule

IV. Training and Supervision

All health facility staff

All staff should receive an overview training of waste management issues and procedures, including:

- Risks of health care waste
- Needle stick dangers, treatment, and reporting requirements

- Segregation system including types of bins and color-coding system

Clinicians and injection providers

All clinicians and injection providers should receive additional training on:

- Principles of Health waste management system
- Procedures or basic steps of HCWM system
- Health worker safety
- Segregation procedures
- Safety box use and assembly
- Responsibilities of clinicians

Waste handlers

All waste handlers should receive additional training on:

- Handling, storage, and transport of safety boxes and waste bins
- Procedures for treatment and disposal of waste
- Responsibilities of waste handlers

Training resources

- The manual “Training of Health Workers and waste handlers in the management of sharps waste”.
- Power point presentation, Group work and field visit.

Training for new staff

- The manual “Do no harm training manual”.

Supervision (M & E)

- As a complement to the facility HCWM plan, a monitoring and evaluation plan needs to be developed together between facility leaders and Environmental health officers.
- Officials of the HCF should regularly monitor and supervise the entire HCWM system of the facility.
- Based of the finding s of the supervision, necessary corrections and re-planning should be done for better performance and achievement.

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