REPUBLIC OF KENYA
MINISTRY OF HEALTH

Guide for Training Health Workers in Health Care Waste Management

Foreword

The Kenya Health Sector Strategic plan (KHSSP III) represents the Ministry's 2nd Medium Term Plan to facilitate the attainment of the country's Vision 2030. The plan is design to provide an overall framework into which sector priorities and actions are derived. The Ministry's mandate on health care waste management is in line with objectives 5 and 6 of the health sector strategic plan, which respectively are to minimize exposure to health risk factors and strengthen collaboration with health related sectors. Other objectives of the strategic plan are also inter-linked to the overall management of health care wastes.

This Trainer's Guide has been developed in line with strategic priority 3 of the new National Health Care Waste Management Strategic Plan 2015 – 2020. The objective of the priority area emphasizes the need to increase the capacity, training and awareness on HCWM among the health workers and the general public. The manual is an immediate resource to health care workers while performing their day-to-day service delivery at various health settings. Its goal is to strengthen the capacity of the health workers and support staff in the management of health care waste in all health settings in order to improve public health and realize sustainable environment. Health care waste management is an issue that is being looked from both the public health and environmental viewpoint. It is therefore important to note that poor practices in health care waste management significantly contribute to the burden of health care associated infections and increased environmental challenges. Health workers and support staffs are particularly at the most risk. Proper waste management practices should therefore be maintained and promoted at all service delivery levels. Critical here is continuous professional development in health care waste management.

The Ministry, therefore, approves the use of this Training Guide as a national training resource material for health workers. It is a guide for the health facilities managers and health workers to manage appropriately and professionally health care wastes while in their day-to-day service delivery practices. The guide is divided into two modules. Module one is a guide for training of health facility managers and health care workers while module two is for training waste handlers and treatment equipment operators. Topics covered in both modules include training overview, introduction to HCWM, segregation of waste, health workers safety, overview of HCW treatment, role and responsibilities for HCWM. Other than the general content, module one also covers waste minimization, overview of legal and policy framework, development and implementation of facility HCWM plan and key messages on HCWM and safe injections and reduction of unnecessary injections. Additional content of module two also include handling, storage, and transport of health care waste and operating and maintaining an incinerator and related equipments like autoclaves and shredders.

The development of this Training Manual was an initiative of the Ministry made possible through the financial and technical assistance from its strategic development partners on health care waste management. Worth to note here is the Program for Appropriate Technology in Health (PATH) and the US Centers for Disease Control (CDC) through financial support from the U.S President's Emergency Plan for AIDS Relief (PEPFAR). The Ministry is therefore very grateful to PATH, CDC, PEPFAR, its staff, other strategic development partners led by the WHO and other stakeholders in the area of health care wastes for their contributions toward the development and implementation of this training guide.

Dr. Khadijah Kassachoon
Principal Secretary
MINISTRY OF HEALTH

Preface

The National Healthcare Waste Management Trainer's Guide for health care workers has been developed as a result of the need to build capacity at both National and Counties level on safe management of health care waste. In this regard, the trainer's guide is aimed at harmonizing and standardizing the training of managers, health care providers, waste handlers and other cadres that may be involved in the handling, treatment and final disposal of health care waste generated during delivery of services within facilities.

Inadequate training on safe handling and disposal of hazardous health care waste by health care workers coupled with low level of awareness on associated risks is a contributor to poor waste management practices. This in turn puts the health workers, patients and the community in general at risk of infections and conditions associated with health care waste as well as environmental pollution. All these factors combined have a negative effect on the quality of health care delivery services and may increase the risk of health care acquired infections (HAIs)

Therefore, the development of this guide is timely and is expected to support the Ministry's effort in building the capacity of health workers to provide health care while observing best practices on health care waste management. I am therefore confident that this guide will be useful in promoting integration of all aspects of infection prevention and control that include health care waste management and injection safety in addition to standard precaution.

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This guide will be made available for use within the wider healthcare industry. I therefore, urge all health care providers, partners and stakeholders to support the implementation of this guide as it contribute towards delivery of quality health care throughout the country as well as contributing to efforts towards environmental sustainability.

Dr Nicholas Muraguri
DIRECTOR OF MEDICAL SERVICES

Acknowledgement

The development of the health care waste management trainer's guide for health workers in the country is a key milestone for the Ministry and the wider health sector. The process of developing this guide was participatory and involved various partners and stakeholders in the field of health care waste management. These included the MOH and its affiliate institutions such as Kenyatta National Hospital (KNH), Kenya Medical Training College (KMTC) and the Kenya Medical Research Institute (KEMRI) as well as development partners and Non-Governmental Organizations. The Ministry wishes to acknowledge all these institutions. These institutions supported the process by sending their staff to participate in the technical review meetings and workshops that were convened for the purpose of developing this guide.

The Ministry also acknowledges and appreciates the support of the US President's Emergency Plan for AIDS Relief (PEPFAR) and the Centers for Disease Control and Prevention (CDC) for funding this work. We also acknowledge PATH, who through their collaboration with the Ministry on the National Health Care Waste Management Project provided the necessary technical support as well as availing the financial resources needed during the development of this guide.

We would like to single out the following individuals for appreciation in their participation and sharing experiences during the development process: J.G. Muriithi, S. Okuche, G. Omondi, M. Mwania, S. Mwangi, P. Murunga, W. Muhoro (MOH); S. Nzioka (WHO), J. Katama (KNH); C. Obiero (KMTC); S. Matu (KEMRI); G. Ngeno, G. Mugare, W. Abere, F. Onditi, and J, Nasaye (PATH).

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Acronyms

BCC	behavior change and communication
CDC	Centers for Disease Control and Prevention
DH	district hospital
EMCA	Environmental Management and Coordination Act
HAI	health care-acquired infection
HCW	health care waste
HCWM	health care waste management
HMT	Hospital Management Committee
IEC	information, education, and communication
IPC	infection prevention and control
IS	injection safety
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
KHSSP III	Kenya Health Sector Strategic Plan
KMTC	Kenya Medical Training College
KNH	Kenyatta National Hospital
M&E	monitoring and evaluation
MMIS	Making Medical Injections Safer
MOH	Ministry of Health
MOMS	Ministry of Medical Services
MOPHS	Ministry of Public Health and Sanitation
MSDS	Material Safety Data Sheet
NaDCC	sodium dichloroisocyanurate
NASCOP	National AIDS and STIs Control Program
NEMA	National Environmental Management Authority
NPHLS	National Public Health Laboratories Services
OJT	on-the-job training
PADM	project administrator
PEPFAR	President's Emergency Plan for AIDS Relief

PEP	post-exposure prophylaxis
PMP	performance monitoring plan
PPE	personal protective equipment
Rs/Rs	roles and responsibilities
SOPs	standard operating procedures
TOT	trainer of trainers
WHO	World Health Organization

Definition of Terms

Health care waste

HCW includes all waste (solid, liquid, or gaseous) generated by health care facilities, research facilities, and laboratories. In addition, it includes waste originating from "minor" or "scattered" sources, such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.).

Health care waste management

This term refers collectively to all administrative and operational activities aimed at ensuring safe disposal of HCW. The administrative activities involve policy formulation, planning, and resource allocation, among other functions. Operational activities include waste minimization, handling, storage, treatment, recycling, and disposal. This term also encompasses training and behavior change, health worker safety, procurement of equipment and commodities, and monitoring and evaluation (M&E).

Waste

Any substance or object that is:

- disposed of; or
- intended to be disposed of; or
- required to be disposed of by the provisions of national law.

Waste includes any product left over at the end of a process or action and is a resource out of place.

Waste disposal

Waste disposal is the ultimate discharge of HCW without the intention of retrieval.

Waste treatment

Waste treatment is the process of rendering hazardous HCW safe by reducing or eliminating its potential to cause harm and reducing the volume.

Safety box

A safety box is a puncture- and leak-resistant container for the disposal of sharps.

Introduction for Trainers

Training Health Care Workers in Health Care Waste Management

Hospitals and other health care facilities have a responsibility to care for the environment and public health—particularly in relation to injection safety and the waste they produce. They must also ensure that there are no adverse health and environmental consequences as a result of injection practices and waste handling, treatment, and disposal activities.

The aim of this course is to provide basic skills training for health care workers in HCWM toward implementation of the national guidelines for safe management of HCW, the HCWM policy, and the infection-prevention policy in Kenya, including the components outlined in this guide. The goal is to prepare health care workers to take steps to ensure a healthy and safe environment in facilities and communities. This guide provides the objectives and content of each training session, training methods, and accompanying training materials.

Recommended Audience

This training is intended for Kenyan health care providers who generate and handle HCW, and who manage health facilities, including medical officers, clinical officers, physicians and specialists, nurses, laboratory technicians, pharmacists, public health officers, nutritionists, managers, and waste handlers.

It is recommended that trainers use local materials and examples as much as possible, reinforced by descriptions of real situations and photographs. The curriculum encompasses extensive onsite training within facilities and includes elements of self-learning.

Purpose of the Guide

The primary purpose of this guide is to provide instruction for trainers to plan for and carry out in-service training for operational-level health workers to improve medical waste-management practices.

Using the Manual

This manual focuses on preparation for and organization, implementation, and evaluation of HCWM training. The intent is to provide facilitators with basic training techniques. It is expected that facilitators will employ these processes and approaches when following all HCWM manuals to train health care workers in management of medical waste.

The content should be adapted to suit individual situations and target audiences, including participant skill levels. The content can be presented by a facilitator and/or used by health care workers individually or in groups using methodologies that are appropriate to each module. Teaching methods are included for relevant topics. PowerPoint presentations have been developed for each session and are available from PATH upon request.

Training can occur at an offsite or onsite location. Offsite training occurs away from the health care facility or practice setting. Onsite training through supportive supervision occurs at the practice

setting and is more advantageous in that actual HCWM practices can be observed. Onsite training also provides the opportunity for participants to implement what they have learned.

Onsite training is recommended, and facilitators should choose a time and place to have a minimum impact on service provision.

To ensure that the training is a success, users of this manual should carefully read and fully comprehend the content. References and links to additional information on HCWM are provided at the end of the manual, including from WHO, Ministry of Medical Services (MOMS), Ministry of Public Health and Sanitation (MOPHS), PATH, and other organizations.

Training Units

This guide includes two modules, each with ten units.

Module 1. Guide for Training Health Facility Managers and Health Care Workers

1. Training Overview
2. Introduction to Health Care Waste Management
3. Waste Minimization
4. Segregation of Waste
5. Health Worker Safety
6. Overview of Health Care Waste Treatment and Disposal
7. Roles and Responsibilities in Health Care Waste Management
8. Overview of the Legal and Policy Framework
9. Developing and Implementing a Facility Health Care Waste Management Plan
10. Key Messages on Health Care Waste Management, Giving Safe Injections, and Reducing Unneccesary Injections

Note: Training for health care workers includes Units 1 through 7.

Module 2. Guide for Training Waste Handlers and Treatment Equipment Operators

1. Training Overview
2. Introduction to Health Care Waste Management
3. Health Worker Safety
4. Segregation of Waste
5. Handling, Storage, and Transport of Health Care Waste
6. Overview of Health Care Waste Treatment and Disposal
7. Roles and Responsibilities in Health Care Waste Management
8. Operating and Maintaining an Incinerator
9. Operating and Maintaining an Autoclave
10. Operating and Maintaining a Shredder

Note: Training for waste handlers includes Units 1 through 7.

Training Overview

Introduction

It is very important that you are adequately prepared before you begin facilitating the training workshop. This introductory session provides guidance on preparation for the training, including logistics, equipment, lesson planning, and the course schedule. It will also help you appreciate the principles of adult learning and some of the facilitation skills you will be required to have in order to carry out an effective training.

Competency

You must be able to organize and conduct a training/workshop.

Specific Objectives

By the end of this overview, you should be able to:

1. Describe the components involved in training organization.
2. Discuss teaching methodologies.
3. Discuss the principles of adult learning.
4. Discuss facilitation skills.

Duration

2 hours.

Preparing for the Training

Preparation refers to all the activities that take place before, during, and after the training. It involves planning and putting in place all the required logistics to ensure that training objectives are achieved and the training is a success.

Major Components of Training Organization

The primary objective of preparation is to ensure that the training process happens effectively and smoothly. In addition, there are various expectations of you as a trainer or facilitator. The core values of **trust** and **integrity** are important in safeguarding the health care workers you train, to ensure that waste handling does no harm to workers, patients, and the community at large.

Therefore, as part of training preparation, you are expected to fully understand the purpose of the training and the background of the organizational setting in which you will be conducting the training. The organizational preparation for training includes:

- Assessment of participant profiles.
- Selection of training materials, approaches, and processes.
- Selection of the appropriate venue.
- Arrangement of appropriate logistics.
- Preparation of lesson plans.
- Preparation of a timetable.

In preparation for training, the facilitator is expected to be able to design lesson plans, including:

- Learning objectives.
- Content.
- Teaching/learning methods based on the specific objectives and content.
- Relevant practical exercises.

When using a lesson that has already been prepared, ensure that you are thoroughly familiar with the material, including evaluation tools to assess learning progress; selected training methods, materials, and techniques; and the schedule or timetable.

As you prepare, it is important to remember that the following activities will be required of you during and after the training exercise:

- Training conducted using the principles of adult learning.
- Evaluation of the training based on set expectations, including:
  - Daily formative evaluation.
  - Pre-training assessment.
  - Post-training assessment.
  - Impact evaluation (part of program design).

Participant Selection and Notification

Develop a list of the participants you expect to attend the training. This will require you to collect information on who works where (i.e., become familiar with staff and their roles and responsibilities, and staffing levels by cadre). It may also require you to find out who has received previous HCWM training, and what that training encompassed.

Participants should be informed through proper mechanisms and with enough advanced notice of the training dates and venue to ensure good attendance of the right participants.

Course Materials

The trainer should ensure that the following materials are available as required:

Educational Equipment and Supplies

- Handouts.
- PowerPoint files.
- Writing board.
- Flip chart and easel.
- Pens.
- Paper.
- Writing paper.
- Marker pens (various colours).
- Masking tape.
- Multimedia projector.
- Extension cords.
- CDs or flash drives.
- Computer/laptop/projector/pointer.
- Pencils.
- Erasers.
- Pencil sharpeners.
- Pouch/document wallet.
- Name tags.
- Printer.
- Toner.
- Printing paper.

HCWM Supplies

- Bins.
- Liner bags.
- Safety boxes.
- Personal protective equipment (PPE):
    - Gloves—heavy-duty, rubber, latex, and leather.
    - Heavy-duty boots.
    - Goggles.
    - Mouth masks.
    - Respirators.
    - Helmets.
    - Mackintoshes.
    - Aprons.
    - Overalls.

Administrative Assistance

Consider assigning a person to the role of administrative assistant, to gather and organize training materials, such as evaluations, reports, and teaching aids. In some cases, it may be necessary for the facilitators to organize among themselves to ensure that administrative duties are carried out.

Lesson Planning

Lesson planning is important; it ensures that you know the materials and methods required to achieve your training objectives.

The stages of a lesson include:

- Opening the lesson and motivating the learners.
- Reviewing past work related to the current lesson's objectives and content.
- Introducing the lesson topic: explain the objectives to be achieved and the teaching/learning method(s) to be used.
- Presenting new information and demonstrating, explaining, or illustrating it as required.
- Engaging the participants actively in the teaching/learning process.
- Reinforcing the new learning by questioning, repetition, practice, etc.
- Assessing the learning and repeating or practicing further if necessary.
- Summarizing/closing the lesson, including providing information on opportunities for further study.

Remember that effective time management of the lesson is critical.

Training Schedules

In some cases, training schedules may be provided. However, you may be required to adapt or come up with new or different schedules depending on the training topic, participants, and location. Examples of training schedules are included in **Appendix 3**. Choose the appropriate sessions needed for each module.

Preparation of the Venue

Seating Arrangement

The seating arrangement can greatly impact the success of each session. Consider the type of seating that would work best, and be creative. As necessary, change the seating arrangement to match the training method being used. The following are the main six seating arrangements normally used:

1. Rows of tables and/or chairs.
2. Hollow U-shape.
3. Banquet or fish-bone style.
4. Conference style.
5. Circle of chairs.
6. Trio of tables.

Each arrangement has its advantages and disadvantages. If you have time, it is good to initiate a session to explore relative advantages and disadvantages of each arrangement.

Registration

All participants should register first thing when they arrive at the venue. This will ensure that you have the right participants, and it also gives you a record of who attended the training. An example of a registration form is included as **Appendix 1**.

Setting the Climate

Climate setting includes introductory activities that help to break the ice. These activities take place on the morning of the first day of the training. They should take no more than one hour, and include:

- **Welcome and introduction to the training, and participant registration (30 minutes):** This should include providing the participants with nametags and marker pens. Instruct the participants to write their names legibly (and include their designation, work station, and contacts on the registration form, if they wish).
- **Self-introductions (20 minutes):** The trainers should introduce themselves and then let each participant introduce themselves, giving their name, designation, station, years of service, interests/hobbies, etc. This exercise should be fun; it is meant to make participants feel comfortable with the facilitators and with one another**.**
- **Establishment of group norms (5 minutes):** Let the participants establish their own norms for the workshop. Norms are "ground rules," or expectations of how participants should conduct themselves so that the training goes smoothly and the course objectives are met. Examples include:
    - Arrive on time for the beginning of each session and after each break.
    - Mobile phones should be shut off while in the training room. Only one person should speak at a time.
- **Addressing administrative preparations and issues (5 minutes):** These include accommodations and meals, allowances, location of ablution facilities, length of workshop, transport, etc.). Address any concerns participants may have to ensure all are comfortable with the arrangements.

Sharing Training Objectives

- Review the training objectives. Briefly review the overall workshop goals and objectives.
- Review the training schedule and briefly explain what is expected for the various activities. Go through the schedule for all the days, highlighting the main topics.
- Review the workshop methodology. Mention that the training is intensive and interactive, with a lot of group work, exercises, and demonstrations.

Teaching and Learning Methods and Aids

Appendix 2 summarizes various teaching and learning methods, showing their use, advantages, and limitations.

Competency-based Training

Competency-based training is designed to allow a learner to demonstrate their ability to do something. This may be to facilitate a training session, to segregate medical waste, or to develop a facility plan. In this training, learners will be expected to demonstrate they can do a task, activity, or exercise well enough to be assessed as competent.

Tips for the Facilitator

- The facilitator should arrive at the training site in time to set up for the training session, including checking for the required training equipment and supplies.
- Select a coordinator to manage the logistics (refreshments, equipment, supplies, etc.) of the training session.
- Become familiar with the principles of adult learning (see below), and limit the amount of time spent in the classroom.
- Devote a greater portion of the course content to demonstration and practice.
- Demonstrate each correct procedure to the participants.
- Require participants to repeat each demonstration until you are satisfied that they have mastered the required skills.
- Conduct practice sessions in areas of the health care facility in which the skills will be used.
- Select participants based on the purpose and content of the training module. For example, when training on logistics, commodities, etc., participants should include supply managers and administrators/managers.
- Use health care facilities that utilize poor injection safety practices as well as those with model performance. This will allow participants to observe, assess, and understand the difference between good and bad practices.
- At the end of each session, allow time for review and to brainstorm plans for improving practice, and to close the session.
- Conduct two assessments, a pre-training assessment of participant knowledge prior to the training and a post-training assessment at the close of the training, to determine the impact of the training. The same assessment is given pre- and post-training (see **Appendix 4**). Discuss results with the participants after the posttest.
- Allow sufficient time after the post-training assessment and discussion for remedial work.

Nonverbal and Verbal Communication Skills

The following are useful skills for the facilitator:

Nonverbal Skills

- Maintain eye contact with everyone in the group as you speak. Do not appear to favor certain people in the group.
- Move around the room without distracting the group. Avoid pacing or addressing the group from a place where you cannot be easily seen.

- React to what people say by nodding, smiling, or other actions that show you are listening.
- Stand in front of the group; do not sit—particularly at the beginning of the session. It is important to appear relaxed and at the same time be direct and confident.

Verbal Skills

- Ask questions that encourage responses. Open-ended questions help: "What do you think about…," "How…," "What if…," etc. If a participant responds with a simple "YES" or "NO," encourage elaboration by asking questions like "Why do you say that?"
- Ask the other participants if they agree with a statement someone makes. Be aware of your tone of voice, and speak clearly and slowly.
- Be sure the participants talk more than you do.
- Do not answer all questions yourself. Participants can answer each other's questions. Say "Does anyone have an answer to that question?"
- Paraphrase by repeating statements in your own words. This allows you to check your understanding and reinforce statements.
- Summarize the discussion. Be sure everyone understands it and keeps it going in the direction you want. See if there are disagreements and draw conclusions.
- Reinforce statements by sharing a relevant personal experience. You might say, "That reminds me of something that happened last year…"

Principles of Adult Learning

Definition of Adult Learning

Adult learning is a process whereby an adult acquires a relatively permanent change in behavior that occurs as a result of insight and practice or experience.

Adult learning may also be defined as acquisition of practically useful knowledge, skills, and attitudes. These equip learners with the capacity to handle personal or occupational responsibilities with efficiency and effectiveness.

Adult learning occurs best when it:

- **Is self-directed.** Adults can share responsibility for their own learning because they know their own needs.
- **Fills an immediate need.** Motivation to learn is highest when it meets the immediate needs of the learner.
- **Is participative.** Participation in the learning process is active, not passive.
- **Is experiential.** The most effective learning is from shared experience; people learn from each other, and the trainer often learns from the learners.
- **Is reflective.** Maximum learning from a particular experience occurs when a person takes the time to reflect upon it, draw conclusions, and derive principles for application to similar experiences in the future.
- **Provides feedback.** Effective learning requires feedback that is corrective but supportive.
- **Shows respect for the learner.** Mutual respect and trust between trainer and learner help the learning process.
- **Provides a safe atmosphere.** A cheerful, relaxed person learns more easily than one who is fearful, embarrassed, or angry.

Module 1: Guide for Training Health Facility Managers and Health Care Workers

Introduction

This module is to be used to train health facility managers in HCWM. The content is as shown below in the training units.

Training Units

1.1 Training Overview
1.2 Introduction to Health Care Waste Management
1.3 Waste Minimization
1.4 Segregation of Waste
1.5 Health Worker Safety
1.6 Overview of Health Care Waste Treatment and Disposal
1.7 Roles and Responsibilities in Health Care Waste Management
1.8 Overview of the Legal and Policy Framework
1.9 Developing and Implementing a Facility Health Care Waste Management Plan
1.10 Supportive Supervision for Health Care Waste Management
1.11 Key Messages on Health Care Waste Management, Giving Safe Injections, and Reducing Unneccesary Injections

1.1 Training Overview

Introduction

This unit gives an overview of the training course. It is intended for both health care workers and the health facility management team.

Duration

10 minutes.

Competency

Development of a common understanding of the training contents and objectives.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Raise awareness of public health and environmental hazards that may be associated with inappropriate segregation, storage, collection, transport, handling, and disposal of HCW.
- Provide information on proper practices for implementing an improved HCWM system.
- Identify roles and responsibilities of all staff involved with managing HCW.

Materials

- **Handout:** Pre-/Post-Test for Managers and Service Providers (found in Appendix 4)

Notes to the trainer

- Review objectives with the group.
- Ask if there are any objectives missing that the participants had hoped to achieve in the training.
- Let participants know time expectations.
- Conduct a pre-training assessment of the participants.

1.2 Introduction to Health Care Waste Management

Introduction

This unit gives an overview of HCWM practices. It is intended for both health care workers and the health facility management team. It highlights the importance of safe HCWM, categories of HCW, and principles of waste management. This unit also outlines key steps in waste management, accompanied by a brief description.

Duration

30 minutes.

Competency

Appreciation of the importance of safe HCWM.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Define key terms used in HCWM.
- Explain the importance of proper HCWM.
- State the categories of HCW.
- List the principles of HCWM.
- Identify and define the key steps of HCWM.

Materials

- **Handout:** Appendix 6. Key Steps in Health Care Waste Management
- **PowerPoint:** Introduction to HCWM

Notes to the trainer

Review and adapt the content for your audience.

The Importance of HCWM

- To minimize the effect of waste on public health, such as disease transmission (e.g., HIV/AIDS, hepatitis B and hepatitis C) and injuries caused by sharps.
- To prevent risks and hazards to waste-handling staff.
- To reduce the environmental impact caused by pollution resulting from improper disposal of waste, including contamination of grounds, water, and air.
- To reduce the costs resulting from waste handling.
- To facilitate resource recovery of useful products (Reduce, Reuse, Recycle).
- To prevent and control breeding of insects, rodents, and other pests.
- To reduce nuisances (e.g., smell, unsightliness).
- To prevent animal and human scavenging.
- To improve on aesthetics; ensure the hospital is a beautiful environment.

Categorization of Health Care Waste

HCW is broadly classified as hazardous and non-hazardous. Hazardous HCW has the potential to cause harm to both humans and the environment if there is exposure or if it is improperly handled or disposed of. It is estimated that approximately only 20 percent of HCW may be considered hazardous where proper segregation is done.

Non-hazardous waste, which constitutes 80 percent of HCW, does not pose much risk to humans; however, it can cause a nuisance or create a breeding site of disease vectors like flies and rats if not properly disposed of.

The *National Guidelines for Safe Management of Health Care Waste* outlines the following categories of waste:

Infectious Waste

This category of waste is suspected to contain pathogenic micro-organisms. It includes:

- Cultures and stocks of infectious agents from laboratory work.
- Waste from surgery and autopsies on patients with infectious diseases (e.g., tissues and materials or equipment) that has been in contact with blood or other body fluids.
- Waste from patients in isolation wards (e.g., excreta, dressings from infected or surgical wounds, clothes soiled with human blood or other body fluids).
- Waste that has been in contact with patients undergoing haemodialysis (e.g., dialysis equipment such as tubing and filters, disposable towels, gowns, aprons, gloves, and laboratory coats).
- Any other instruments or materials, including food remains that have been in contact with infected persons or animals (e.g., HIV/AIDS, diabetes home-based care, and intravenous drug use).

Highly Infectious/Pathological Waste

- Pathological waste consists of tissues, organs, body parts, human fetuses and animal carcasses, blood, infected animals from laboratories, and body fluids.
- Within this category, recognizable human or animal body parts are also called anatomical waste.
- This category should be considered as a subcategory of infectious waste, even though it may also include healthy body parts.

Sharps

- Sharps are items that could cause cuts or puncture skin, and may include needles, hypodermic needles, scalpels and other blades, knives, infusion sets, saws, broken glass, and nails.
- Whether or not they are infected, such items should be considered as highly hazardous HCW.

Pharmaceutical Waste

- Pharmaceutical waste includes expired, spilled, and contaminated pharmaceutical products.
- This includes drugs, vaccines, and sera that are no longer required.
- The category also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues, and drug vials.

Radioactive Waste

- Radioactive waste includes solid, liquid, and gaseous materials contaminated with radionuclide.
- It is produced as a result of procedures such as in vitro analysis of body tissue and fluid, in vivo organ imaging and tumor localization, and various investigative and therapeutic practices.
- In addition, this waste is also produced from health care and research activities involving radionuclide, and related activities such as equipment maintenance and storage.

Genotoxic/Cytotoxic Waste

- Genotoxic waste may include certain cytostatic drugs often used in cancer therapy; vomit, urine, or feces from patients treated with cytostatic drugs; chemicals; and radioactive material.
- Genotoxic waste is highly hazardous and may have carcinogenic properties.
- It raises serious safety problems, both inside hospitals and after disposal, and should be given special attention.

Chemical Waste

- Chemical waste consists of discarded solid, liquid, and gaseous chemicals (e.g., from diagnostic and experimental work and from cleaning, housekeeping, and disinfecting procedures).
- Chemical waste from health care may be hazardous or non-hazardous.
- Within the context of protecting health, it is considered to be hazardous if it is toxic, corrosive, flammable, reactive, and/or genotoxic.
- Non-hazardous chemical waste consists of chemicals with none of the above properties. These are commonly used in the maintenance of health facilities (e.g., disinfectants, detergents, insecticides, and engine oils for machinery and equipment).

Waste with Heavy Metal Content

- This category includes waste containing mercury, cadmium, and lead, and drugs containing arsenic, among others.
- Drugs containing arsenic should be treated as pharmaceutical waste.
- Mercury waste is typically generated by spillage from broken clinical equipment (although equipment containing mercury is gradually being replaced with solid-state electronic sensing instruments, including thermometers, blood pressure gauges, etc.), residues from dentistry procedures, and fluorescent tubes.
- Whenever possible, spilled drops of mercury should be recovered.
- Cadmium waste comes mainly from discarded batteries.
- It should be noted that certain “reinforced wood panels” used in radiation-proofing of x-ray and diagnostic departments may contain lead.

Non-infectious Waste/General Waste

- This consists of waste generated from offices, kitchens, and packaging material, and from stores. It is similar to domestic waste.

Other wastes generated from health care settings, including:

- Electronic waste.
- Construction waste.
- Obsolete equipment/furniture.

Principles of HCWM

Duty of Care Principle

Stipulates that any person handling or managing hazardous substances or related equipment is ethically responsible for using the utmost care in that task.

Proximity Principle

Recommends that treatment and disposal of waste should take place at the closest possible location to its source in order to minimize risks linked to the transport of waste.

Precautionary Principle

Governs health and safety protection. When the magnitude of a particular risk is uncertain, it should be assumed that this risk is significant, and measures to protect health and safety should be designed accordingly.

Polluter Pays Principle

Implies that all producers of waste are responsible for the safe and environmentally sound disposal of the waste they produce.

Key Steps in HCWM

Minimization

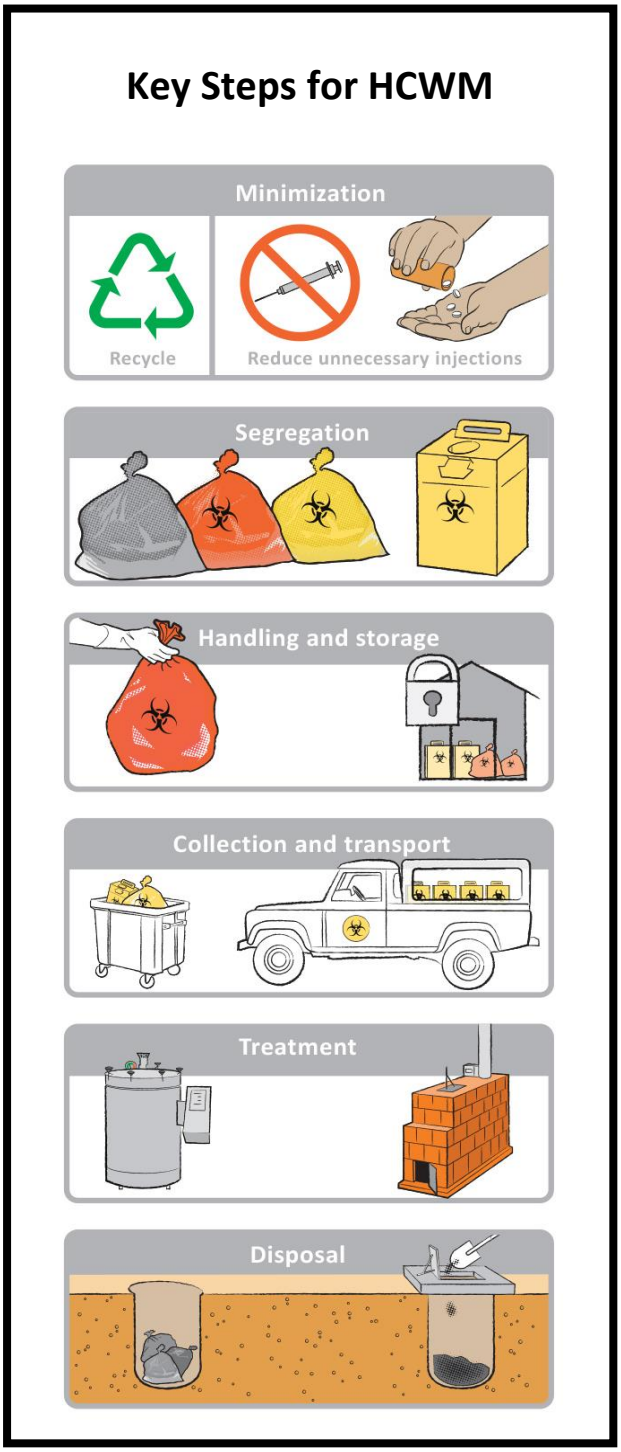
Approaches adopted by the health facility to reduce the amount of HCW generated during delivery of services. It includes strategies to reduce unnecessary injections, recycling, or reusing some of the materials.

Segregation

Sorting HCW into separate containers according to type of category: non-infectious or general waste, infectious, highly infectious, and sharps waste.

Handling and Storage

Taking steps to manage waste during containment and storage while waiting for collection, or during transportation to a treatment or disposal plant.



Collection and Transport

An organized system for removing waste from the point of generation or temporary storage to a treatment or disposal site. Waste may be transported within the health facility or to an offsite treatment and disposal plant.

Treatment

A means of rendering HCW safe for handling and final disposal. Some of the methods used include:

- **Incineration.** Burning at high temperatures 850°C to 1100°C (De Montfort-type 600°C to 700°C) in an incinerator.
- **Sterilization.** Using autoclave or microwave technology.
- **Chemical disinfection.** A treatment method using a chemical (such as chlorine bleach, JIK) to render the waste safe.
- **Shredding.** Using mechanical grinders to break down the waste into unrecognizable pieces. Macerators for anatomical waste fall into this category of treatment. This method does not treat infectious waste and should be used together with sterilization.

Disposal

Final disposal of waste and residues or byproducts from the treatment of waste. Some of the common methods of disposal are:

- **Municipal landfills.** This is a designated site for disposal of municipal waste in a controlled manner to minimize pollution to ground water, land, and the air.
- **Burial in pits.** Infectious waste pits, placenta pits, ash pits.

Please note that incineration is not a disposal method because the ash residue has to be disposed either in a protected ash pit or municipal landfill.

1.3 Waste Minimization

Introduction

This unit targets both health facility managers and health care workers. It covers in detail the approaches that can be employed to reduce the amount of HCW generated. Emphasis is given to the reduction of unnecessary injections as a key strategy to reducing the volume of sharps and other waste.

Duration

1 hour.

Competency

Appreciation of the importance of minimizing HCW and ways to minimize HCW.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Describe ways to minimize waste.
- Discuss reasons why to reduce injections.
- Identify the unnecessary injections practiced in their health facility.
- Identify ways to reduce unnecessary injections.

Materials

- Flash cards.
- Flip chart.
- Marker pens.
- PowerPoint slides on minimization of waste.

Activities

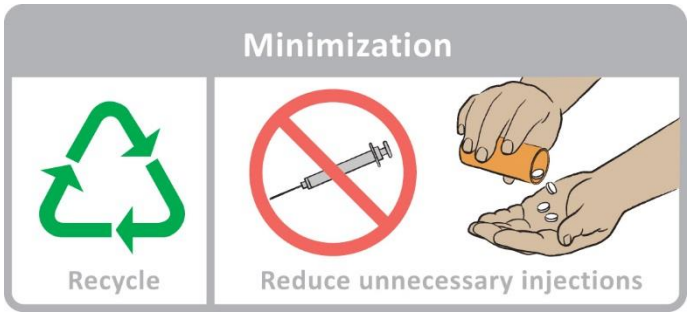
- Activity 1: Waste Minimization
- Activity 2: Benefits of Reducing Unnecessary Injections
- Activity 3: Injection Practices in Your Facility

Notes to the trainer

Review and adapt the content for your audience.

Waste Minimization

This refers to approaches adopted by the health facility to reduce the amount of HCW generated during delivery of services. It includes strategies to reduce unnecessary injections, recycling, or reusing some of the materials. Waste minimization is directly proportional to waste management costs and related risk.



How to Minimize Waste

Health facilities can adopt many policies, facility guidelines, and practices that might reduce their waste volume. Some policies include:

- **Source reduction.** Purchasing and supplying materials which are less wasteful and/or generate less medical waste.
- **Stock management.** Frequent auditing; use of the oldest stock first and checking the expiry date of products during receiving and issuing of commodities.
- **Encouraging the use of recyclable products.** Using materials that can be recycled both off- and onsite.
- **Centralized** purchasing, supply, and monitoring of medical goods.
- **Segregation of waste at the point of generation.** Sorting the waste into different categories helps to minimize the quantities of infectious waste generated.
- **Reduction** of unnecessary injections.

Activity 1: Waste Minimization

Preparation:

- Have ready three to five sets of flash cards showing pictures of different waste types.
- Divide the participants into three to five groups.
- Distribute one set/group.
- Ask them to brainstorm ways to reduce waste that they produce on a daily basis.
- Ask the co-facilitator to write the answers on a flip chart and present in plenary.
- Summarize by showing a slide on ways to minimize waste.

Unnecessary Injections

- Although some injections are necessary, many are unnecessary.
- An unnecessary injection is one that is given when there are alternative medications or treatments which would have been used and would have been just as effective or better.
- Other forms of medication which are just as effective as injections include oral medications, inhalers, lotions, pessaries, and suppositories.
- Compared to injections, the benefits of alternative forms of medication include reduced risk of infection, fewer expenses incurred, and reduced medical waste.

Risks from Unnecessary Injections

Many injections are not only unsafe but also unnecessary. Health care workers often administer injections when oral alternative medications are just as effective.

Health care workers prescribe injections for a variety of reasons, including the belief that injections satisfy the patients and oral alternatives are not available.

The risks associated with unsafe injection practices include:

- Transmission of infections.
- Paralysis.
- Drug reactions.
- Development of abscesses.
- Trauma.
- In some circumstances, death.

According to WHO, worldwide unsafe injections cause 8 to 16 million cases of hepatitis B, 2.3 to 4.7 million cases of hepatitis C, and 80,000 to 160,000 HIV infections each year.

Reducing Unnecessary Injections

- All providers and pharmacists should be trained to counsel patients about the use of other forms of medication.
- All facilities should document their plan to reduce the number of injections, for prescribers to follow. Medicines and therapeutics committees should spearhead these efforts.
- All community health workers attached to the facilities should be trained to facilitate discussions in the community about the effectiveness of other forms of medication.
- Facilities should use all accessible communication channels to disseminate messages to the community, including health talks within the health facility and health programs in the media.

Activity 2: Benefits of Reducing Unnecessary Injections

Ask participants to form three different groups. Ask each group to discuss the benefits of reducing unnecessary injections.

Group 1: Benefits to health workers.

Group 2: Benefits to patients.

Group 3: Benefits to the community.

Have each group present their findings in plenary.

Activity 3: Injection Practices in Your Facility

Identify the unnecessary injections practiced at your health facility and discuss ways of reducing them.

- What treatments with injections have you seen that could be treated in other ways?
- What are the challenges of reducing unnecessary injections at the facility level and at the community level?

What are the possible solutions?

1.4 Segregation of Waste

Introduction

This unit explains the process and importance of segregation. It also covers the assembling and use of safety boxes.

Duration

1 hour.

Competency

Ability to practice proper waste management at the point of service delivery and throughout the HCWM system.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Define segregation.
- Identify various categories of waste.
- Define steps for proper segregation.
- Handle waste safely.
- Assemble a safety box.

Materials

- Waste receptacles.
- Safety boxes.
- Segregation posters.
- Flash cards.
- **Handout:** Appendix 7. Segregation Guidelines
- **Handout:** Appendix 8. Using a Safety Box
- **PowerPoint:** Segregation

Activities

- Activity 1: Assemble a Safety Box
- Activity 2: Practice Waste Segregation

Notes to the trainer

- Review and adapt the content for your health system.
- ***Note the colour-coded system and ensure the colours reflect your system.***
- ***Stress the importance of segregating waste and health care providers' critical role in the process.***

Definition of Segregation

Segregation means the separation of waste according to type and defined waste categories at the point of generation.

Why Segregate?

Segregation of waste is the key to proper HCWM and has the following advantages:

- Facilitates safe handling of the waste.
- Separates recyclable waste from hazardous waste.
- Ensures that the waste will be treated according to its hazard.
- Reduces the overall costs of waste management, including transport, treatment, and disposal.

Colour-Coding and Marking Health Care Waste

The use of colour-coding and marking helps to easily segregate waste and identify the different categories of waste. It therefore contributes to safer handling of waste by clearly associating a specific colour with a specific category and its associated hazard. Table 1 illustrates the recommended colour codes for Kenya.

Table 1. Health care waste categories, colour-coding, and marking.

Category	Examples	Colour of Bin and Liner	Marking
General or non-infectious	Paper, packaging materials, plastic bottles, food, cartons	Black	No recommended marking
Infectious	Gloves, dressings, blood, body fluids, used specimen containers	Yellow	
Highly infectious or anatomical/ pathological	Laboratory specimens and containers with biological agents, anatomical waste, pathological waste	Red	
Chemical	Formaldehyde, batteries, photographic chemicals, solvents, organic chemicals, inorganic chemicals	Brown	Marking will vary with classification of the chemical
Radioactive	Any solid, liquid, or pathological waste contaminated with radioactive isotopes of any kind	Yellow	 Radioactive symbol

Segregation Categories

Health care workers should immediately segregate HCW according to the type of waste. The national HCW segregation chart below has the following categories:

- General or non-infectious waste.
- Infectious waste.
- Highly infectious or anatomical/pathological waste.
- Sharps waste.

Individual health facilities may include other categories in addition to the above, such as food remains, bottles, etc. This can promote recycling or reuse of materials that may potentially have value for resale.

Figure 1. HCWM segregation chart.

Safety Box for Sharps

- Sharps waste must be immediately contained after use to prevent injury.
- The primary way to contain sharps is by using a safety box.
- Infusion sets should be put in the clinical waste bin (yellow bin) and not in the safety box.
- If not properly disposed of, scavengers may collect and reuse sharps waste.
- Reusing syringes and needles results in high risk of infection or disease transmission.

- Sharps can cut or puncture the skin and, if they are contaminated, they can cause infections or diseases including hepatitis B, hepatitis C, and HIV.

Tips on How to Use a Safety Box

- Follow the assembling instructions printed on the box.
- Keep the safety box within arm's reach at each place where injections are given.
- Remove cannula/needle from IV set and place sharp in safety box.
- Dispose of used syringes into the small opening in the safety box immediately after use.
- Do not recap and do not collect syringes for later disposal.
- Fingers should never be placed inside the box.
- Close the flap on the small opening of the box when it is three-quarters full. Do not overfill.
- NOTE: Safety boxes in use should not remain in the clinical area for more than seven days, even if not three-quarters full.
- NOTE: Fill the safety box only once and then destroy.

What Should be Disposed of in a Safety Box?

- Syringes with needles.
- Suture needles.
- Infusion needles/cannulas.
- Scalpels.
- Blades.
- Broken ampoules.

Other categories of sharps and cannulas should be disposed of in specially designed sharps containers. These include:

- Chest tube introducers.
- Biopsy needle.
- Central line introducer.
- Cord clumps.
- Fistula needles

Activity 1: Assemble a Safety Box

Safety boxes are essential in protecting us from used sharps. It is important therefore that we know how to assemble, use, store, and dispose of them.

1. Break into groups and provide one unassembled safety box per group.
2. Ask each group to assemble the box.
3. Ask each group to give examples of waste items that would be disposed of in the safety box.
4. Ensure that each safety box is well-assembled.

Remember:

- Health care workers should segregate waste at the point of generation.
- Waste should NEVER be re-sorted.

- Seal all waste containers and label the bags using markers, stickers, tags, or pre-labeled bags to describe contents and area of origin.

Sharps which may not fit in a safety box. Some sharps, (e.g., large infusion sets), may not fit in a safety box. Managers and health workers should identify an alternate, safe way of collecting these sharps and storing them until treatment/disposal.

Activity 2: Practice Waste Segregation

Use appropriate colour-coded bins and liner bags. Alternatively, use paper cutouts labeled with different waste categories.

1. Discuss in plenary different categories of HCW. Ask participants to list reasons for waste segregation and write their responses on a flip chart.
2. In a mini-presentation and with the use of liners and bins, the facilitator should introduce the colour codes used in Kenya.
3. Using flash cards (one word per flash card on waste items or drill list), have participants suggest where to throw away the item written on their card and physically do it in the classroom.

Ask participants to fill in the following table. Discuss the results in plenary.

Waste	Immediate Disposal Facility Segregation	Final Disposal Facility
Wrappings of the needle and syringe		
Needle cut off the syringe		
Syringe and needle		
Used swabs and gloves		
Infectious plastics (e.g., intravenous sets)		
Pathological waste		

After participants have practiced in which container to throw their items, have each participant practice tying a knot in a bin liner.

Discuss what to do if the liner is too heavy to knot or if the bag is too full. Brainstorm solutions. These should include reporting problems to the manager.

During the discussion, ask the following questions:

- If a facility does not have the proper colour-coded bags, how else could waste be segregated? (Possible answers: label bins, tie bin liners with coloured yarn or fabric, label bags with stickers.)
- Are there other things that can safely be used to tie around a bag of waste which is too heavy to knot?
- What is the difference between waste that goes in a black bag and that which goes in a yellow (or red) bag?
- Why is it important to keep waste separated?
- What do you do if you find infectious or sharps waste improperly placed in a black bag?

1.5 Health Worker Safety

Introduction

This unit covers issues related to health worker safety, risks associated with HCWM, and interventions, including universal precautions that promote infection-prevention practices.

Duration

1 hour.

Competency

Ability to promote and observe safety at the health care delivery workplace.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Describe the risks and hazards associated with improper HCWM.
- Describe ways to reduce risk.
- Describe the practice of standards precautions.
- Demonstrate how to respond in case of an accident or incident.
- Appreciate the role of PPE in promoting safety.
- Appreciate the necessity for occupation-related vaccination.

Materials

- Soap, clean running water, sanitizer gel, and serviette (for hand-drying).
- PPE, gloves, apron, masks, caps gowns, goggles, closed boots or shoes, scrub suits.
- **Handout:** Appendix 9. Assessing Risk in our Health Facilities Using the Risk-Assessment Tool
- **Handout:** Appendix 10. WHO Guidelines on How to Handwash
- **Handout:** Appendix 10. General Procedure for Dealing with Spillages
- **Handout:** Appendix 11. Personal Protective Equipment for Waste Handlers
- **Handout:** Appendix 12. Accidents, Incidents, and Spills Report Form

PowerPoint: Health Worker Safety Activities

- Activity 1: Assessing risk in our health facilities using the risk-assessment tool.
- Activity 2: Handwashing.
- Activity 3: Spill Management.
- Activity 4: Role Play—Needlestick Injury!

Notes to the trainer

- Review and adapt the content for your health system.
- Note the guidelines for reporting needlestick injuries and protective clothing. It is important that these be adapted to reflect the systems currently in place in your facilities.

Risks and Hazards from Health Care Waste

Everyone working at a health care facility should be committed to infection prevention. Health care providers are not only at risk of infection themselves but are partly responsible for the spread of infection in the population if they do not maintain standard hygiene practices. Health care workers risk infection and spreading infection as they handle and come across different types of infectious medical waste. Examples of poor hygiene practices that can cause infection are inadequate handwashing, inappropriate use of gloves, recapping of needles, and lack of appropriate decontamination.

Disease Transmission

Diseases can be transmitted from:

- Health worker to patient, resulting from unwashed hands, contaminated sharps, or improperly cleaned reusable equipment.
- Patient to health worker, resulting from accidental prick by needles or sharps that have been used on patients or blood or body fluids accidentally splashing on to or coming in contact with broken skin.
- Health worker to family and community, resulting from health workers with unclean hands or contaminated clothing or shoes carrying infection home to family members.
- Health facility to community, resulting from improper disposal of medical waste and sharps. This can lead to transmission of disease to community members due to needlestick injury or needle reuse.

Incorrect management of infectious waste may lead to hospital-associated nosocomial infections. Hospital-associated infections are defined as infections that are not present in a human at the time of entry into the hospital but develop during work or stay in the hospital or can be later linked with work or stay in the hospital.

Hazards from Sharp Items

- The main source of illness from infectious waste is most likely injuries from used sharps. Sharps cause cuts and punctures and infect the wounds with agents that previously contaminated the sharps.
- According to WHO, the risk of infection following a needlestick injury with a needle from an infected source patient is 0.3 percent for HIV, 3 percent for hepatitis C, and 6 percent to 30 percent for hepatitis B.
- Recapping of sharps continues to be a challenge. Recapping means to put the protection cap back on the needle after usage and is considered one of the main reasons for needlestick accidents.

Hazards from Infectious Waste

Infectious waste may contain a great variety of pathogenic micro-organisms, which may infect the human body through one of the following pathways:

- Crack or cut in the skin (injection) through absorption.
- Mucous membranes through absorption.

- Inhalation and ingestion.

Hazards from Chemical and Pharmaceutical Waste

Some examples of hazardous substances and their effects in health care facilities are:

Mercury
Mercury is prevalent in hundreds of different devices but is most concentrated in diagnostic devices such as thermometers, blood pressure meters, oesophageal dilators, and Miller-Abbott and Cantor tubes. It is also found in additional mercury sources such as fluorescent light tubes and batteries.

Disinfectants
Disinfectants constitute a particularly important group, as they are used in large quantities and are often corrosive. It should also be noted that reactive chemicals may form secondary compounds of high toxicity.

Chemical residues
Chemical residues discharged into the sewage system may have toxic effects on the operation of biological sewage treatment plants or on the natural water ecosystem.

Pharmaceutical residues
Pharmaceutical residues may have the same effects, as they may include antibiotics and other drugs, heavy metals such as mercury, phenols and derivatives, and other disinfectants and antiseptics.

Reducing Risk

- Wash your hands after handling waste or infectious material.
- Handle all sharps with care to minimize needlestick injury.
- When handling waste, wear appropriate protective clothing, including a water-resistant apron, heavy-duty gloves, boots or closed-toe shoes, and eye protection.
- Do not open waste containers to sort waste.
- Be aware of procedures for treatment of injuries, cleaning of contaminated areas, and reporting of sharps injuries or accidents.
- Report sharps injuries to the appropriate personnel.
- Injuries should be followed up by post-exposure prophylaxis (PEP) treatment.
- Managers should maintain a log of all accidents.
- A full course of hepatitis B and tetanus vaccination will protect you from the hepatitis B virus and tetanus—anyone handling sharps should be vaccinated.

Standard Precautions

Standard precautions are taken to reduce the risk of transmitting bloodborne micro-organisms and other pathogens from both recognized and unrecognized sources. These precautions should be followed, as a minimum in the care of all patients in health care facilities and settings, regardless of their diagnoses or presumed infection status.

Standard precautions include:

- Hand hygiene.
- Good housekeeping.
- Appropriate use of PPE.
- PEP.

Appropriate hand hygiene must be carried out in the following circumstances:

- Upon arriving at and before leaving the health care facility.
- Before putting on gloves.
- After removing gloves.
- Before and after every patient contact.
- After any situation in which hands might become contaminated, such as:
  - Handling contaminated objects, including used instruments.
  - Using the toilet, wiping or blowing one's nose, or performing other personal functions.
  - Touching waste that may have mucous membranes, blood, body fluids, secretions, or excretions or other sources of micro-organisms.
  - Before preparing, handling, serving, or eating food.

Handwashing

- The purpose of handwashing is to remove soil, blood, and other organic material and transient micro-organisms from the skin.
- The three elements that are essential for effective handwashing are (1) soap, (2) clean running water, and (3) friction.
- Hand hygiene is the single most important way to prevent transmission of pathogens associated with health care services.

<u>Steps in Handwashing</u>

Handwashing takes about 40 to 60 seconds.

1. Remove all jewelry.
2. Thoroughly wet your hands with running water. Do not dip hands into a basin that contains standing water, even with the addition of an antiseptic agent, because micro-organisms can survive and multiply in these solutions. Use a comfortable water temperature. Washing your hands in hot water increases the risk of skin irritation and does not remove more micro-organisms.
3. Apply a handwashing agent (soap or detergent). Washing your hands with plain water without soap is not effective.
4. Rub all areas of hands and fingers vigorously for 10 to 15 seconds, paying close attention to fingernails and areas between the fingers. Do not forget the wrists. Repeat each action five times.
5. Remove debris from under the fingernails.
6. Rinse hands thoroughly with clean running water from a tap for 10 to 15 seconds.
7. Use a paper towel when turning off the water if the tap is hand-operated.
8. Dry hands with paper towels or air-dry them. Avoid using common or shared towels, which might harbor micro-organisms and contaminate hands even after proper handwashing. To avoid sharing

towels, use alcohol-based handrub, disposable paper towels, or single-use hand towels. Do not dry your hands on personal clothes or on wet and soiled towels. Blow dryers are not recommended. See appendix 9 for WHO guidelines on how to handwash.

Activity 1: Handwashing

Preparation:

- Distribute handout on proper handwashing.
- Have participants practice proper procedure.

Good Housekeeping

Good housekeeping refers to the general cleaning of your work area, including the floors, walls, certain types of equipment, furniture, and other surfaces. Cleaning entails removing dust, soil, and contaminants on environmental surfaces.

Housekeeping helps eliminate micro-organisms that could come in contact with patients, visitors, staff, and the community. It ensures a clean and healthy hospital environment for patients and staff.

Personal Protective Equipment

- Health workers protect themselves by establishing a barrier between themselves and the infective agent. The type of protection needed depends on the workers' activities.
- Protective clothing must be worn at all times when handling HCW.
- PPE must be properly maintained and kept clean.
- The clothing should not be taken home; it must remain at the health facility to avoid possible contamination of the community.

Principles for Using PPE

- Assess the risk of exposure to blood, body fluids, excretions, or secretions and choose items for PPE accordingly.
- Use the right PPE for the right purpose.

- Avoid any contact between contaminated (used) PPE and surfaces, clothing, or people outside the patient care area.
- Do not share PPE.
- Change PPE completely and thoroughly wash your hands each time you leave a patient to attend to another patient or another duty.
- Disinfect reusable PPE appropriately.
- Discard used PPE appropriately in designated disposable bags.

The following individuals should use PPE:

- Health care workers who provide direct care to patients and who work in situations in which they might have contact with blood, body fluids, excretions, or secretions.
- Support staff, including waste handlers, cleaners, and laundry staff, in situations in which they may have contact with blood, body fluids, excretions, or secretions.
- Laboratory staff who handle patient specimens.
- Family members who provide care to patients and could come in contact with blood, body fluids, excretions, or secretions.

Table 2. Types of PPE and their recommended uses.

Type of PPE	Recommended Use	Person Protected
Gloves	When there is a reasonable chance of hands coming in contact with blood or other body fluids, mucous membranes, or skin that is not intact. Before performing invasive medical procedures (e.g., when inserting vascular devices such as peripheral venous lines). Before handling contaminated waste items or touching contaminated surfaces.	Service providers
Caps, gowns, scrub suits, or aprons	When performing invasive procedures during which tissue beneath the skin is exposed. When handling immunocompromised patients or clients. When handling patients with infectious disease. When handling contaminated waste.	Service providers and patients
Masks	When performing invasive procedures. When handling patients with airborne or droplet infections. When handling medical waste.	Service providers, patients, incinerator operators, and visitors
Goggles or glasses	Situations in which splashing of blood, body fluids, secretions, or excretions is likely.	Service providers
Mackintoshes, plastic or rubber aprons	Situations in which splashing or spillage of blood, body fluids, secretions, or excretions is likely. When handling infectious waste.	Service providers
Closed boots or shoes	Situations in which sharp instruments or in which spillage of infectious agents is likely. When handling immunocompromised patients.	Service providers and patients
Sterile drapes	When performing major or minor surgical procedures.	Patients

Adapted from the *National Infection Prevention and Control Guidelines for Health Care Services in Kenya.*

Maintaining PPE

Supervisors must see to it that PPE is properly cleaned, laundered, repaired, replaced, or disposed of as needed, at no cost to health workers.

The following precautions for handling and using PPE should be observed:

- Remove garments penetrated by blood and other infectious material as soon as possible.
- Place contaminated protective equipment in designated areas or containers for storage, washing, decontaminating, or discarding each day or shift.
- Replace gloves if torn, punctured, or contaminated, or if their ability to function as a barrier is compromised.
- Utility gloves may be decontaminated for re-use if the integrity of the gloves is not compromised. However, they must be discarded if they are cracked, peeling, torn, etc.

Post-Exposure Prophylaxis Procedures

Health workers are at risk of accidental needlestick or other injuries from sharps. WHO recommends following the ten steps below after a needlestick injury:

1. Allow the wound to bleed freely and wash the area with soap under clean running water.
2. If blood or body fluids get in your eyes, splash eyes with clean water.
3. Immediately report the incident to a designated person.
4. Retain, if possible, the item involved in the incident; get details of its source for identification of possible infection.
5. Seek additional medical attention in an emergency health department as soon as possible, including evaluating the exposure for its potential to transmit HIV infection (based on body substance and severity of exposure).
6. Get counseling and testing.
7. Initiate PEP, if available and appropriate.
8. Record the incident in the PEP register.
9. Investigate the incident and identify and implement remedial action to prevent similar incidents in the future.
10. Follow up according to guidelines.

Managing Injuries

If you sustain an injury:

- Let the wound bleed freely.
- Wash with soap and running water.
- Alert your supervisor.
- Identify source patient.
- Immediately report to designated person/facility.
- Document the incident.
- Get pre- and post-test counseling.
- Initiate PEP within 72 hours.
- Evaluate injuries:
  - Immediately.
  - After six weeks.
  - In three months.
  - In six months.
- Conduct follow-up on a six-monthly basis.

General Spill Management

The general process in the case of spillage is as follows:

- Evacuate the area of the accident and proceed to a safe location.
- Determine whether staff have experience in handling potentially hazardous waste spills and if all necessary PPE is available for clean-up.

    - If able to clean up the spill, follow proper clean-up procedures and use the appropriate PPE.
    - Manage the generated waste as appropriate.
    - If unable to clean up the spillage, isolate the spill area to keep people away, and post signs as necessary.
- Inform the supervisor or other responsible person.

Incident and Accident Response

Immediate human injuries occur from pricks, tissue scratches, inhalation, etc. The following is the process for incidents involving human injuries (accident):

- Report any human injury immediately to the supervisor.
- Apply first aid if a superficial (minor) injury occurs.
- Consult a doctor for significant (major) injuries.
- Bring the injured person to the causality department for treatment in severe cases.
- Create a report. Needlestick or sharps injuries must be handled in accordance with the specific policy and a special report has to be filed.

Spill Kits

Laboratories must develop procedures for dealing with spills and should have appropriate equipment and materials available. A basic spill kit should include a concentrated disinfectant (chlorine bleach or iodophor), a package of paper towels, sponges, heavy-duty utility gloves, forceps for picking up broken glass, and a container that can be autoclaved. Spillage of blood and sputum should be treated with either sodium hypochlorite or sodium dichloroisocyanurate (NaDCC).

- For small spills, wipe with a paper towel soaked in 1 percent hypochlorite.
- For large spills, first cover with NaDCC granules for at least two minutes before cleaning with paper towels. Alternatively, cover the spill with paper towels then gently pour 1 percent hypochlorite and leave for at least two minutes before cleaning.

When spills occur on the body:

- Remove contaminated clothing.
- Wash the exposed area vigorously with soap and running water for one minute.
- Obtain medical attention if the spill is on mucous membrane or on skin that is not intact.
- Report the incident to the laboratory supervisor.

Complete the Accidents, Incidents, and Spills Form (see **Appendix 12**), which is an important procedure in management of spills. The form captures information related to the spill such as the date of the spill or accident, type of injury, and the treatment received by the health worker, among other details. As with all medical information, the report must be kept confidential. Information is disclosed only with the health care worker's signed consent.

Spill in a Biological Safety (Biosafety) Cabinet

Leave the cabinet turned on and follow these procedures:

- While wearing gloves and a laboratory coat, spray or wipe the cabinet walls, work surfaces, and equipment with the selected disinfectant.
- If necessary, flood the work surface, drain pans, and catch basins below the work surface with disinfectant. Allow at least 20 minutes of contact time.
- Soak up the disinfectant and drain the catch basin below the work surface with disinfectant. Allow at least 20 minutes of contact time.
- Autoclave all clean-up materials and protective clothing. Wash hands and exposed skin areas with disinfectant.
- If the spill overflows into the interior of the cabinet, more extensive decontamination of the cabinet might be necessary.

Spill in the Open Laboratory Level 1 (Biosafety Level 1)

When spills occur in the open laboratory, follow these procedures:

- Notify other health care workers in the area.
- Remove any contaminated clothing and wash exposed skin with soap and water.
- Wear gloves, a laboratory coat, and safety glasses.
- Pour an appropriate disinfectant, such as chlorine, on the surface of the spill and allow at least ten minutes of contact time.
- Cover the spill with paper towels, absorb it, and discard the paper towels.
- If the spill contains broken glass, use mechanical tools or rigid sheets of cardboard to remove the glass and place it in a sharps container.
- Spills of concentrated micro-organisms should be disinfected first and then absorbed on to disposable materials such as paper towels.

Each facility should have a facility safety program for HCWM. All personnel who handle HCW should be trained to deal with injuries and exposures.

The ten general response actions should be:

1. Implement immediate first-aid measures, such as cleansing of wounds and skin, and irrigation (splashing) of eyes with clean water.
2. Immediately provide a report of the incident to a designated responsible person.
3. Retain, if possible, the item involved in the incident.
4. Collect details of its source for identification of possible infection.
5. Get additional medical attention in an accident and emergency.
6. Alert the occupational health committee as soon as possible.
7. Provide medical surveillance.
8. Conduct blood or other tests if indicated.
9. Record the incident.
10. Investigate the incident; identify and implement remedial action.

Activity 2: Spill Management

Divide participants into small groups and let them discuss the following scenario:

A health worker accidentally drops a bottle with a blood specimen in a ward after collection from a patient. How would the health worker go about managing the spill? (Prepare on a flip chart the key answers to the question.)

Allow each group to present in plenary.

Activity 3: Role Play—Needlestick Injury!

Break into pairs and have one person play the role of supervisor and one person play the role of a provider, waste handler, or incinerator operator who suffered a needlestick injury. Describe the injury, the steps you took afterward, and let the manager/supervisor recommend the next steps.

Vaccination

- Viral hepatitis B and tetanus immunizations should be provided for health care personnel and waste handlers.
- Each health care facility is encouraged to conduct a pre-employment hepatitis B screening program and also put in place employee vaccination arrangements.
- The health care facility should also maintain and keep long-term records of vaccinations to ensure that booster doses are given as required.

1.6 Overview of Health Care Waste Treatment and Disposal

Introduction

This unit covers issues related to waste treatment and disposal options for HCW.

Duration

30 minutes.

Competency

An understanding of the range of options for safe treatment and disposal of HCW.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Understand the importance of safe treatment and disposal of HCW.
- Describe the various methods of treatment and disposal of HCW used in the health facility.

Materials

- Handouts.
- PPE.
- Equipment manuals.
- Equipment operation and maintenance logs.

Notes to the trainer

- Review and adapt the content for your audience.
- More detailed content is included in Module 2.

Treatment and Disposal

Waste Treatment

- HCW should be treated prior to disposal to ensure protection from potential hazards posed by the waste.
- To be effective, treatment must reduce or eliminate the risk present in the waste so that it no longer poses a hazard to persons who may be exposed to it.
- The common methods of waste treatment are:
    1. Incineration.
    2. Steam sterilization/Autoclaving
    3. Chemical disinfection.
    4. Microwave irradiation.
    5. Maceration.
    6. Other Methods – Encapsulation, inertization, shredding, and grinding.
- Treatment methods should be chosen according to the national and local situation.

Incineration

Incineration is defined as high-temperature dry oxidation at > 850^{o}C in the primary chamber and 1,100^{o}C in the secondary chamber with a retention time of two seconds to avoid formation of dioxins and furans. Incineration applies the three principles (3 Ts), which are:

- Temperature.
- Time.
- Turbulence.

This process is usually selected to treat waste that cannot be recycled, reused, or disposed of in a sanitary landfill.

There are two main types of incinerators in Kenya. These are diesel-fired incinerators and De Montfort (brick-type) incinerators.

Medium-Temperature Incineration

- All types of incinerators, if operated properly, eliminate pathogens from the waste and reduce waste to ashes.
- However, certain types of HCW (e.g., pharmaceutical or chemical waste) require higher temperatures for complete destruction. Higher operating temperatures and cleaning of exhaust gases limit the atmospheric pollution and odours produced by the incineration process.

Steam Sterilization/Autoclaving

This is the use of steam under pressure to decontaminate waste or sterilize waste between 121–134°C, typically for 15 to 20 minutes, depending on the size of the load and the contents at 15 psi/2 bar.

Sterilization occurs by three mechanisms:

- Temperature.
- Pressure.
- Thermal oxidation.

Note: Waste from the laboratory must be autoclaved before releasing to the main waste treatment in the hospital. Waste should also not be re-sorted.

Chemical Disinfection

These are treatment methods using chemicals such as hypochlorite solution (JIK) to render the waste safe.

Microwave Irradiation

The waste is automatically fed into a waste-grinding device where it is shredded and sprayed with steam to increase the moisture content of the waste to approximately 10 percent. The moist ground waste is then heated by exposure to six microwave irradiation units over a two-hour period. The process heats the waste to over 90°C.

Maceration

This is the mechanical shredding of waste (placenta) to small sizes before disposal to the sewer

Waste Disposal

- HCW should be treated prior to disposal to ensure protection from potential hazards posed by the waste.
- The common methods of waste disposal:
    1. Municipal disposal sites.
    2. Sanitary landfills.
    3. Protected ash pits.
    4. Placenta pits.
    5. Anatomical pits.
    6. Recycling.
    7. Return to supplier/manufacturer.
    8. Approved sewer/drainage systems.
- Untreated waste discharged into an uncontrolled, non-engineered, open dump does not protect the local environment and should not be used. Discharging waste in open dumps either within the health care institution or in the municipal facility is an insufficient solution and leads to environmental pollution.

Sanitary Landfill

- Properly constructed and operated landfill sites offer a relatively safe disposal route for municipal solid waste, including HCW.

- The priority is protection of the aquifer system and that each day's waste is compacted and covered with soil to maintain sanitary conditions.
- Treated HCW can be safely disposed of in a sanitary landfill site without any problems.

Management and Disposal of Pharmaceutical Waste

Sound management of pharmaceutical products facilitates waste minimization and is of prime importance to better waste management in general. Disposal of small amounts of chemical or pharmaceutical waste is easy and relatively cheap; large amounts require the use of special treatment facilities.

The disposal options for small quantities of pharmaceutical waste include those outlined below.

Landfill Disposal

Small quantities of pharmaceutical waste produced on a daily basis may be landfilled, provided that it is dispersed in large quantities of general waste. Cytotoxic and narcotic drugs, however, should never be landfilled, even in small quantities.

Encapsulation

Small quantities of pharmaceutical waste may be encapsulated, together with sharps if appropriate.

Safe Burial on Hospital Premises

Safe burial of small quantities of pharmaceutical waste prevents scavenging and may be an appropriate disposal method for some establishments. Particular attention should be paid to prevention of ground water pollution.

Discharge to a Sewer

Moderate quantities of relatively mild liquid or semi-liquid pharmaceuticals, such as solutions containing vitamins, cough syrups, intravenous solutions, eye drops, etc. (but not antibiotics or cytotoxic drugs) may be diluted in a large flow of water and discharged into municipal sewers. It is not acceptable, however, to discharge even small quantities of antibiotics or cytotoxic drugs.

Incineration

Small quantities of pharmaceutical waste may be incinerated together with infectious or general waste, provided that they do not form more than 1 percent of the total waste (in order to limit potentially toxic emissions to the air).

Caution

Always refer to Material Safety Data Sheet (MSDS) of the pharmaceutical waste before incineration

Flammable pharmaceutical waste should NOT be incinerated.

1.7 Roles and Responsibilities in Health Care Waste Management

Introduction

This unit discusses the roles and responsibilities of various players in the health facility in the management of HCW.

Duration

30 minutes.

Competency

An understanding of roles and responsibilities with regard to HCWM.

Specific Learning Objectives

At the end of this unit, participants will be able to define the HCWM roles and responsibilities of health facility staff.

Materials

- Flip chart.
- Marker pens.
- Activity 1: Describe the HCWM Roles and Responsibilities of Facility Staff
- Activity 2: What's My Role in the Health Facility?
- **PowerPoint:** Roles and Responsibilities

Notes to the trainer

- Review the roles and responsibilities and adapt them based on your health system.
- This session may be conducted as an activity in which the participants describe the roles and responsibilities of facility staff in HCWM. The facilitator builds on the group reports.

Roles and Responsibilities in HCWM

At the health facility, roles and responsibility given to different personnel vary according to their titles and their functions. Overall, managers are responsible for overseeing the safe disposal of HCW generated in their establishments and for fostering an environment that can provide necessary and high-quality health care at maximum efficiency. The composition of managers depends on the services that are offered in the institution. It should at least comprise the hospital medical superintendent, heads of hospital departments, infection control officer, head of pharmacy, radiation officer, nursing officers in charge, waste management focal persons, senior nursing officers, food service manager, and housekeeping supervisors. Specific roles include:

Managers

- Obtain and be familiar with national waste management policies.
- Form a national waste management team.
- Initiate the establishment of IPC committee.
- Develop a facility HCWM plan (goal, budget, personnel, roles, supervision, training, reporting).
- Coordinate the adequacy of supplies of HCWM commodities (safety boxes, bins, bin liners, and PPE) at each management level.
- Identify and budget for HCWM activities, including final disposal.
- Develop protocol for management of needlestick injury.
- Ensure seamless flow of services.
- Safeguard medical data from unauthorized access.
- Administer payroll.
- Advocate for health worker safety.
- Provide supportive supervision and capacity-building of staff on HCWM.
- Detail spill management strategies and designate trained personnel for spillage management on-site.
- Identify training needs for staff in HCWM.
- Plan for environmentally friendly products.
- Designate responsible person for HCWM to oversee HCWM equipment.
- Ensure payments are made for waste treatment from other facilities.
- Ensure all health workers are vaccinated against hepatitis B and other immunizable diseases.
- Ensure in-house HCWM monitoring tools are correctly completed and dispatched to the right office.
- Ensure that ambulances are equipped with puncture-proof containers of appropriate size, mainly for infectious waste and sharps.
- Ensure that drivers transporting waste are aware of the procedures governing transportation of hazardous goods. If possible, obtain proof (authorization letter or certificate indicating form of training in transportation).
- Ensure staff are appropriately segregating waste.

Health Care Providers

- Adhere to the current waste-management policies with special emphasis on special waste (e.g., genotoxic/cytotoxic waste).
- Adhere to the colour-coded waste-segregation system.
- Properly dispose of sharps in a safety box.
- Do not overfill safety boxes.
- Ensure staff have received hepatitis B and other required vaccinations.
- Liaise with waste management focal person to monitor working practices for failures or mistakes.
- Provide on-the-job training (OJT) and refreshers for new staff.
- Train health workers on correct procedures for IPC and HCWM.
- Provide advice concerning the control of infections and the standards of waste-disposal system.
- Identify training requirements according to staff grades and duties.
- Practice "Duty of Care" principle.

Waste Handlers

- Be familiar with the colour-coding system.
- Adhere to the colour-coding system.
- Collect filled safety boxes and used bin liners on hospital-stipulated frequency for disposal.
- Adhere to segregation practices.
- Securely store waste in a covered area until disposal.
- Always use appropriate PPEs at all times and report to supervisor in case of shortages.
- Ensure you have appropriate equipment for safe transportation of waste to the final disposal site.
- Ensure you have received hepatitis B and any other required vaccinations.
- Ensure your own safety when operating the equipment and report any incidents or accidents to the supervisor.
- Ensure a clean environment at the facility.

Treatment Equipment Operators

- Adhere to the equipment autoclave/incinerator procedure.
- Always use appropriate PPEs and report to supervisor in case of shortages.
- Ensure availability of appropriate suppliers' records on treated waste.
- Ensure that records on treated waste are properly filled.
- Ensure treated waste is safely transported to collection point for final disposal.
- Ensure you have received hepatitis B and any other required vaccinations.
- Monitor and promptly report any shortages (of fuel/electricity).
- Record the weight and type of waste received.
- Follow a regular maintenance schedule and quality-assurance testing procedures.
- Ensure your own safety when operating the equipment and report any incidents or accidents to the supervisor.
- Verify proof of payment for waste received outside facility for incineration.

Activity 1: Describe the HCWM Roles and Responsibilities of Facility Staff

Nursing officer

Hospital manager

Departmental heads

Pharmacist in charge

Supply officer

IPC coordinator

Activity 2: What's My Role in the Health Facility?

Objectives

(a) Participants will be able to clearly define HCWM roles and responsibilities (Rs/Rs) for the hospital medical superintendent, department heads, infection control officer, pharmacy head, radiation officer, nursing officer in charge, and waste management focal person.

(b) Participants will gain a better understanding of how they fit into the HCWM system and the responsibilities of others.

Description

In this activity, participants will be asked to properly categorize the different Rs/Rs in an HCWM system. A flip chart will be posted at the front of the room for each type of facility worker (manager, injection provider, waste handler, waste carrier, incinerator operator). The trainer will distribute a card to each participant with a different R/R on each card. Each participant will be asked to come to the front of the room, read or describe the R/R on their card, and then categorize the card appropriately. The trainer should ask the group if they are in agreement with the placement of the card and discuss if there are any questions. At the end of the exercise, the trainer should ask the participants if there are any Rs/Rs that should be added. Using a pen, the trainer can add the Rs/Rs as suggested to each category of health worker. At the end of the activity, the trainer should ensure that all of the Rs/Rs are included on the flip charts.

Training for health care workers ends here!

The next units in this module should be used to train management-level health facility staff.

1.8 Overview of the Legal and Policy Framework

Introduction

Each country has its own laws and policies in terms of waste management. Kenyan laws require that all HCW be segregated using a colour-coding system, an environmental impact assessment be done at facilities with HCW treatment equipment, and waste treatment be licensed annually.

The laws and regulations related to HCW are provided for by the Public Health Act, 1999 Environmental Management and Coordination Act (EMCA), 2007 Occupational Safety and Health Act of the Laws of Kenya, and the Food, Drugs and Chemical Substances Act. This unit briefly outlines the HCW regulations and policies available in Kenya.

Duration

30 minutes.

Competency

Appreciation of legal structures and provisions.

Specific Learning Objective

At the end of this unit, participants will be able to understand the legal requirements related to HCWM.

Materials

- National policies on HCWM and safe injection.

Notes to the trainer

Ask participants the following questions:

- Which laws govern HCWM in the country?
- What does the EMCA talk about in relation to waste management?

Participants then brainstorm the answers. The facilitator can build on the answers given and then perhaps give a lecture.

Constitution of Kenya 2010

Bill of Rights

Article 42. Every person has the right to a clean and healthy environment. Article 43. (1b). Every person has a right to accessible adequate housing and to reasonable standards of sanitation.

Article 70(1). If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being, or is likely to be denied, violated, infringed, or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.

National Laws

1999 Environmental Management and Coordination Act (EMCA)

This act is aimed at improving the legal and administrative coordination of the various sectorial initiatives in the field of environment. It provides a framework for ensuring that environmental considerations are successfully integrated into the country's overall economic and social development. Regulations made under the act stipulate specific requirements regarding the issues addressed in the parts, some of which are summarized as follows:

Article 3(1). Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment.

Article 9(1). The object and purpose for which the Authority is established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

Regulations under EMCA

Waste Management Regulations, 2006
Segregation of waste by generator: A waste generator shall segregate waste by separating hazardous waste from non-hazardous waste and shall dispose of such wastes in such facility as shall be provided by the relevant local authority.

- Part VI 38: Any person who generates biomedical waste shall at the point of generation and at all stages thereafter segregate the waste in accordance with the categories provided under the Seventh Schedule to these Regulations.
- Waste transportation license: (1) No person shall be granted a license under the Act to transport waste unless such person operates a transportation vehicle approved by the Authority upon the recommendation of the relevant lead agency.
- Treatment—Part VI 40: Any person who generates waste shall treat, or cause to be treated all biomedical waste in the manner set out in the Ninth Schedule to these Regulations, before such biomedical waste is stored or disposed of.

- Legal Notice No. 121, Waste Management Regulations, 2006: These regulations focus on the management of solid waste, industrial waste, hazardous waste, pesticides and toxic substances, biomedical waste, and radioactive substances. They provide details on the responsibility of the waste generator, adoption of cleaner production principles, waste handling and transportation, waste treatment, and disposal.
- Legal Notice No. 101, Environmental (Impact Assessment and Audit) Regulations, 2003: These regulations provide for identification and management of waste likely to be produced from proposed projects, including health care facilities. They also provide for M&E of waste management through environmental audits.
- Legal Notice No. 120, Water Quality Regulations, 2006: These regulations address pollution of water resources as well as water conservation. Any development likely to affect water resources (both surface and ground water) through pollution or use is required by law to comply with these regulations. They provide effluent discharge control standards for both surface and underground water.

Public Health Act—Cap 242

This act provides for securing and maintaining health in Kenya by making it an offence for any land owner or occupier to engage in or allow engagement in activities that are likely to cause nuisance or are injurious or dangerous to health to be undertaken on his/her land.

Occupational Safety and Health Act, 2007

This act applies to all workplaces in which any person is either temporarily or permanently and lawfully at work. It stipulates the provisions for securing the health, safety, and welfare of persons at work.

Work Injury Benefits Act, 2007

Provides for compensation to employees for work-related injuries and occupational diseases.

The County Government Act, 7, 2012

Part II article 5, sections 1 and 2 give the county government mandate on legislations (including those related to waste management) in accordance with article 185 of the constitution and executive functions as assigned in 4th schedule of the constitution.

International Conventions

International conventions are agreements made between or amongst countries on how to manage common challenges threatening human health or environment. It is a requirement by Kenyan constitution that any international law, treaty, or convention signed and ratified by the state shall form part of the Kenyan law.

Basel Convention

Under the United Nations, signed by 100 nations. Controls trans-boundary movement of hazardous waste.

Stockholm Convention
Global treaty to protect human health and environment from persistent organic pollutants, specifically dioxins and furans. Commits all parties to reducing the release of dioxins with the goal of continued minimization and, where feasible, ultimate elimination.

MINAMATA Convention
This provides for management of mercury-related waste products.

UN Packaging Requirements
Guidelines for proper packaging and international transport of infectious substances. Defines both inner and outer packaging-composition requirements.

Policy, Regulations, and Guidelines for Managing Health Care Waste

Policies are guiding principles that direct organizational goals and objectives on various issues:

- National Policy on Injection Safety and Health Care Waste Management 2007

Related guideline: National Guidelines for Safe Management of Health Care Waste

- National Infection Prevention and Control Policy for Health Care Services in Kenya

1.9 Developing and Implementing a Facility Health Care Waste Management Plan

Introduction

This unit discusses the development and implementation of a facility HCWM plan.

Duration

45 minutes.

Competency

An ability to design, develop, and implement a facility HCWM plan.

Specific Learning Objective

At the end of this unit, participants will be able to develop a facility HCWM plan.

Materials

- **Handout:** Appendix 20. Health Care Waste Management Facility Planning Tool
- **Handout:** Appendix 21. Health Care Waste Management Facility Plan: Waste Quantification Tool
- **Handout:** Appendix 22. Status of Health Care Waste Management: A Facility Self-Assessment Tool
- **PowerPoint:** HCWM Facility Planning

Activity

- Activity 1: Health Care Waste Planning

Notes to the trainer

Review and adapt the content for your audience.

Steps for Developing a Facility HCWM Plan

Step 1. Form a team to develop the facility HCWM plan.

Step 2. The team should designate a responsible person who should guide in conducting an HCWM survey and invite suggestions.

Step 3. The team should come up with recommendations and an implementation plan.

Step 4. The team should draft the HCWM plan.

Step 5. The plan should be submitted for approval by the facility management.

Step 6. The plan should be implemented.

Step 7. Review the HCWM plan periodically to ensure that set objectives are achieved, and it is in line with new developments.

The facility planning tool is included as Appendix 18.

Quantification of HCWM Commodities

In order to ensure your facility has adequate supplies of HCWM commodities, a quantification exercise must be undertaken. This includes recording the amount and types of waste your facility is generating and forecasting your supply needs based on this quantification exercise. This should be done quarterly to ensure your data are up to date. A tool is included in Appendix 19.

Specifications and Selection of Health Care Waste Commodities

Different facilities have different commodity needs. Work with your management team to ensure you have forecasted correctly to ensure you have the right supplies and equipment.

This includes designating which wards need which types of bins and how many sets of PPE your staff needs.

Maintaining Equipment

HCWM equipment requires proper maintenance. Ensure your facility's equipment is operated properly and regular maintenance is conducted. Appendix 15 includes a maintenance checklist for incinerators.

Activity 1: Health Care Waste Planning

Divide participants into groups and distribute the HCW planning template. Ask each group to attempt to fill in the different sections using information from one of the health facilities represented. In plenary, let each group present the information they have included.

Introduction

This unit covers issues related to support supervision in a health facility to ensure standardization and quality HCWM is adhered to.

Duration

30 minutes.

Competency

Ability to correctly conduct supervision to ensure set standards are met.
An all-around knowledge of HCWM policies and guidelines.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Properly use supervision tools to conduct supervision.
- Identify problems and provide improvement solutions.

Materials

Flip charts.
Supervision checklist.
PowerPoint: Supervision structure in HCWM.

Activity

Activity 1: Department supervision

Notes to the trainer

Review and adapt content for your health facility.
Emphasize the importance of correct and consistent use of supervision tools.
Emphasize the need to maintain quality, conduct follow-up visits, and provide feedback.

References:

Guidelines for implementing supporting supervision-A step-by-step guide with tools to support immunization. (2003) Retrieved from http://www.path.org/vaccinereources/files/guidelines_for_Supportive_Supervision.pdf

Training for mid-level managers (MLM). (2008) Retrieved from www.who.int/immunization/documents/MLM_module4.pdf

Supportive Supervision in Health Care Waste Management

Supervision

Supervision is a management function that is planned and carried out in order to guide, support, and assist staff in carrying out assigned tasks. It involves on-the-job transfer of knowledge and skills between the supervisor and staff members. The role of IPC supervisor is to determine the quality of health care workers' performance in relation to standardized roles and activities and help them solve problems and identify quality-improvement goals on performance and staff needs. Supervisors should provide feedback to health care workers to motivate and offer suggestions for improvement.

Regular facilitative supervision by relevant teams is important as it helps to identify adherence to and compliance with IPC practices according to national IPC standards, to determine availability of IPC supplies and equipment, and to address other issues that need attention or improvement.

Supportive supervision encourages open, two-way communication, and building team approaches that facilitate problem-solving. It focuses on monitoring performance toward goals, and using data for decision-making, and depends upon regular follow-up with staff to ensure that new tasks are being implemented correctly. It builds on past gains to meet future goals (*Training for mid-level managers (MLM) (2008) Retrieved from www.who.int/immunization/documents/MLM_module4.pdf*).

Supportive Supervision Monitoring Objectives

1. Establish responsibilities during supervision.

The IPC committee is charged with ensuring that health care facilities develop and implement specific policies and procedures to prevent the spread of infections among health care staff and patients. The IPC comprises department heads and management.

During supervision, the IPC aims to:

Responsibility	Description
Monitor	The Infection Control Committee monitors infectious processes within the health care facility. They track nosocomial infections and incidents that have the potential to cause infections. They review infection control statistics from the facility in an effort to minimize risk, identify problem areas, and implement corrective actions. When infections do occur, the committee undertakes epidemiological investigations to determine the cause of the problem and recommends the necessary education or changes in protocols.
Evaluate	Along with monitoring specific incidents, the Infection Control Committee also looks at the bigger picture as it continually strives to improve processes within the facility. This is demonstrated by the regular review of infection control procedures for all departments. The committee may also be called upon to evaluate practices and provide input regarding products and protocols.
Update	Perhaps one of the biggest challenges that all Infection Control Committees face is keeping current. The constant advancement of medical technology

	introduces changes at all levels within the health care facility, new bacterial strains complicate and challenge older infection control practices, and new research often requires re-examination of established procedures. The Infection Control Committee's purpose is to provide guidance and leadership through these changes. This requires that all members of the team strive to keep abreast of changes within their area of expertise. By keeping current, they can assist the committee as it works to manage its facility's infection control policy.
Educate	Finally, as an integral part of its leadership, the committee must take an active role in staff education. That role may be a hands-on approach or it may be an advisory role in partnership with the facility's education department. However it functions, the committee must set direction for staff education and validation of that education.

The following are also important to note:

What happens during supervision encounters?	Who performs supervision?	What happens after supervision encounter?	When supervision happens?
• Observation of performance and comparison to standards. • Provision of corrective and supportive feedback on performance. • Discussion with clients. • Provision of technical updates or guidelines. • Onsite training • Use of data and client input to identify opportunities for improvement. • Joint problem solving.	• Staff designated by the service management through self-assessment.	• Actions and decisions recorded. • Ongoing monitoring of weakness areas and improvements. • Follow-up on prior visits and problems.	• Continuously: during routine work. • Team meetings. • Visits by external supervisors.

Source: Guidelines for implementing supporting supervision-A step-by-step guide with tools to support immunization. (2003) Retrieved from http://www.path.org/vaccinereources/files/guidelines_for_Supportive_Supervision.pdf

2. Motivate workers during supervision.

Motivation is very key in ensuring successful supervision. It can, however, be challenging if workers are poorly paid or transferred without their consent. Ways to motivate include:

- Inform staff in advance of planned supervision.
- Be friendly and conduct supervision in a respectful and non-authoritarian way.
- Commend staff in areas where they are doing well; if possible, use monetary rewards, certificates, letter acknowledging good work, new uniforms, bags, etc. to recognize a job well-done.

- Identify career growth areas or leadership opportunities.
- Act on feedback provided during supervision.

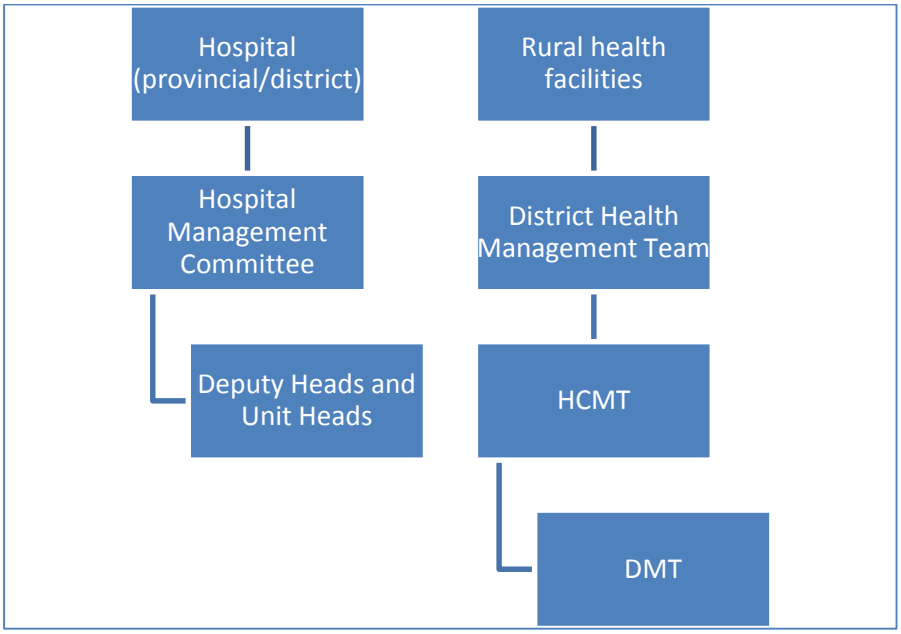
3. Understand the supervisory levels.

The two levels are:

1. Hospital (provincial/district) level.
2. Rural health facilities level.

At the hospital, the Hospital Management Committee (HMT) is the overall management organ chaired by the Medical Superintendent (Med Supt). Below him/her are deputy heads and unit heads in the hospital.

At the rural health facilities, A District Health Management Team oversees this team and is chaired by the DMOH. Below this team are HCMT at the health-center level and DMT at the dispensary level.



4. Conduct audits, supervision, monitoring, and evaluation.

- Regular audits should be conducted and documented by IPC committees.
- A checklist should be developed and used for documentation. No particular checklist format is required for all situations as long it suits specific needs of the supervisors.
- The checklist is a tool to ensure a systematic approach to supervision by reminding supervisors to focus on the knowledge, skill, major activities, plans, and performance of workers.

Two essential parts:

- List of activities and skills to be supervised.

- Space for the supervisor to make notes/comments on their observations, assessments, recommendations, or actions taken.

Monitoring

Monitoring: routine or continuous measurement of progress while the project is ongoing.
Objectives of monitoring include:

- Checking and measuring progress.
- Analyzing the situation.
- Reacting to new events, opportunities, and issues.

Monitoring process:
Define objectives.

- Clearly define the objectives of your activities.

Develop indicators.

- Clearly state the indicators to be monitored.

Collect data.

- Collect data through supervision and audits.

Analyze performance.

- Document the data collected and provide feedback.

Parameters to be monitored by WMO.
Waste generated each month, by waste category:

- In each department.
- Treatment and disposal methods.

Financial aspects of HCWM:

- Direct costs (supplies and materials, e.g., bins and liners).
- Training costs (labor and materials).
- Operational costs (maintenance of treatment equipment).
- Contractor costs (contracting cleaning services).

Other parameters to be monitored.
Public health aspects:

- Incidents resulting in injury, near misses, PEP.
- Failures in handling.

Other aspects:

- Reduction of injections in outpatient department (OPD).
    - Tracking OPD injections and attendances.
- Waste-segregation practices.
    - Identifying departmental supervisors/champions.

- Use of PPE by waste handlers and incinerator operators.
- Functionality of the treatment equipment/method and disposal methods.

Evaluation:
The measurement of progress, results, and impact when any project is completed.

Steps to ensure successful supervision.

1) Set up a supportive system. This involves:
    a. Training core staff.
    b. Creating checklist, supervision tools, or jobs aids to update staff during supervision.
    c. Ensuring availability of resources.

2) Planning regular supervisory visits:
    a. Use data to determine areas to supervise.
    b. Schedule supervision routinely using work plan.
    c. Identify support areas and skills that require updating.
    d. Follow up on recommendations made during previous visit.
    e. Plan to spend as much time as required (this will depend on the needs).
    f. Stick to schedule and respect health workers' time. Always schedule a return visit.
3) Conduct supportive supervision, which includes:
    a. Observation.
    b. Using data.
    c. Solving problems.
    d. Using OJT.
    e. Recording observations and feedback.
4) Follow-up:
    a. Follow up on agreed actions by supervisors and supervised staff.
    b. Perform regular data analysis.
    c. Provide feedback to all stakeholders.
5) Building sustainability:
    a. Ensure sustainability of supportive supervision within the system.
    b. Incorporate supervision into the national budget and work plan.
    c. Increase decision-makers' and managers' awareness of its benefits by use of data.
    d. Advocate for supportive supervision.
    e. Develop team approach to increase supportive supervision and make it routine.

Activity 1: What is my role as a supervisor?

Objectives

a) Participant should be able to identify strengths and weak areas and provide appropriate feedback.

Description

In this activity, participants will be given pieces of paper with different scenarios normally encountered/observed (as listed below) in a facility. The trainer will ask each participant to pick three pieces of paper. Read out the problem to the group and provide recommendations for each scenario.

1. You bump into a waste handler transporting waste with open shoes.
2. A staff member who has resumed from study leave after recently graduating from an advanced course shows interest in undertaking more complex roles.
3. Patients complain of being mistreated by the health provider.
4. You find misplaced job aids and unmatched bins in the wards.

Activity 2: Role play

A waste handler observes a health care provider not segregating waste properly. He tells you as the supervisor. What must you do to solve the problem?

Tip

- The supervisor should tell the provider to observe him/her. Do not discipline the provider, particularly if it's the first time.
- Take the opportunity to remind the provider about the segregation categories and the importance of segregation!
- Provide a refresher training to the health care provider on how to properly segregate waste.

1.10 Key Messages on Health Care Waste Management, Giving Safe Injections, and Reducing Unneccesary Injections

Introduction

The purpose of this section is to provide health facility staff and program managers with the information and resources needed to improve the status of HCWM, ensure that only safe injections are administered, and that unnecessary injections are reduced in health facilities.

Duration

45 minutes.

Competency

Familiarity with the key messages on the importance of improving the status of HCWM, ensuring safe injections are administered, and reducing unnecessary injections in health facilities.

Specific Learning Objectives

At the end of this unit, participants will be able to list the key messages and be able to articulate them to others.

Materials

- **PowerPoint:** Key Messages

Notes to the trainer

Ask participants the following questions:

- What are the key messages about HCWM?
- What are the key messages about giving safe injections?
- What are the key messages about reducing unnecessary injections?

Participants then brainstorm the answers. The facilitator can build on the answers given and then perhaps give a lecture.

Key Messages on HCWM

- Active support by management is critical to improving HCWM systems at the program and facility levels and within other health programs.
- There should be a dedicated budget for HCWM activities.
- There should be an active IPC committee and designated staff responsible for HCWM.
- Essential HCWM commodities should be adequate to support segregation. HCW should be segregated at the point of generation and treated appropriately.
- In the absence of an onsite safe treatment and disposal method, the facility should consider transporting waste offsite to where adequate facilities are available.
- Health workers need to be protected with the appropriate PPE.
- All staff who handle HCW should be vaccinated to protect them from tetanus and hepatitis B and C. When exposed to HIV infection in the course of duty, health workers should seek PEP. A PEP register should be filled out every time a health worker is provided with the service.
- All staff should be trained on HCWM, including orientation for new hires. Refresher training should be offered when possible and during supportive supervision.
- Information, education, and communication (IEC) materials focusing on HCWM, IS, and IPC should be strategically placed in all departments at the hospital to reinforce HCWM messages.
- Each facility should have a waste management plan and copies of the national policy documents on IPC and HCWM to guide implementation of HCWM activities.

Key Messages on Giving Safe Injections

- A safe injection is one that is given by a certified health care provider in a registered health care facility using a new needle and syringe which is properly disposed of after use.
- Unsafe injections spread disease, including HIV, hepatitis, and others.
- Facility and program managers can prevent unsafe injections by reducing the unnecessary use of injectable medications in health facilities.
- Facilities must be stocked with adequate injection supplies to ensure a new needle and syringe are used for every injection.
- Facilities must be stocked with adequate supplies of safety boxes and HCWM supplies to ensure all syringes are safely disposed of after use.
- Facilities should have established and well-known procedures in place if accidental needlestick injuries occur.
- Staff at all facilities should know about the importance of PEP.
- All of us have a professional commitment to ***FIRST DO NO HARM***.

Key Messages on Reducing Unnecessary Injections

- Although some injections are necessary, many are unnecessary.
- Other forms of medication that are just as effective as injections include oral medications, inhalers, lotions, pessaries, and suppositories.
- The benefits of alternative forms of medication include reduced risk of infection, fewer expenses incurred, and reduced medical waste compared to injections.

- Providers and pharmacists should be trained to counsel patients about the use of other forms of medication.
- All facilities should document their plan to reduce the number of injections, for prescribers to follow. The medicines and therapeutics committees should spearhead these efforts.
- Community health workers should be trained to facilitate discussions in the community about the effectiveness of other forms of medication.
- Facilities should use all accessible communication channels to pass messages to the community, including health talks within the health facilities and health programs in the media.

Module 2: Guide for Training Waste Handlers and Treatment Equipment Operators

Introduction

This module is to be used to train waste handlers and treatment equipment operators in health care waste management. The content is as shown below in the training units.

Training Units

2.1 Training Overview
2.2 Introduction to Health Care Waste Management
2.3 Health Worker Safety
2.4 Segregation of Waste
2.5 Handling, Storage, and Transport of Health Care Waste
2.6 Overview of Health Care Waste Treatment and Disposal
2.7 Roles and Responsibilities in Health Care Waste Management
2.8 Operating and Maintaining an Incinerator
2.9 Operating and Maintaining an Autoclave
2.10 Operating and Maintaining a Shredder

2.1 Training Overview

Introduction

This unit gives an overview of the training course. It is intended for both health care workers and the health facility management team.

Duration

10 minutes

Competency

Development of a common understanding of the training contents and objectives.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Raise awareness of public health and environmental hazards that may be associated with inappropriate segregation, storage, collection, transport, handling, and disposal of health care waste.
- Provide information on proper practices for implementing an improved HCWM system.
- Identify roles and responsibilities of all staff involved with managing health care waste.

Materials

- **Handout:** Pre-/Post-Test for Waste Handlers and Incinerator Operators (found in Appendix 4)

Notes to the trainer

- Review objectives with the group.
- Ask if there are any objectives missing that the participants had hoped to achieve in the training.
- Let participants know time expectations.
- Administer pre-test.

2.2 Introduction to Health Care Waste Management

Introduction

This unit gives an overview of HCWM practices. It is intended for both waste handlers and treatment equipment operators. It highlights the importance of safe HCWM, categories of health care waste, and principles of waste management. This unit is also an outlines of key steps in waste management, accompanied by a brief description.

Duration

30 minutes

Competency

An understanding of the key principles and policies in safe HCWM.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Define health care waste.
- Explain the principles of HCWM.
- Define the key steps of HCWM.
- Identify various types of equipment and tools used in waste management.
- Discuss the risks from poor HCWM.
- Understand the legal and policy frameworks for HCWM.

Materials

Activity 1: Role Play Key Steps

Handout: Appendix 6. Key Steps in Health Care Waste Management

PowerPoint: Introduction to HCWM

Notes to the trainer

Review and adapt the content for your health system.

Problem

- 80 percent of waste from health facilities is "general" waste and not harmful.
- 20 percent of health care waste can be dangerous; only 1 percent is sharps waste.
- Poor waste disposal practices are dangerous to the community and health care workers.
- Waste management infrastructure may be limited in low-resource settings.
- There is no perfect solution. There are tradeoffs between costs, health risks to the community, and environmental pollution.

Six Key Steps in HCWM: Definitions

1. Minimization

Refers to approaches adopted by the health facility to reduce the amount of health care waste generated during delivery of services. It includes strategies to reduce unnecessary injections, recycling, or reusing some of the materials. Waste minimization is directly proportional to waste management costs and related risk.

Reduce the amount of health care waste that requires treatment by:

- Reducing unnecessary injections.
- Segregating waste properly to ensure only infectious waste is treated.
- Recycling packaging materials where possible.
- Identifying systems for reducing the amount of food waste produced in the facility.

2. Segregation

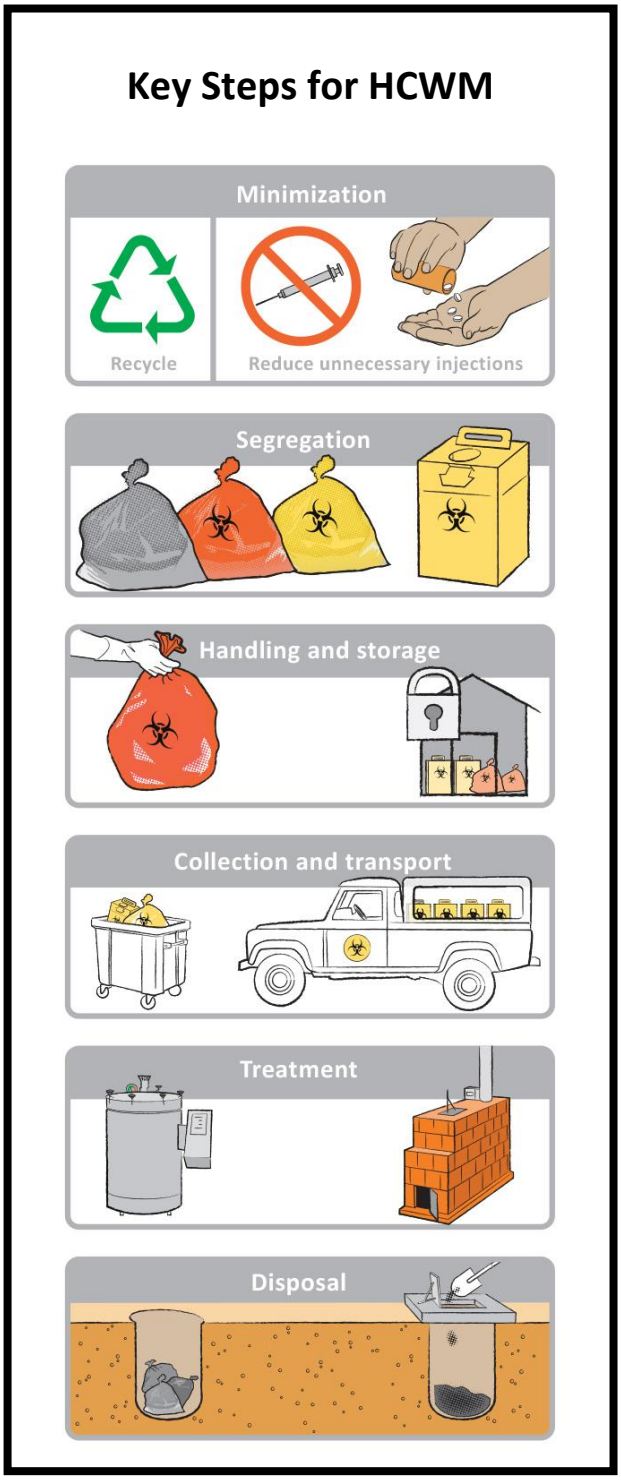
Placing health care waste into separate containers according to category: non-infectious or general waste, infectious, highly infectious, and sharps waste.

3. Handling and Storage

Steps taken to manage during containment and storage while waiting for collection or transport to a treatment or disposal plant.

4. Collection and Transport

An organized system for removing waste from the point of generation or temporary storage to a



treatment or disposal site. Waste may be transported within the health facility or to an offsite treatment and disposal plant.**Treatment**

Treatment is a means of rendering health care waste safe for handling and final disposal.

Some of the methods used include:

- Incineration. Burning at high temperatures: 850°C to 1100°C (600°C to 700°C in a small-scale incinerator).
- Sterilization. Using autoclave or microwave technology.
- Chemical disinfection. A treatment method using a chemical such as hypochlorite solution (chlorine bleach, JIK) to render the waste safe.
- Using mechanical grinders to break down the waste into unrecognizable pieces. Macerators for anatomical waste fall into this category of treatment. This method does not treat infectious waste and should be used together with sterilization.

5. Disposal

This refers to the final disposal of waste and residues or byproducts from the treatment of waste. Some of the common methods of disposal are:

- Municipal landfills. These are designated sites for disposal of municipal waste in a controlled manner to minimize pollution to ground water, land, and the air.
- Burial in pits. Infectious waste pits, placenta pits, and ash pits.

Please note that incineration is considered treatment, not disposal, because the resulting ash residue has to be disposed either in a protected ash pit or municipal landfill.

Policies, Regulations, and Guidelines for Managing Health Care Waste

The National Environmental Management Authority requires that health care waste be segregated using a colour-coded system.

Activity 1: Role Play Key Steps

Have the group list the six key steps of HCWM and describe each step.

2.3 Health Worker Safety

Introduction

This unit covers issues related to health worker safety, risks associated with HCWM, and interventions, including universal precautions that promote infection prevention practices.

Duration

45 minutes

Competency

Knowledge of how to ensure the safety of health care workers at the workplace.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Discuss the risks of poor HCWM.
- Demonstrate how to respond to a health care waste-related accident or incident.
- Appreciate the necessity for occupation-related vaccination.
- Demonstrate post-exposure prophylaxis procedures.
- Describe general safety considerations.

Materials

- Soap, clean running water, sanitizer gel, and serviette (for hand drying)
- Personal protective equipment, gloves, apron, masks, caps, gowns, closed boots or shoes, scrub suits

Activities

- Activity 1: Role Play—Needlestick Injury!
- Activity 2: Handwashing
- **Handout:** Appendix 9. Assesing risk in our health facilities using the risk assessment tool
- **Handout:** Appendix 10. WHO Guidelines on How to Handwash
- **Handout:** Appendix 10. General Procedure for Dealing with Spillages
- **Handout:** Appendix 11. Personal Protective Equipment for Waste Handlers
- **Handout:** Appendix 12. Accidents, Incidents and Spills Report Form

- **PowerPoint:** Health Worker Safety

Notes to the trainer

- Review and adapt the content for your health system.
- Note the guidelines for reporting needlestick injuries and protective clothing. It is important that these be adapted to reflect the systems currently in place in your facility.

Disease Transmission

Causes of Disease Transmission

Diseases can be transmitted from:

- Health worker to patient, resulting from unwashed hands, contaminated sharps, or improperly cleaned reusable equipment.
- Patient to health worker, resulting from accidental pricks stuck by needles or sharps that have been used on patients or blood or body fluids accidentally splashing on to or coming in contact with broken skin.
- Health worker to family and community, resulting from health workers with unclean hands or contaminated clothing or shoes carrying infection home to family members.
- Health facility to community, resulting from improper disposal of medical waste and sharps. This can lead to transmission of disease to community members due to needlestick injury or needle reuse.

Reducing Risk

- Wash your hands after handling waste or infectious material.
- Handle all sharps with care to minimize needlestick injury.
- When handling waste, wear appropriate protective clothing, including a water-resistant apron, heavy-duty gloves, boots or closed-toe shoes, and eye protection.
- Do not open waste containers to sort waste.
- Be aware of procedures for treatment of injuries, cleaning of contaminated areas, and reporting of sharps injuries or accidents.
- Report sharps injuries to the appropriate personnel.
- Injuries should be followed up by post-exposure prophylaxis (PEP) treatment.
- Managers should maintain a log of all accidents.
- A full course of hepatitis B and tetanus vaccination will protect you from the hepatitis B virus and tetanus—anyone handling sharps should be vaccinated.
- Keep facility clean inside and out.

Health workers are at risk of accidental needlestick or other injuries from sharps. The World Health Organization recommends following the ten steps below after a needlestick injury:

Allow the wound to bleed freely and wash the area with soap under clean running water.

- If blood or body fluids get in your eyes, splash eyes with clean water.
- Immediately report the incident to a designated person.
- Retain, if possible, the item involved in the incident; get details of its source for identification of possible infection.
- Seek additional medical attention in an emergency health department as soon as possible, including evaluating the exposure for its potential to transmit HIV infection (based on body substance and severity of exposure).
- Get counseling and testing.

- Initiate PEP, if available and appropriate.
- Record the incident in the PEP register.
- Investigate the incident and identify and implement remedial action to prevent similar incidents in the future.
- Follow up according to guidelines.

Personal Protective Equipment

- Health workers protect themselves by establishing a barrier between themselves and the infective agent. The type of protection needed depends on the worker's activities.
- Personal protective equipment (PPE) must be worn at all times when handling health care waste.
- PPE must be properly maintained and kept clean.
- The clothing should not be taken home; it must remain at the health facility to avoid possible contamination of the community.

PPE includes:

- Heavy-duty gloves. Always wear gloves when contaminated items are handled. Puncture-resistant gloves should be used when handling sharps containers or bags with unknown contents.
- Heavy-duty boots. Rubber boots provide extra protection to the feet from injury by sharps or heavy items that may accidentally fall. They must be kept clean. When possible, avoid wearing sandals, thongs, or shoes made of soft materials.
- Aprons. Rubber or plastic aprons provide a protective, waterproof barrier to the body.
- Goggles. Plastic goggles can protect the eyes from accidental splashes.

Incident and Accident Response

In case of an incident or accident, follow the steps below:

1. Evacuate the contaminated area.
2. Decontaminate the eyes and skin of exposed personnel immediately.
3. Inform the designated person (usually the waste management officer), who should coordinate the necessary actions.
4. Determine the nature of the spill.
5. Evacuate all the people not involved in cleaning up if the spillage involves a particularly hazardous substance.
6. Provide first aid and medical care to injured individuals.
7. Secure the area to prevent exposure of additional individuals.
8. Provide adequate PPE to personnel involved in clean-up.
9. Limit the spread of the spill.
10. Neutralize or disinfect the spilled or contaminated material if indicated.

11. Collect all spilled and contaminated material. Sharps should never be picked up by hand; brushes and pans or other suitable tools should be used. Spilled material and disposable contaminated items used for cleaning should be placed in the appropriate waste bags or containers.
12. Decontaminate or disinfect the area, wiping up with absorbent cloth.
13. Rinse the area, and wipe dry with absorbent cloth.
14. Decontaminate or disinfect any tools that were used.
15. Remove protective clothing and decontaminate or disinfect it if necessary.
16. Seek medical attention if exposure to hazardous material has occurred during the operation.

Each facility should have a facility safety program for HCWM. All personnel who handle health care waste should be trained to deal with injuries and exposures.

The ten general response actions should be:

1. Implement immediate first aid measures, such as cleansing of wounds and skin, and irrigation (splashing) of eyes with clean water.
2. Immediately provide a report of the incident to a designated responsible person.
3. Retain, if possible, the item involved in the incident.
4. Collect details of its source for identification of possible infection.
5. Get additional medical attention in an accident and emergency.
6. Alert the occupational health committee as soon as possible.
7. Provide medical surveillance.
8. Conduct blood or other tests if indicated.
9. Record the incident.
10. Investigate the incident; identify and implement remedial action.

Vaccination

- Viral hepatitis B and tetanus immunizations should be provided for health care personnel and waste handlers.
- Each health care facility is encouraged to conduct a hepatitis B pre-employment screening program and also put in place employee vaccination arrangements.
- The health care facility should also maintain and keep long-term records of vaccinations to ensure that booster doses are given as required.

PEP Procedures

Managing Injuries

If you sustain an injury the following actions should be taken:

- Let the wound bleed freely.
- Wash with soap and running water.
- Alert your supervisor.
- Identify source patient.
- Immediately report to designated person/facility.

- Document the incident.
- Get pre- and post-test counseling.
- Initiate PEP within 72 hours.
- Evaluate injuries:
  - Immediately.
  - After six weeks.
  - In three months.
  - In six months.
- Conduct follow-up on a six- monthly basis.

General Safety Considerations

Safety considerations for health care workers handling waste are outlined below.

- Prevent exposure to molten plastic and flowback heat from combustion chambers during loading by poking the waste before loading additional waste, this avoids loading waste too close to the loading door. Additionally, do not load waste if the fire is fiercely burning.
- Safely handle sharps in ash and debris after burning/incineration.
- Ensure low levels of exposure to emissions from waste gases and smoke by using appropriate PPE at all times when handling waste.
- Wear PPE to protect from hot surfaces which may cause burns.

Activity 1: Role Play—Needlestick Injury!

Break into pairs and have one person play the role of supervisor and one person play the role of a provider, waste handler, or incinerator operator who suffered a needlestick injury. Describe the injury, the steps you took afterward, and let the manager/supervisor recommend the next steps.

Standard Precautions

Standard precautions are taken to reduce the risk of transmitting bloodborne micro-organisms and other pathogens from both recognized and unrecognized sources. These precautions should be followed, as a minimum in the care of all patients in health care facilities and settings, regardless of their diagnoses or presumed infection status.

Standard precautions include:
- Hand hygiene.
- Good housekeeping.
- Appropriate use of personal protective equipment (PPE).
- Post-exposure prophylaxis.

Appropriate hand hygiene/handwashing must be carried out in the following circumstances:

- Upon arriving at and before leaving the health care facility.
- Before putting on gloves.

- After removing gloves.
- Before and after every patient contact
- After any situation in which hands might become contaminated, such as:
  - Handling contaminated objects, including used instruments.
  - Using the toilet, wiping or blowing one's nose, or performing other personal functions.
  - Touching waste that may have mucous membranes, blood, body fluids, secretions, or excretions or other sources of micro-organisms.
  - Before preparing, handling, serving, or eating food.

Handwashing

- The purpose of handwashing is to remove soil, blood, and other organic material and transient micro-organisms from the skin.
- The three elements that are essential for effective handwashing are (1) soap, (2) clean running water, and (3) friction.
- Hand hygiene is the single most important way to prevent transmission of pathogens associated with health care services.

Steps in handwashing

Handwashing takes about 40 to 60 seconds.

1. Remove all jewelry.
2. Thoroughly wet your hands with running water. Do not dip hands into a basin that contains standing water, even with the addition of an antiseptic agent, because micro-organisms can survive and multiply in these solutions. Use a comfortable water temperature. Washing your hands in hot water increases the risk of skin irritation and does not remove more micro-organisms.
3. Apply a handwashing agent (soap or detergent). Washing your hands with plain water without soap is not effective.
4. Rub all areas of hands and fingers vigorously for 10 to 15 seconds, paying close attention to fingernails and areas between the fingers. Do not forget the wrists. Repeat each action five times.
5. Remove debris from under the fingernails.
6. Rinse hands thoroughly with clean running water from a tap for 10 to 15 seconds.
7. Use a paper towel when turning off the water if the tap is hand operated.
8. Dry hands with paper towels or air-dry them. Avoid using common or shared towels, which might harbor micro-organisms and contaminate hands even after proper handwashing. To avoid sharing towels, use alcohol-based handrub, disposable paper towels, or single-use hand towels. Do not dry your hands on personal clothes or on wet and soiled towels. Blow dryers are not recommended.

See appendix __for WHO guidelines on how to handwash.

Good Housekeeping

Good housekeeping refers to the general cleaning of your work area, including the floors, walls, certain types of equipment, furniture, and other surfaces. Cleaning entails removing dust, soil, and contaminants on environmental surfaces.

Housekeeping helps eliminate micro-organisms that could come in contact with patients, visitors, staff, and the community. It ensures a clean and healthy hospital environment for patients and staff.

Activity 2: Handwashing

Preparation:

- Distribute handout on proper handwashing.
- Have participants practice proper procedure.

2.4 Segregation of Waste

Introduction

This unit gives an overview of HCWM practices. It is intended for both health care workers and the health facility management team. It highlights the importance of safe HCWM, categories of health care waste, and principles of waste management. The unit also outlines the key steps in waste management, accompanied by brief descriptions.

Duration

1 hour

Competency

Ability to maintain segregation of health care waste during collection and transport for disposal.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Define segregation.
- Identify various categories of waste.
- Define steps for proper segregation.
- Handle waste safely.
- Assemble a safety box.

Materials

- Waste receptacles
- Safety boxes
- Segregation posters
- Flash cards

Activities

- Activity 1: Assemble a Safety Box
- Activity 2: Practice Waste Segregation
- **Handout:** Appendix 7. Segregation Guidelines
- **Handout:** Appendix 8. Using a Safety Box
- **PowerPoint:** Segregation

Notes to the trainer

- Review and adapt the content for your health system.
- Note the colour-coded system and ensure the colours reflect your system.
- Stress the importance of segregating waste and the health care providers' critical role in the process.

Definition of Segregation

Segregation means the separation of waste according to type and defined waste categories at the point of generation.

Why Segregate?

Segregation of waste is the key to proper HCWM and has the following advantages:

- Facilitates safe handling of the waste.
- Separates recyclable waste from hazardous waste.
- Ensures that the waste will be treated according to its hazard.
- Reduces the overall costs of waste management, including transport, treatment, and disposal.

Colour Coding and Marking Health Care Waste

The use of colour coding and marking helps to easily segregate the waste and identify the different categories of waste. It therefore contributes to safer handling of waste by clearly associating a specific colour with a specific category and its associated hazard. Table 3 illustrates the recommended colour codesfor Kenya.

Table 3. Health care waste categories, colour coding, and marking.

Category	Examples	Colour of Bin and Liner		Marking
General or non-infectious	Paper, packaging materials, plastic bottles, food, cartons	Black		No recommended marking
Infectious	Gloves, dressings, blood, body fluids, used specimen containers	Yellow		
Highly infectious or anatomical/ pathological	Laboratory specimens and containers with biological agents, anatomical waste, pathological waste	Red		
Chemical	inorganic chemicals			Marking will vary with classification of the chemical
Radioactive	Any solid, liquid, or pathological waste contaminated with radioactive isotopes of any kind	Yellow		Radioactive symbol

Segregation Categories

Health care workers should immediately segregate health care waste according to the type of waste. The national health care waste segregation chart (Figure 2 below) has the following categories:

- General or non-infectious waste.

- Infectious waste.
- Highly infectious or anatomical/pathological waste.
- Sharps waste.

Placement of Bins

Colour-coded bins for collection of biomedical waste and safety boxes for sharps waste should be strictly under the charge of relevant health workers (nurses, pathologists, laboratory technicians, etc.), and are to be placed specifically at the places of generation of such waste (nursing station, labor room, laboratory, etc.). Patients and visitors should not have access to these containers.

Using a Safety Box for Sharps Waste

- If not properly disposed of, scavengers may collect and reuse sharps waste.
- Reusing syringes and needles results in high risk of infection or disease transmission.
- Sharps can cut or puncture the skin, and, if they are contaminated, can cause an infection or disease, including:
  - Hepatitis B.
  - Hepatitis C.
  - HIV.

Sharps waste must be immediately contained after use to prevent injury. The primary way to contain sharps is by using a safety box and needle remover (if available).

What Goes Into a Safety Box?

- Syringes with needles.
- Syringes with needles removed (if using a needle remover).
- Infusion needles/cannulars.
- Suture needles.
- Scalpels.
- Blades.
- Broken ampoules.

Figure 2. HCWM segregation chart.

Activity 1: Assemble a Safety Box

Safety boxes are essential in protecting us from used sharps. It is important therefore that we know how to assemble, use, store, and dispose of them.

- Break into groups and provide one unassembled safety box per group.
- Ask each group to assemble the box.
- Ask each group to give examples of waste items that would be disposed of in the safety box.
- Ensure that each safety box is well assembled.

Activity 2: Practice Waste Segregation

Use appropriate coloured bins and liner bags. Alternatively, use paper cutouts of different types of waste and have participants separate them into the appropriate categories.

4. Discuss in plenary different categories of health care waste. Ask participants to list reasons for waste segregation and write their responses on a flip chart.
5. In a mini presentation and with the use of liners and buckets, the facilitator should introduce the colour codes used in Kenya.
6. Using flash cards (one word per flash card on waste items or drill list), have participants suggest where to throw away the item written on their card and physically do it in the classroom.

Ask participants to fill in the following table. Discuss the results in plenary.

Waste	Immediate Disposal Facility Segregation	Final Disposal Facility
Wrappings of the needle and syringe		
Needle cut off the syringe		
Syringe and needle		
Used swabs and gloves		
Infectious plastics (e.g., intravenous sets)		
Pathological waste		

After participants have practiced in which container to throw their items, have each participant practice tying a knot in a bin liner.

Discuss what to do if the liner is too heavy to knot or if the bag is too full. Brainstorm solutions. These should include reporting problems to the manager.

During the discussion, ask the following questions:

- If a facility does not have the proper colour-coded bags, how else could waste be segregated?
- (Possible answers: label bins, tie bin liners with coloured yarn or fabric, label bags with stickers.)
- Are there other things that can safely be used to tie around a bag of waste which is too heavy to knot?
- What is the difference between waste that goes in a black bag and that which goes in a yellow (red) bag?
- Why is it important to keep waste separated?
- What do you do if you find infectious or sharps waste improperly placed in a black bag?

2.5 Handling, Storage, Collection, and Transport of Health Care Waste

Introduction

This session provides an overview of the key activities involved in safe handling, storage, collection, and transport of health care waste.

Duration

1 hour

Competency

Ability to practice safe handling, storage, collection, and transport of health care waste.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Describe the process of safe handling and storage of health care waste.
- Understand the waste collection and transport system for their health facility.

Materials

- Flip chart
- Marker pens
- Activity 1: Waste Storage
- **PowerPoint:** Handling and Storage

Notes to the trainer

Review and adapt the content for your audience.

Activity 1: Waste Storage

Ask participants to describe cases from their health facility in which they have observed poor storage of waste. List examples on a flip chart and ask them to suggest what should have been the correct practice for each of the listed items.

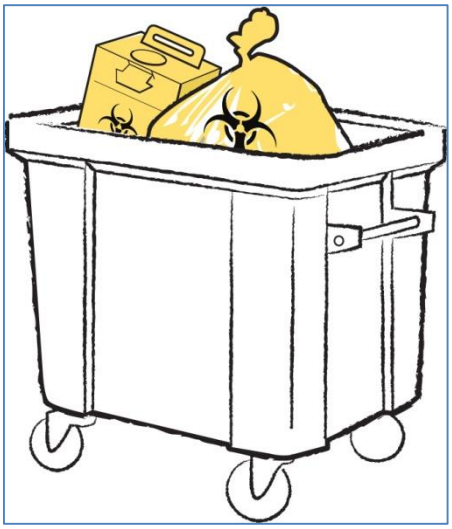
Safe Storage of Health Care Waste

- Keep boxes in a secure location, away from medical supplies and out of reach (a locked room is best).
- Keep safety boxes dry.
- Keep a written record of the number of safety boxes received and disposed of.
- Store safety boxes for no more than one week (or according to facility guidelines).

Steps in Handling Health Care Waste

In general, the following measures should be taken when handling health care waste:

- Health workers handling waste must wear appropriate personal protective equipment when handling waste.
- Sharps must always be placed in injection safety boxes and never be placed in waste bags.
- Waste must be contained in colour-coded and well-labeled plastic bags.
- General waste should be contained in well-labeled black bags.
- Waste bags must not be over-filled (fill to approximately three-quarters of capacity).
- The volume of a waste bag should not exceed 55 liters.
- At the point of waste generation, excess air should be expelled from the bag, without compacting the contents, prior to closure using a bag tie.
- All bags should be held away from the body by the closed top of the bag, and placed directly into a mobile garbage bin or trolley.
- Where waste bags are sealed and stored pending collection, they should be in a secure place with restricted access.
- A waste collection schedule should be in place.



Collection of Health Care Waste

- Remove waste bags from the service point and take them to a storage or disposal area.

- Waste should not be allowed to accumulate at the point of production. For this reason, a routine program for waste collection should be established as part of the HCWM plan.
- Nursing and other clinical staff should ensure that waste bags are tightly closed or sealed when they are about three-quarters full.
- Light-gauge bags can be closed by tying the neck, but heavier-gauge bags probably require a plastic sealing tag of the self-locking type.
- Bags should not be stapled closed.

The following recommendations should be followed by the ancillary workers in charge of waste collection:

- Waste should be collected daily (or as frequently as required) and transported to the designated central storage site.
- No bags should be removed unless they are labeled with their point of production (hospital and ward or department) and contents.
- The bags or containers should be replaced immediately with new ones of the same type.
- The waste containers and trolleys should be regularly cleaned and decontaminated.
- A supply of fresh collection bags or containers should be readily available at all locations where waste is produced.
- The person in charge should ensure that adequate supplies (three months) are available and that procurement is timely to ensure the facility does not run out of the bags.

Weighing Health Care Waste

Health care waste should be quantified by volume or weight, labeled with information on its source, and recorded. Waste should be weighed at the incineration point to quantify waste being generated on a quarterly basis. If waste is to be transported offsite for treatment, it should be weighed at the facility first, before being transported. Full safety boxes should also be recorded. This information can be used to advocate for funds for waste management.

Storage

Any storage of waste, including sharps, before treatment or collection for offsite disposal should be in a secure location designated for the purpose.

The following are recommendations for the transfer station/storage area and its equipment:

- There should be a water supply for cleaning purposes.
- The area should be clearly demarcated and have a sign warning trespassers.
- The storage area should have an impermeable, hard-standing floor with good drainage; it should be easy to clean and disinfect.
- The storage area should afford easy access for staff in charge of handling waste.
- It should be possible to lock the storage to prevent access by unauthorized persons.
- Easy access is required for waste collection vehicles.

- The area should have protection from the sun.
- The storage area should be inaccessible to animals, insects, and birds.
- There should be good lighting and ventilation (passive ventilation at a minimum).

Transport of Health Care Waste

When moving waste from one place to another—either onsite or offsite—the following precautions should be taken:

- Boxes of waste must be kept upright; avoid direct contact of safety boxes with other waste or medical supplies in the same vehicle.
- Safety boxes must be kept dry.
- All health workers should be aware of the waste collection schedule.
- Waste should be placed in collection points to ensure that the waste handlers do not enter the wards/departments as they move enroute.
- Health facilities should have a clearly defined route for transportation of waste. The transportation routes should avoid food preparation and heavily used areas.
- After transport, clean vehicle surfaces.

Onsite Transport of Health Care Waste

- When moving waste from one point to another within the health care facility, it should be moved in a designated trolley or wheel barrel.

Offsite Transport of Health Care Waste

- When transporting waste outside the health facility, it is preferable that the transport vehicle is designated for waste transport only.
- The vehicle should be covered.
- The vehicle should follow the scheduled routes approved by the local environmental management authority from the point of collection to the disposal site or plant.
- The transporter should possess at all times during transportation of the waste, a completed tracking document (see Appendix 17), and produce it on demand to any law enforcement officer.
- The vehicle must be cleaned and sanitized at the end of each day.
- Bins/bags/safety boxes must be kept upright, secured, dry (i.e., protected against rain), and out of direct contact with other supplies.
- The person responsible for waste disposal must be aware of the schedule for pickup and delivery of waste.

2.6 Overview of Health Care Waste Treatment and Disposal

Introduction

This unit covers issues related to waste treatment and disposal options for health care waste

Duration

1 hour

Competency

Knowledge of the range of options for safe treatment and disposal of health care waste.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Understand the importance of safe treatment and disposal of health care waste.
- Describe the various methods of treatment and disposal of health care waste used in their health facility.

Materials

- Handouts
- Personal protective equipment
- Equipment manuals
- Equipment operation and maintenance logs

Notes to the trainer

Review and adapt the content for your audience.

Treatment of Health Care Waste

- Health care waste should be treated prior to disposal to ensure protection from potential hazards posed by the waste.
- To be effective, treatment must reduce or eliminate the risk present in the waste so that it no longer poses a hazard to persons who may be exposed to it.
- The common methods of treatment are incineration, steam sterilization, chemical disinfection, steam sterilization/ autoclaving, microwave irradiation and maceration.
- Other methods that can be used include encapsulation and inertization, shredding and grinding.
- Treatment methods should be chosen according to the national and local situation.

Incineration

Incineration is defined as high temperature dry oxidation at > 850º C in the primary chamber and 1,100ºC in the secondary chamber with a retention time of 2 seconds to avoid formation of dioxins and furans. Incineration applies the three principles (3 T's) which are:

- Temperature
- Time
- Turbulence

This process is usually selected to treat waste that cannot be recycled, reused, or disposed of in a sanitary landfill.

There are two main types of incinerators in Kenya. These are diesel fired incinerators and demontfort (brick type) incinerators.

Medium-Temperature Incineration

- All types of incinerators, if operated properly, eliminate pathogens from the waste and reduce waste to ashes.

However, certain types of health care waste (e.g., pharmaceutical or chemical waste) require higher temperatures for complete destruction. Higher operating temperatures and cleaning of exhaust gases limit the atmospheric pollution and odours produced by the incineration process

Steam sterilization/ Autoclaving

This is the use of steam under pressure to decontaminate waste or sterilize waste between 121 - 134 °C, typically for 15 to 20 minutes depending on the size of the load and the contents at 15 psi/2 bar.

Sterilization occurs by three mechanisms:

- Temperature
- Pressure
- Thermal oxidation.

Note: Waste from the laboratory waste must be autoclaved before releasing to the main waste treatment in the hospital. Waste should also not be re- sorted.

Chemical disinfection

These are treatment methods using chemicals such as hypochlorite solution (jik) to render the waste safe

Microwave irradiation

The waste is automatically fed into a waste grinding device where it is shredded and sprayed with steam to increase the moisture content of the waste to approximately 10%. The moist ground waste is then heated by exposure to six microwave irradiation units over a 2 houe period. The process heats the waste to over 90 °C.

Maceration

This is the mechanical shredding of waste (placenta) to small sizes before disposal to the sewer

Waste Disposal

- Health care waste should be treated prior to disposal to ensure protection from potential hazards posed by the waste.
- The common methods of waste disposal:
    1. Municipal disposal sites
    2. Sanitary land fills
    3. Protected ash pits
    4. Placenta pits
    5. Anatomical pits
    6. Recycling
    7. Return to supplier/Manufacturer
    8. Approved sewer/drainage systems

- Untreated waste discharged into an uncontrolled, non-engineered, open dump does not protect the local environment and should not be used. Discharging waste in open dumps either within the health care institution or in the municipal facility is an insufficient solution and leads to environmental pollution.

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Sanitary Landfill

- Properly constructed and operated landfill sites offer a relatively safe disposal route for municipal solid waste, including health care waste.
- The priority is protection of the aquifer system and that each day's waste is compacted and covered with soil to maintain sanitary conditions.
- Treated health care waste can be safely disposed of in a sanitary landfill site without any problems.

2.7 Roles and Responsibilities in Health Care Waste Management

Introduction

This unit discusses the roles and responsibilities of various players in the health facility in the management of health care waste.

Duration

30 minutes

Competency

A knowledge of their own and other staff's HCWM responsibilities.

Specific Learning Objectives

At the end of this unit, participants will be able to define the HCWM roles and responsibilities of health facility staff.

Materials

- Flip chart
- Marker pens
- Activity 1: What's My Role in the Health Facility?
- **PowerPoint:** Roles and Responsibilities for HCWM

Notes to the trainer

Review the roles and responsibilities and adapt them based on your health system.

HCWM Roles and Responsibilities in HCWM

At the health facility, roles and responsibility given to different personnel vary according to their titles and their functions. Overall, managers are responsible for overseeing they the safe disposal of health care waste generated in their establishments and foster and environment that can provide necessary and quality health care at maximum profit . The composition of managers depends on the services that are offered in the institution. It should at least comprise of Hospital Medical Superintendent, Heads of Hospital Departments, Infection Control Officer, Head of Pharmacy, Radiation Officer, Nursing Officers in Charge, Waste Management focal persons, Senior Nursing Officers, food service manager and Housekeeping supervisors. Specific roles include:-

Managers

- Obtain and be familiar with national waste management policies.
- Form a national waste Management team
- Initiate the establishment of IPC committee.
- Develop a facility HCWM plan (goal, budget, personnel, roles, supervision, training, reporting).
- Coordinate the adequacy of supplies of HCWM commodities (safety boxes, bins, bin liners, and personal protective equipment (PPE)) At each management level.
- Identify and budget for HCWM activities, including final disposal.
- Develop protocol for management of needlestick injury
- Ensure seamless flow of services
- Safeguard medical data to unauthorized access
- Administer payroll
- Advocate for health worker safety.
- Provide supportive supervision and capacity building of staff on Health care Waste Management
- Detail spill management strategies and designate trained personnel for spillage management on-site
- Identify training needs for staff in HCWM.
- Plan for environmentally friendly products
- Designate responsible person for HCWM to oversee HCWM equipment.
- Ensure payments are done for waste treatment from other facilities.
- Ensure all health workers are vaccinated against Hep B and other immunizable disease.
- Ensure in-house HCWM monitoring tools are correctly filled and dispatched to the right office.
- Ensure that ambulances are equipped with puncture proof containers of appropriate size, mainly for infectious waste and sharps.
- Ensure that drivers transporting waste are aware of the procedures governing transportation of hazardous goods. If possible, proof (authorization letter or certificate indicating form of training in transportation).

- Ensure staff are appropriately segregating waste.

Health Care Providers

- Adhere to the current waste management policies with special emphasis on special waste e.g. Geno toxic/cytotoxic waste.
- Adhere to the colour-coded waste segregation system.
- Properly dispose of sharps in a safety box.
- Do not overfill safety boxes.
- Ensure staff have received hepatitis B and other required vaccinations
- Liaise with Waste Management focal person to monitor working practices for failures or mistakes
- Provide OJT for new staff and refreshers
- Train health workers on correct procedures for IPC and HCWM
- Provide advice concerning the control of infections and the standards of waste disposal system
- Identify training requirements according to staff grades and duties
- Practice "Duty of Care" principle

Waste Handlers

- Be familiar with the colour-coding system.
- Adhere to the color coding system
- Collect filled safety boxes and used bin liners on hospital stipulated frequency for disposal
- Adhere to segregation practices
- Securely store waste in a covered area until disposal.
- Always use appropriate PPE's at all times and report to supervisor in case of shortages.
- Ensure you have appropriate equipment for safe transportation of waste to the final disposal site.
- Ensure you have received hepatitis B and any other required vaccinations
- Ensure your own safety when operating the equipment and report any incidences or accidents to the supervisor
- Ensure a clean environment at the facility.

Treatment Equipment operators

- Adhere to the equipment autoclave/incinerator procedure
- Always use appropriate PPE's and report to supervisor in case of shortages
- Ensure availability of appropriate suppliers records on waste treated
- Ensure that records on treated waste are properly filled
- Ensure treated waste is safely transported to collection point for final disposal
- Ensure you have received hepatitis B and any other required vaccinations
- Monitor and timely report on for shortage of (fuel/electricity)
- Record the weight and type of waste received
- Follow a regular maintenance schedule and quality assurance testing procedures.
- Ensure your own safety when operating the equipment and report any incidents or accidents to the supervision.
- Verify proof of payment for waste received outside facility for incineration.

Training for waste handlers ends here!

The following units in this module are intended for training incinerator treatment equipment operators.

2.8 Operating and Maintaining an Incinerator

Introduction

This unit covers issues related to incinerator operation, maintenance, and documentation.

Duration

1 hour

Competency

Development of the skills needed to safely operate and maintain an incinerator.

Specific Learning Objectives

At the end of this unit, participants will be able to:

- Define incineration.
- Know which personal protective equipment an incinerator operator needs.
- Know the steps to safely operate an incinerator, including key concepts such as the preheating and loading schedule.
- Understand the importance of maintenance.
- Understand how to fill the incinerator burn log and maintenance log

Materials

- **Handout:** Appendix 14. Personal Protective Equipment for Incinerator Operators
- **Handout:** Appendix 15. Incinerator Burn Log
- **Handout:** Appendix 16. Standard Operating Procedures: Operation of a Small-Scale Incinerator
- **Handout:** Appendix 17. Maintenance Checklist for a Small-Scale Incinerator
- **Handout:** Appendix 18. Standard Operating Procedures: Operation of a Diesel-Fired Incinerator
- **PowerPoint:** Operating an Incinerator

Notes to the trainer

- Review and adapt the content for your health system.
- Use the incinerator maintenance checklist as a handout to reinforce specific areas of focus.

Incineration

What is Incineration?

Incineration is the high temperature dry oxidation to > 850^0 C in the primary chamber and $1{,}100^0$ C in the secondary chamber with a retention time of 2 seconds to avoid formation of dioxins and furans.

Incineration applies three principles – (3 T's)

- Temperature
- Time
- Turbulence

Why Incinerate Health Care Waste?

Incineration reduces volume and eliminates pathogens.

Types of Incinerators

Demontfort

This is an auto combustion fire refractory brick type dual-chamber incinerator. It operates in temperatures ranging from 600 -900^0C, and has no flue gas treatment system.

Diesel powered incinerator

This is a double chamber incinerator that uses diesel and electricity for burning and combustion with an automated control panel for temperature and air control. The primary chamber operates at minimum temperature of 850^0 C and 1100 ^{0} C at secondary chamber. Some diesel incinerators have flue gas treatment devices.

Incinerator parts

1. **Primary chamber-** This refers to the initial chamber where the waste is loaded and initial burning takes place. It decomposes all combustibles and gasifies carbon through partial combustion.
2. **Secondary chamber -** This is post combustion chamber where complete combustion of all unburned and partially burnt waste are converted into gas form. Pathogens are also destroyed in this chamber.
3. **Control panel -** This unit houses all the electrical controls of the diesel fired incinerators with display screens on temperatures.
4. **Burners -** It is a device that has piezo- igniter.
5. **Thermocouple -** A device that senses and relays temperatures in the primary and secondary chamber to the control panel.
6. **Refractory lining -** This is an internal wall in the incinerator made of fire resistant bricks (high alumina refractory bricks) with cement

7. **Chimney** – This is a vertical pipe stack or flue part of the incinerator that conveys smoke and other flue gases to the surrounding environment
8. **Fan blower** – it is a device that introduces oxygen from the surrounding environment and distributes to enhance combustion
9. **Venture panels** –These are air vent blocks casted of high thermo castable cement separating the primary chamber from the secondary ,they regulate the size of particulate matter moving from the primary to the secondary chamber
10. **Air Ducts** –Conduits that allow entry of oxygen into the primary chamber walling

Incinerator Operation

Proper operation of an incinerator ensures safe and optimal performance. When operated correctly, there will be minimal emissions and waste will be treated more effectively. Incinerator operation procedures and maintenance will be outlined for small-scale (De Montfort type) and medium-scale incinerators (diesel-powered type). Medium-scale incinerators have an automated control panel for temperature and air control, and need additional fuel for the burning process. Some may also have flue gas treatment devices.

Incineration Steps for a Small-Scale Incinerator

1. Wear personal protective equipment (PPE)—helmet, goggles, respirator, overcoat/overalls, heavy-duty gloves, apron, and boots.
2. Ensure fuel is available for operating the incinerator and that the waste to be incinerated is dry.
3. Record the number of safety boxes and bags to be burned.
4. Clean the incinerator.
   - Remove the ash without raising dust and deposit it safely in the ash pit.
   - Place the grate/tray back in the incinerator.
5. Preheat the incinerator.
   - Place firewood or other material in the incinerator.
   - Light the wood or other material.
   - After five minutes of steady burning, add more wood.
   - Continue this process every ten minutes for 30 - 45 minutes total (four cycles).

Notes on Preheating the Incinerator

1. The loading door may be kept open for this operation. Add more wood or waste with a small quantity of kerosene (if available), paper, or dry wood until the flame is burning well. Add more dry waste and close the loading door. Light smoke should be observed coming out of the chimney top. Add more fuel at regular intervals until the flame can be seen through the primary air holes burning fiercely.
2. Make sure that the chamber is at least two-thirds full of dry matter before adding waste. To hurry this process, more kerosene, paper, or dry wood can be added.
3. To determine that the incinerator is preheated, waves of heat at the base of the chimney should be observed and a fierce rumbling sound heard.

6. Load and burn the waste.
    - Load two safety boxes every eight to ten minutes.
    - Alternate loading bags of waste with loading safety boxes.
        - If the temperature drops, load combustible material such as paper or sawdust. If you observe dark smoke, the temperature is too low.
        - If the temperature gets too high, add a bag of waste.
    - When there is a flame of fire in the chimney, the temperature is too high.

Notes on Burning Waste

1. Very wet loads should be separated and included with drier material, and in extreme cases, supplemented by an extra increment of kerosene, paper, or dry wood.
2. If the incinerator is being loaded with entirely plastic materials, such as syringes in sharps boxes, it is advisable to let one box burn almost completely before adding the next. The time can be gauged by noting when the smoke level decreases.
3. Before additional loading the waste should be poked to ensure that the waste in the chamber is completely incinerated.
4. The incinerator operator should ensure he is wearing proper PPE.

7. Burn down.
    - Load the last safety box.
    - Wait ten minutes and add firewood to maintain the fire and ensure the waste is completely burned. This may take up to 30 minutes.
    - When the waste is completely burned, allow the fire to die out.
    - Do not leave the incinerator until the fire has burned down to ashes

8. Personal Protective Equipment

- Safely remove, clean and store PPEs
- Practice personal hygiene

Incineration Steps for a Diesel-Fired Incinerator

- Every incinerator must be operated in accordance with the manufacturer's instructions.
- Operation and maintenance manuals should be easily accessible for use and review by personnel responsible for operation and maintenance.
- A medium-scale incinerator normally contains a panel which provides information about the burning temperature in the first and second chamber and with which the control of the burner and fans are managed.
- Additional fuel is needed to ensure proper burning temperatures and control.

The following general operation and maintenance steps should be adapted to the specific type and brand of equipment your facility has:

1. Wear PPE—helmet, goggles, respirator, overcoat/overalls, heavy-duty gloves, apron, and boots.
2. Ensure that fuel is available for operating the incinerator.
3. Waste (amount and kind) and liters of fuel used should be recorded.
4. Clean the incinerator. Remove the ash and deposit it safely in the ash pit or to a landfill for hazardous waste.
5. Purging (optional). Purging refers to the activity of discharging combustible gases that may remain in the combustion chamber. These combustible gases may cause a gas expansion while the burners are turned on. This is achieved by switching on the fan blower for five minutes before preheating.

6. Preheating is an activity that warms up the refractory brick walling slowly in order to prevent cracking from sudden expansion. The steps for preheating are as follows:

    - Place Set the switch to the BURNING position.
    - Ensure the phase lamp indicator illuminates.
    - Turn the BURNER FAN selector to the ON position.
    - Activate the second burner by turning the switch to the ON position.
    - Preheat the second chamber for about 20 minutes.
    - After the second chamber temperature has achieved about 300ºC, preheat the first chamber by turning the switch to the ON position.
    - Preheat the first chamber for about 10 to 15 minutes, or until the first chamber temperature reaches +200°C—whichever comes first.

7. Load and burn the waste.

    - Make sure that the charging door is closed.
    - Switch off the first burner and blower.
    - Feed the waste into the incinerator through the chamber door. Waste entering the incinerator chamber must not exceed the capacity requirement of the incinerator; load quantity should consider the type of waste that will be burned. Loading of waste every ten minutes depends on the type of waste.
    - Watch the incinerator operation throughout, until the waste burns down and the emission fulfils the quality that is recommended visually.

8. Cool-down (if applicable). The cooling process is done automatically by turning the switch to the COOLING position or by turning off the burner and allowing the blower to operate for at least one hour.

Notes on Loading the Incinerator

The following waste classes can be incinerated:

- Infectious waste.
- Sharps waste.
- Pathologic waste.
- Pharmaceutical waste (expired medicine).

Never put the following into the incinerator:

- Explosives waste, such as pressurized tin, metals, or glass.
- Chemical waste.
- Radioactive waste.

Note

Glass bottles and vials should not be burned in the incinerator, as they can damage the burning chamber, block the incinerator, and create a dangerous situation for the operator, as they may implode in the chamber.

Maintenance and Repair

Scheduled Maintenance

All incinerator equipment requires regular service and preventative maintenance. In addition, unscheduled maintenance and repair are also required in the event of failures. Maintenance is scheduled daily, weekly, monthly, and annually. A service schedule should be established, and well-trained and qualified technicians should regularly visit incineration sites to inspect and service equipment.

- The facility should budget to cover the cost of travel of service and maintenance personnel.
- During site visits, any task performed, repairs done, and consumables or spare parts used should be recorded on the equipment history sheet.
- Consumables should be stocked as part of a routine service program (fuel filters, burner nozzles, etc.). Parts that are commonly replaced should also be stocked (temperature sensing probes, grates, etc.).

Small-Scale Incinerator Maintenance

Daily Maintenance

- Remove ash without raising ash dust and load it to an ash bucket; transport to a secured pit or secured landfill.
- Check for evidence of cracks on the brickwork.
- Maintain fuel stock levels.
- Keep the area clean and disinfected.
- Carefully sweep the area around the incinerator.
- Clean tools and equipment.
- Store safety boxes and other health care waste in an orderly manner.
- Ensure that the incineration area is not used as a storage area for other tools and equipment (e.g., engines).
- Prominently display service schedules near the incinerator, where they are accessible to anyone.
- Operation and service manuals should be available to operators and supervisors for reference.

Weekly Maintenance

- Clean the chimney and remove the soot.
- Remove lumps of melted glass/plastics and clean the grates.
- Properly reinstall the grates after cleaning.
- Maintain good housekeeping of the waste disposal site.
- Ensure the fencing is intact.
- Check the cement seal in the brickwork.

Monthly Maintenance

- Ensure that the fence around the site is intact.
- Check the vertical fixings of the chimney.
- Check the top sand seals and place the sand to the level of the steel channels.
- Check the external brickwork for evidence of thermal damage.
- Check the brickwork for damaged cement seal or damaged brick bonds.
- Check the ash door for corrosion.
- Check for damaged hinges on the incineration unit.
- Check the ash door for latch blockage in the door frame.
- Perform simple repairs but avoid makeshift solutions.
- Conduct repairs on defective parts of the incinerator.
- Take an inventory of the condition of tools and equipment.

Yearly Maintenance

- Inspect and replace metal parts, bricks, and consumable parts.
- Seal cracks in the mortar of the brickwork.
- Inspect and replace the stay wire/guy ropes.
- Where necessary, overhaul the incinerator unit.
- Replace incinerator operating tools as necessary.
- Check the status of the ash pit.
- Perform an annual audit.
- Ensure environmental audits and licenses are obtained.

Medium-Scale Incinerator Maintenance

Daily Maintenance

- Check for evidence of cracks in the incinerator's sheet metal casing and chamber refractory bricks.
- Check on complete removal of ash.
- Perform simple repairs but avoid makeshift solutions.
- Keep the area clean and disinfected.
- Carefully sweep and mop up the area around the incinerator.
- Clean tools and equipment.
- Maintain fuel stock levels for incineration.
- Check door seals for wear, closeness of fit, and air leakage of the burning chamber.
- Inspect the blower intake for accumulation of lint or debris.
- Check the oil filter and fuel line for leaks.

Weekly Maintenance

- Maintain good housekeeping of the ash storage site.
- Ensure that the fencing is intact.
- Inspect and clean the control panels as required.
- Investigate for fuel leakage in the fuel intake.

Monthly Maintenance

- Inspect and clean the external surface of the incinerator and stack as required. Keep the panel securely closed and free of dirt to prevent electrical malfunction.
- Inspect external "hot" surfaces in the refractory. White spots or discoloration may indicate loss of the refractory.
- Inspect the secondary combustion chamber for wear. The stainless steel face may require replacement within one to five years.
- Lubricate and inspect the burner as indicated in the manual.
- Take an inventory of the condition of tools and equipment.

Yearly Maintenance

- Inspect and replace metal parts, refractory lining, and consumable parts as needed.
- External surfaces: Inspect and paint with heat-resistant paint as required.
- Perform an annual audit and obtain appropriate documentation.
- Ensure that environmental audits and licenses are obtained and valid.
- Ensure the equipment history sheet is completed whenever the equipment is serviced.

Caution!

Do not use the waste disposal unit or incinerator station for storing non-waste commodities. Make sure the incinerator operation manuals are available for reference.

Health Care Waste Management Training Manual

References

References

National Policy and Planning

National Infection Prevention and Control Guidelines for Health Care Services in Kenya
Kenya Ministry of Public Health and Sanitation and Ministry of Medical Services, 2010.
The aim of this document is to provide health professionals and stakeholders with the guidance to implement comprehensive infection prevention and control programs.

National Policy on Injection Safety and Medical Waste Management
Kenya Ministry of Health, 2007
The aim of this document is to guide health professionals and stakeholders to provide safe injections and proper waste management in order to protect health care providers and the community from medical sharps injuries.

National Standards and Guidelines on Injection Safety and Medical Waste Management
Kenya Ministry of Health, 2006
The overall objective of the standards and guidelines is to ensure safe injection practices and proper management of related medical waste. Adherence to these guidelines will minimize risks arising from unsafe injections and improper handling of medical waste.

Guiding Principles for Managing Medical Waste
PATH, 2005
This document provides a brief overview of key considerations for developing a medical waste management plan at the facility, district, and national levels.

District- and Facility-Level Planning

Planning for Safe Syringe Disposal: Making Medical Injections Safer
PATH, 2004
This guide is designed to help health workers plan disposal systems for sharps waste. The document details critical planning steps, including mapping the district, reviewing sharps collection options and needle removal, reviewing options for disposal, developing a disposal system, and creating a district planning guide to calculate needs and plan implementation.

Technical Resources

The Incinerator Guidebook: A Practical Guide for Selecting, Purchasing, Installing, Operating, and Maintaining Small-Scale Incinerators in Low-Resource Settings
Making Medical Injections Safer (MMIS), 2010
This guidebook captures lessons learned by PATH over the course of the MMIS project, in both US Centers for Disease Control (CDC) and US Agency for International Development (USAID)

countries, on selecting, procuring, and installing a small-scale incinerator for health care waste management (HCWM).

Small-Scale Autoclaves to Manage Medical Waste: A Buyer's Guide to Selecting Autoclaves Manufactured in India

PATH, 2008

This booklet is intended to provide a starting point for managers interested in learning more about autoclaves and to aid in decision-making regarding the purchase of medical waste autoclaves manufactured in India. It includes issues to consider when purchasing an autoclave, technical specifications of some devices, and a list of Indian manufacturers of autoclaves with current contact information. The information is based on desk research and has not been verified through bench testing or field evaluation.

Small-Scale Incinerator Construction: Recommendations from the Rwanda Experience

MMIS, 2007

This report documents efforts in Rwanda to support infrastructure and systems development to ensure the safe handling, treatment, and final disposal of infectious medical waste. The document highlights recommendations from the Rwanda experience in an effort to assist stakeholders interested in safe disposal of medical waste in Rwanda and other countries to better plan HCWM infrastructure projects that include small-scale incinerator construction.

Personal Protective Equipment and Segregation Supply Specifications: For Health Care Waste Management

PATH, 2006

This resource provides guidance on the selection and purchasing of personal protective equipment. These specifications are guidelines that can be adapted to local policies and product availability. Web links provide pictures and product information that demonstrate commercial equipment that meets these specifications.

Treatment Alternatives for Medical Waste Disposal

PATH, 2005

The purpose of this document is to inform the reader about different technology options for the treatment of infectious medical waste, particularly for developing countries. It describes incineration, chemical treatment, autoclaving, microwaving, and shredding/compacting. Performance issues, environmental impact, and perspectives from several developing countries are described.

Advocacy

Quantifying Infectious Waste Produced by HIV/AIDS, Malaria, and Tuberculosis Programs and the Needs for Injection Safety Equipment

PATH, 2009

This document is intended to start discussions around quantifying the need for safe injection equipment and the amount of infectious sharps waste produced by testing and treatment programs for diseases such as HIV/AIDS, tuberculosis, and malaria. The analysis was developed to support advocacy efforts to integrate injection safety as an essential element of all health care programs.

Helping PEPFAR Partners Manage Health Care Waste: Practical Approaches and Lessons Learned From Uganda and Nigeria

PATH, 2009

Under the MMIS project, PATH has supported ministries of health and environment to develop the systems needed for effective HCWM. This paper describes the process, tools, and strategies used to successfully engage US President's Emergency Plan for AIDS Relief (PEPFAR) partners in Uganda and Nigeria to improve HCWM.

Health Care Waste Management: Sharing the Responsibility

PATH, 2009

PATH and John Snow Inc. (JSI) developed these brief talking points on HCWM to support advocacy efforts in order to raise awareness about why HCWM is important and how programs can improve current practices.

Global Resources for Health Care Waste Management

MMIS, 2009

This table was developed under the MMIS project, which PATH partners on in the areas of HCWM procurement and technical assistance. The table provides brief summaries and contact information on many of the organizations that are actively engaged in HCWM throughout the developing world. It is intended to be a resource for country programs and governments seeking funding to support HCWM activities at the country level.

Training and Guidelines

Incinerator Maintenance Checklist

PATH, 2010

This job aid was developed to support training of small-scale incinerator operators and provides key message about how to perform regular maintenance. Regular maintenance is critical to ensuring the incinerator functions optimally for the projected life of the unit.

Incinerator Operator Guidelines

PATH, 2010

This job aid was developed to support training of small-scale incinerator operators and summarizes safe and effective operation. Key steps are outlined, including preheating and optimal loading instructions. By following these steps, incinerator operators can help ensure the unit operates optimally, reaching desired temperatures and ensuring waste is safely treated.

Personal Protective Equipment for Waste Handlers and Incinerator Operators

PATH, 2008

This training aid was developed as part of training health workers in the management of sharps waste. The aid includes a graphic representation of the key equipment needed to help protect waste handlers and incinerator operators during the collection, treatment, and final disposal of health care waste.

Training Health Workers in the Management of Sharps Waste

PATH, 2006

This document contains a set of training modules designed to be adapted for use in various health care settings. The purpose of these materials is for use in training health workers in the management of

sharps waste. These materials are divided into two training guides, one for training injection providers and one for training waste handlers. By providing the materials in electronic files that can be modified and used in a modular format, PATH is hoping to facilitate local adaptation.

Key Steps in Sharps Waste Disposal
PATH, 2006
This training aid was developed as part of training health workers in the management of sharps waste. The aid includes a graphic representation of the key steps involved in the safe management of health care waste: segregation, containment, handling and storage, transport, treatment or destruction, and disposal.

Segregation of Medical Waste
PATH, 2006
This training aid was developed as part of training health workers in the management of sharps waste. The aid includes a graphic representation of the segregation of medical waste into three categories: noninfectious, infectious, and sharps. Over the last few years, a number of countries have adapted the basic concepts and developed country-specific versions of this for use in training as well as in posters in health facilities. An example adapted for Kenya is also available.

Giving Safe Injections: Using Auto-Disable Syringes for Immunization
PATH, 2001
This manual is intended for health workers and covers five different lessons related to safe injection of vaccine: disease transmission through unsafe injection, safe selection and reconstitution of vaccine, preventing needlestick injuries through safe injection practices, and an introduction of the auto-disable syringe. This manual can be presented by a trainer or reviewed by health workers alone or in groups. The manual is available in English, French, and Russian.

Online Resources

PATH website: Kenya HCWM Resources

http://www.path.org/projects/health_care_waste_Kenya_resources.php

PATH website: HCWM Resources

http://www.path.org/projects/health_care_waste_resources.php

Health Care Without Harm
Health Care Without Harm is an international coalition of 473 organizations in more than 50 countries working to transform the health care sector so it is no longer a source of harm to people and the environment. Visit the Health Care Without Harm website.

Making Medical Injections Safer Project
The MMIS project is a five-year initiative funded by PEPFAR through USAID and the CDC. MMIS is implemented by JSI in collaboration with PATH, the Academy for Educational Development, and the Manoff Group. By the end of the five-year project (2009), MMIS and national counterparts established an environment in which patients, health care workers, and the community are better

protected from the medical transmission of HIV and other bloodborne pathogens. Visit the Making Medical Injections Safer website.

Safe Injection Global Network Alliance

The Safe Injection Global Network (SIGN) Alliance is coordinated through the World Health Organization (WHO). SIGN is a voluntary coalition of stakeholders aiming to achieve safe and appropriate use of injections throughout the world. Visit the Safe Injection Global Network website.

Technical Network for Strengthening Immunization Services

Technical Network for Strengthening Immunization Services (TechNet21) is a professional network of experts in logistics who are involved in the management of immunization and other primary health care operations at the country and international levels. It serves as a forum where issues relevant to implementation of immunization services can be discussed, debated, and clarified. The forum is maintained by WHO. Visit the TechNet21website.

Vaccine Resource Library

PATH's Vaccine Resource Library offers a wide variety of high-quality, scientifically accurate documents and links on vaccine-preventable diseases and topics on immunization. In addition to resources developed at PATH, the library contains materials published by international leaders in public health, including the CDC, WHO, GAVI Alliance, and many others. Visit the Vaccine Resource Library website.

World Health Organization Healthcare Waste Management Resource

This website is managed by WHO. It is a resource for policy, planning, and management of health care waste and includes a number of databases that can be searched for technical reference material. View the WHO Healthcare Waste Management Resource website.

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Guide for Training Health Workers in Health Care Waste Management: Training Manual Appendices

Appendix 1. Participant Registration Form

PARTICIPANTS' REGISTRATION FORM

Type of training: _____

Date: _____ Venue: _____

	Name	Designation	Dept./Station	Phone No.	Email	Signature

Appendix 2. Teaching and Learning Methods

The table below summarizes various teaching and learning methods, showing their use, advantages, and limitations.

Type	Use	Advantage	Limitation
Lecture	• Provides factual knowledge. • Increases knowledge. • Teaches a specific skill or technique.	• Inexpensive. • Apparent saving of time (for the teacher) and resources. • Presence of the teacher (showmanship). • Covers a large group of students. • Covers a large amount of information within a specified period of time.	• Monologue. • Keeps the students passive. • Does not help students learn how to solve problems. • Does not allow for individual pace of learning.
Simulation	• Increases knowledge and elicits reactions from individuals and groups. • Increases knowledge. • Teaches a specific skill or technique. • Builds skills/competence. • Develops observation skills. • Improves practical abilities of those in the field.	• Inexpensive. • Interactive. • Accounts for participants' views. • Stimulates individual thinking. • Easy to focus learners' attention. • Shows a practical application of a method. • Problem oriented. • Provides constructive feedback from peers and teachers. • Ensures full participation.	• Can be time consuming. • Number of students is limited.

Type	Use	Advantage	Limitation
Role playing	• Increases knowledge and elicits reactions from individuals and groups. • Stimulates creative thinking. • Increases knowledge. • Changes attitudes. • Builds problem-solving skills. • Strengthens independent learning. • Develops peer teaching. • Teaches a specific skill or technique. • Models a step-by-step approach. • Builds skills/competence. • Develops observation skills. • Improves practical abilities of those in the field. • Illustrates reality.	• Interactive. • Accounts for participants' views. • Stimulates individual thinking. • Builds consensus. • Elicits group's understanding/agreement on a topic. • Permits teacher/student dialogue. • Easy to focus learners' attention. • Shows practical application of a method. • Develops empathy and understanding. • Develops communication skills. • Provides constructive feedback from peers and teachers. • Elicits individual feelings, attitudes, opinions on topic. • Ensures full participation.	• Can be time consuming. • High cost in personnel and time (unless peer teaching is used).
Case study	• Increases knowledge and elicits reactions from individuals and groups. • Stimulates creative thinking. • Changes attitudes. • Builds problem-solving skills. • Strengthens independent learning. • Improves practical abilities of those in the field. • Elicits group's solutions to a problem.	• Covers a large group of students. • Stimulates individual thinking. • Facilitates evaluation. • Easy to focus learners' attention. • Shows practical application of a method. • Assesses participants' mastery of topic. • Problem oriented. • Reality oriented. • Allows learners to explore alternative approaches to a situation. • Develops empathy and understanding. • Provides constructive feedback from peers and teachers. • Ensures full participation.	• Can be time consuming.

Type	Use	Advantage	Limitation
Demonstration	• Provides factual knowledge. • Increases knowledge and elicits reactions from individuals and groups. • Changes attitudes. • Builds problem-solving skills. • Strengthens independent learning. • Develops peer teaching. • Teaches a specific skill or technique. • Models a step-by-step approach.	• Covers a large group of students. • Stimulates individual thinking. • Permits teacher/student dialogue. • Facilitates evaluation. • Easy to focus learners' attention. • Shows practical application of a method. • Assesses participants' mastery of topic. • Problem oriented. • Reality oriented. • Interactive. • Develops empathy and understanding. • Ensures full participation.	• Can be time consuming. • High cost in personnel and time (unless peer teaching is used). • Can be expensive, depending on the materials used in the demonstration.
Small group activity	• Increases knowledge and elicits reactions from individuals and groups. • Stimulates creative thinking. • Changes attitudes. • Builds problem-solving skills. • Models a step-by-step approach. • Promotes discussion of common problems. • Promotes group discussion and group problem-solving. • Changes attitudes. • Builds skills/competence.	• Stimulates individual thinking. • Builds consensus. • Highly interactive. • Elicits group's understanding/agreement on a topic. • Permits teacher/student dialogue. • Easy to focus learners' attention. • Problem oriented. • Reality oriented. • Develops empathy and understanding. • Provides constructive feedback from peers and teachers. • Ensures full participation.	• Can be time consuming. • High cost in personnel and time (unless peer teaching is used). • Number of students is limited.

Type	Use	Advantage	Limitation
Brainstorming	• Stimulates creative thinking. • Changes attitudes. • Builds problem-solving skills. • Develops peer teaching. • Promotes group discussion and group problem-solving. • Elicits group's solutions to a problem.	• Inexpensive. • Interactive. • Accounts for participants' views. • Stimulates individual thinking. • Builds consensus. • Elicits group's understanding/agreement on a topic. • Permits teacher/student dialogue. • Allows learners to explore alternative approaches to a situation. • Provides many possible solutions to problems. • Develops empathy and understanding. • Provides constructive feedback from peers and teachers. • Elicits individual feelings, attitudes, opinions on topic. • Ensures full participation.	• Can be time consuming. • Number of students is limited.
Buzzing	• Stimulates creative thinking. • Changes attitudes. • Builds problem-solving skills. • Develops peer teaching. • Promotes group discussion and group problem-solving. • Elicits group's solutions to a problem.	• Inexpensive. • Interactive. • Accounts for participants' views. • Stimulates individual thinking. • Elicits group's understanding/agreement on a topic. • Permits teacher/student dialogue. • Allows learners to explore alternative approaches to a situation. • Provides many possible solutions to problems. • Develops empathy and understanding. • Provides constructive feedback from peers and teachers. • Elicits individual feelings, attitudes, opinions on topic. • Ensures full participation.	• Can be time consuming.

Type	Use	Advantage	Limitation
Discussion	• Increases knowledge and elicits reactions from individuals and groups. • Stimulates creative thinking. • Builds problem-solving skills. • Models a step-by-step approach. • Elicits discussions about common problems. • Elicits group's solutions to a problem.	• Inexpensive. • Accounts for participants' views. • Stimulates individual thinking. • Builds consensus. • Highly interactive. • Permits teacher/student dialogues. • Easy to focus learners' attention. • Problem oriented. • Reality oriented. • Allows learners to explore alternative approaches to a situation. • Provides many possible solutions to problems. • Develops empathy and understanding. • Develops communication skills. • Provides constructive feedback from peers and teachers. • Elicits individual's feelings, attitudes, opinions on topic. • Ensures full participation.	• Can be time consuming.

Type	Use	Advantage	Limitation
Focus group discussion	• Provides oral information to large and small groups. • Increases knowledge and elicits reactions from individuals. • Stimulates creative thinking. • Increases knowledge. • Changes attitudes. • Builds problem-solving skills. • Develops peer teaching. • Elicits discussions about common problems. • Promotes group discussion and group problem-solving.	• Inexpensive. • Accounts for participants' views. • Stimulates individual thinking. • Builds consensus. • Highly interactive. • Easy to focus learners' attention. • Problem oriented. • Reality oriented. • Allows learners to explore alternative approaches to a situation. • Provides many possible solutions to problems. • Develops empathy and understanding. • Develops communication skills. • Provides constructive feedback from peers and teachers. • Elicits individual feelings, attitudes, opinions on topic. • Ensures full participation.	• Can be time consuming.

Appendix 3. Draft Training Schedules

Health Care Waste Management Training for Managers

DAY 1		
Time	**Topic**	**Facilitator**
8:15AM–8:45AM	Introductions and setting the climate/experiences	
8:45AM–9:30AM	Pre-test	
9:30AM–10:00AM	Project overview and training objectives	
10:00AM–10:30AM	Introduction to health care waste management	
10:30AM–11:00AM	**Tea break**	
11:00AM–12:00PM	Waste minimization	
12:00PM–1:00PM	Segregation of waste	
1:00PM–2:00PM	**Lunch**	
2:00PM–3:00PM	Health worker safety	
3:00PM–4:00PM	Roles and responsibilities	
4:00PM–5:00PM	Overview of legal and policy framework	
DAY 2		
Time	**Topic**	**Facilitator**
8:15AM–8:45AM	Recap	
8:45AM–9:45 AM	Overview of legal and policy framework	
9:45AM- 10:15 AM	Field visit and report back	
10:15AM–10:30AM	**Tea break**	
10:30AM–1:00PM	Development/ review of facility HCWM plan	
1:00PM–2:00PM	**Lunch**	
2:00PM–3:00PM	Supervision skills	
4:30PM–5:00PM	Post-test and closure	

Health Care Waste Management Training for Service Providers

DAY 1		
Time	**Topic**	**Facilitator**
8:15AM–8:45AM	Introductions and setting the climate/experiences	
8:45AM–9:30AM	Pre-test	
9:00AM – 9:30AM	Project overview and training objectives	
9:30AM – 10:00AM	Introduction to health care waste management	
10:00AM- 10:30AM	**Tea break**	
10:30AM- 11:00AM	Key steps in health care waste management	
11:00AM- 11:30AM	Waste minimization	
11:30AM–12:30PM	Segregation of waste	
12:30PM- 1:00	Health worker safety	
1:00PM–2:00PM	**Lunch**	
2:00PM–2:30PM	Health worker safety	
2:30PM- 3:00PM	Roles and responsibilities	
3:00PM- 4:30PM	Field visit & report back	
4:30PM- 5:00PM	Post- test and closure	

Health Care Waste Management Training for Waste Handlers

Time	**Topic**	**Facilitator**
8:15AM–8:45AM	Introductions and setting the climate	
8:45AM–9:15AM	Pre-test	
9:15AM–9:30AM	Project overview and training objectives	
9:30AM–10:00AM	Introduction to health care waste management	
10:00AM–10:30AM	**Tea break**	
10:30AM–11:30AM	Health worker safety	
11:30AM–12:00PM	Segregation of waste	
12:00PM–1:00PM	Handling, storage, and transport of health care waste	
1:00PM–2:00PM	**Lunch**	
2:00PM–2:30PM	Overview of health care waste treatment and disposal	
2:30PM–3:30PM	Roles and responsibilities	
3:30PM–4:00PM	Operation and maintenance of an incinerator	
4:00PM–4:30PM	Post-test and closure	

Appendix 4. Pre- and Post-Tests for Health Care Waste Management

Pre-/Post-Test for Training of Trainers

Participant number: _____ Date: _____

1. **Evaluating learner knowledge is the primary goal of competency – based training** (Tick correct answer)

A	Yes
B	No

2. **You are planning to conduct a training on health care waste management in a county hospital. Which one of the strategies will be MOST appropriate?**

A	Send participants to the neighbouring county
B	Train the providers in their facility
C	Bring the participants to the capital for training

3. **Match the following teaching and learning methods with the expected competency**

Lecture	Identifying strengths and weaknesses in a facility HCWM system
Role play	Key facts on HIV transmission
Demonstration	Reporting a needle stick injury to a supervisor
Field trip	Assembling a safety box,

4. **Which is the most appropriate for structured on- the – job training (Tick correct answer)**

A	Bring the providers in a group and go through the same exact training
B	Bring providers from other facilities to focus on specific skills
C	Tailor training to the learning needs for the different target groups

5. **Brainstorming is BEST used to:**

A	Discuss issues that are new to learners
B	Generate ideas on a specific topic
C	Debate controversial ideas

6. **Hazardous waste includes?** (Tick the correct answers)

A	Newspapers
B	Leftover patient food
C	Needles and scalpels
D	Dirty wound dressings
E	Empty beverage bottles
F	Infusion (I.v.) lines
G	Laboratory specimens

7. Where would you place the types of waste outlined below?

(Tick inside the column on your right with the correct colour container)

	Waste	Black Bin	Yellow Bin	Red Bin	Safety Box
A.	A used syringe				
B.	A piece of gauze oozing with pus removed from a patient				
C.	Gloves used for dressing wounds				
D.	Broken glass ampoule				
E.	A placenta				
F.	Wrapping from a roll of cotton wool				
G.	An amputated limb following a road traffic accident				
H.	A serviette used for drying hands after washing with soap				
I.	Used IV line				
J.	Latex gloves used during dusting office furniture in the clinical area				

8. What is the best practice for waste segregation while attending a patient at the bedside?

(Tickthe correct answer)

A. Separate all waste including sharps in the safety box at the point of generation and later pour the rest into the respective colour coded bins

B. Mix the waste in one receptacle while attending the patient and then wear gloves to sort it into the different colour coded receptacles and the sharps box afterwards

C. Mix the waste in one receptacle while attending the patient and then pour it all into the yellow bin afterwards

9. Containers for sharps may be emptied and reused: (Tick correct answer)

A	Yes
B	No

10. Containers for sharps waste must be? (Tick correct answers)

A	Puncture proof
B	Filled with a disinfectant
C	Dry
D	Of clear plastic, so that one can see how full it is
E	Equipped with an easily removable lid to enable reuse

11. At what point is a safety box considered full and should be disposed of? (Tick correct answer)

A. When the needles are projecting out of the sharps box

B. When it is three- quarter full
C. When 100% full

12. Collection of infectious waste from wards and other points of generation should preferably take place? (Tick correct answer)

A	On a daily basis
B	Once a week
C	Once a month
D	When bins are full and at a minimum once a day

13. Storage of Infectious waste should ideally take place? (Tick correct answer)

A	In the individual wards or departments at the point of generation
B	In a separate area or room
C	Together with the ordinary household waste
D	In an area with easy access for visitors and patients

14. Ways of treating infectious waste are? (Tick correct answers)

A	Incineration
B	Disposal in special landfill site
C	Burial in a pit on hospital premises
D	Disposal together with household waste
E	Disinfection by sunshine
F	Disinfection in steam autoclave, followed by shredding

15. If incineration of infectious waste takes place the flue gas temperature should preferably be? (Tick correct answer)

A	Above 400 ^{o}C for minimum 2 seconds
B	Above 850 ^{o}C for minimum 2 seconds

16. The principle of standard precautions is? (Tick correct answer)

A	All human secretions and excretions with visible blood are potentially infectious
B	Faeces, nasal secretions, sputum, tears, urine and vomits, regardless of visible blood, are potentially infectious

17. The most important infection control measure is? (Tick correct answer)

A	Isolation of patient
B	Disinfection of surfaces
C	Hand washing
D	Correct segregation of waste

18. What will you do, if you have a problem with health care waste in your health care facility? (Tick correct answers)

A	Ignore it
B	Report the problem to your supervisor
C	Solve the problem together with colleagues
D	Solve the problem right away on your own without reporting
E	Send a written complaint to public authorities in charge of waste handling

19. **A health care waste management plan for your institution should at least address:** (tick correct answers)

A	How collection of risk waste and ordinary waste takes place
B	Detailed instructions on how health care is performed
C	Emergency procedures for managing waste
D	Definitions of responsibilities and duties

20. **List at least three steps to take immediately after an accidental needle stick injury**

a) _____

b) _____

c)_____

21. **Name three infections that are commonly associated with sharps injury**

a)_____b)_____

_____

c)_____

22. **Name two ways that you can protect yourself from acquiring infections in a health facility**

a)_____b)_____

_____

23. **List at least three policies/ guidelines/ legislation that relate to health care waste management**

a)_____b)_____

_____c)_____

_____

The End

Pre-/Post-Test for Managers and Service Providers

Participant number: _____ Date: _____

1. **Hazardous waste includes which of the following?** (Tick the correct answers.)

A	Newspapers.
B	Leftover patient food.
C	Needles and scalpels.
D	Dirty wound dressings.
E	Empty beverage bottles.
F	Infusion (IV) lines.
G	Laboratory specimens.

2. **Where would you place the types of waste outlined below?** (Tick inside the cell to the right of the waste item that corresponds to the correct colour container.)

	Waste	Black bin	Yellow bin	Red bin	Safety box
K.	A used syringe.				
L.	A piece of gauze oozing with pus removed from a patient.				
M.	Gloves used for dressing wounds.				
N.	Broken glass ampoule.				
O.	A placenta.				
P.	Wrapping from a roll of cotton wool.				
Q.	An amputated limb following a road traffic accident.				
R.	A serviette used for drying hands after washing with soap.				
S.	A used IV line.				
T.	Latex gloves used during dusting of the office furniture in the clinical area.				

1. **What is the best practice for waste segregation while attending a patient at the bedside?** (Tick the correct answer.)

A	Separate all waste, including sharps in the safety box at the point of generation and later pour the rest into the respective colour-coded bins.
B	Mix the waste in one receptacle while attending the patient and then wear gloves to sort it into the different colour-coded receptacles and the sharps box afterward.
C	Mix the waste in one receptacle while attending the patient and then pour it all into the yellow bin afterward.

2. **Containers for sharps may be emptied and reused:** (Tick the correct answer.)

A	Yes.
B	No.

3. **Containers for sharps waste must be:** (Tick the correct answers.)

A	Puncture proof.
B	Filled with a disinfectant.
C	Dry.
D	Of clear plastic, so that one can see how full it is.
E	Equipped with an easily removable lid to enable reuse.

4. **At what point is a safety box considered full and should be disposed of?** (Tick the correct answer.)

A	When the needles are projecting out of the sharps box.
B	When it is 75% full.
C	When it is 100% full.

5. **Collection of infectious waste from wards and other points of generation should ideally take place:** (Tick the correct answer.)

A	When bins are full or at a minimum on a daily basis.
B	Once a week.
C	Once a month.

6. **Storage of infectious waste should ideally take place:** (Tick the correct answer.)

A	In the individual wards or departments at the point of generation.
B	In a separate area or room.
C	Together with the ordinary household waste.
D	In an area with easy access for visitors and patients.

7. **Which of the following are ways of treating infectious waste?** (Tick the correct answers.)

A	Incineration.
B	Disinfection by sunshine.
C	Disinfection in steam autoclave, followed by shredding.

8. **If incineration of infectious waste takes place, what does the National Environmental Management Authority recommend the flue gas temperature preferably be?** (Tick the correct answer.)

A	Greater than 400^{o}C to 600^{o}C for a minimum of 2 seconds.
B	Greater than 850^{o}C to 1100^{o}C for a minimum of 2 seconds.

9. **What is the principle of standard precautions?** (Tick the correct answer.)

A	All human secretions and excretions with visible blood are potentially infectious.
B	Faeces, nasal secretions, sputum, tears, urine, and vomits, regardless of visible blood, are potentially infectious.

10. **What is the most important infection prevention and control measure?** (Tick the correct answer.)

A	Isolation of the patient.
B	Disinfection of surfaces.
C	Handwashing.
D	Use of personal protective equipment.

11. **What will you do if you observe health care waste not being segregated in your health care facility?** (Tick the correct answers.)

A	Ignore it.
B	Report the problem to your supervisor.
C	Solve the problem together with colleagues.
D	Solve the problem right away on your own without reporting.
E	Send a written complaint to public authorities in charge of waste handling.

12. **A health care waste management plan for your institution should at least address:** (Tick the correct answers.)

A	How collection of risk waste and ordinary waste takes place.
B	Detailed instructions on how health care is performed.
C	Emergency procedures for managing waste.
D	Definitions of responsibilities and duties.

13. **Select the first three steps to take immediately after an accidental needle stick injury:**

A	Identify the source patient.
B	Document the incident
C	Let the wound bleed freely.
D	Wash with soap and running water.
E	Get post-exposure prophylaxis within 72 hours.
F	Alert your supervisor.

14. **Select three bloodborne infections that are commonly associated with sharps injury:**

A	Hepatitis B.
B	HIV.
C	Hepatitis C.
D	Tetanus.

15. **Name two ways that you can protect yourself from acquiring infections in a health facility:**

A	Dispose of syringes into safety boxes immediately after use.
B	Properly segregate health care waste at point of generation.
C	Reduce unnecessary injections.
D	Wear personal protective equipment.

16. **List at least three steps to take immediately after an accidental needle stick injury**

a) _____

b) _____

c)_____

17. **Name three infections that are commonly associated with sharps injury**

a)_____b)_____

_____

c)_____

18. **Name two ways that you can protect yourself from acquiring infections in a health facility**

a)_____b)_____

_____

19. **List at least three policies/ guidelines/ legislation that relate to health care waste management**

a)_____b)_____

_____c)_____

_____

The End

Pre-/Post-Test for Waste Handlers and Treatment Equipment Operators

Participant number: _____ Date: _____

1. **Select three bloodborne infections that are commonly associated with sharps injury:**

A	Hepatitis B.
B	HIV.
C	Hepatitis C.
D	Tetanus.

2. **Where would you place the types of waste outlined below?** (Tick inside the cell to the right of the waste item that corresponds to the correct colour container.)

	Waste	Black bin	Yellow bin	Red bin	Safety box
A.	A used syringe.				
B.	A piece of gauze oozing with pus removed from a patient.				
C.	Gloves used for dressing wounds.				
D.	Broken glass ampoule.				
E.	A placenta.				
F.	Wrapping from a roll of cotton wool.				
G.	An amputated limb following a road traffic accident.				
H.	A serviette used for drying hands after washing with soap.				
I.	A used IV line.				
J.	Latex gloves used during dusting of the office furniture in the clinical area.				

3. **Select the first three steps to take immediately after an accidental needle stick injury:**

A	Identify the source patient.
B	Document the incident.
C	Let the wound bleed freely.
D	Wash with soap and running water.
E	Get post-exposure prophylaxis within 72 hours.
F	Alert your supervisor.

4. **Personal protective equipment should only be used when cleaning the wards.** (Tick the correct answer.)

A	True.
B	False.

5. **You can prevent upper respiratory tract infections through regular handwashing.** (Tick the correct answer.)

A	True.
B	False.

6. **When should collection of infectious waste from wards and other points of generation preferably take place?** (Tick the correct answer.)

A	When bins are full or at a minimum on a daily basis.
B	Once a week.
C	Once a month.

7. **Incineration is the first step in health care waste management.** (Tick the correct answer.)

A	True.
B	False.

8. **Open air burning is recommended for hospital waste treatment.** (Tick the correct answer.)

A	True.
B	False.

Appendix 5. Course Evaluation for Health Care Waste Management Training

1. **The topics provided new knowledge and practical skills for improving your professional work.**

   a) Strongly agree. b) Agree. c) Neutral. d) Disagree. e) Strongly disagree.

2. **The training methods used enabled you to improve your understanding of the subject matter.**

   a) Strongly agree. b) Agree. c) Neutral. d) Disagree. e) Strongly disagree.

3. **Please rate the following list of statements on a scale of 1 to 5 by ticking the appropriate number in the table below.**

   1. = Strongly agree 2. = Agree 3. = Neutral 4. = Disagree 5. = Strongly disagree

	Statement	**1** Strongly Agree	**2** Agree	**3** Neutral	**4** Disagree	**5** Strongly Disagree
A.	Exercises and activities helped me understand content.					
B.	Facilitators used relevant examples throughout the training.					
C.	Facilitators involved me in the learning process.					
D.	Facilitators provided clear explanations.					
E.	Facilitators ensured a good learning environment.					
F.	Facilitators were responsive to participants.					
G.	Facilitators organized sessions in a logical sequential manner.					
H.	Facilitators had good knowledge of the subject matter.					

4. **a. What do you consider the three key strengths to be of the training**?

_____

_____

_____

_____

_____

_____

_____

_____

b. What do you consider the three key weaknesses to be of the training?

_____

_____

_____

_____

_____

_____

_____

_____

5. **Give your comments about venue and meals:**

_____

_____

_____

_____

6. **What other comments would you like to make?**

_____

_____

_____

_____

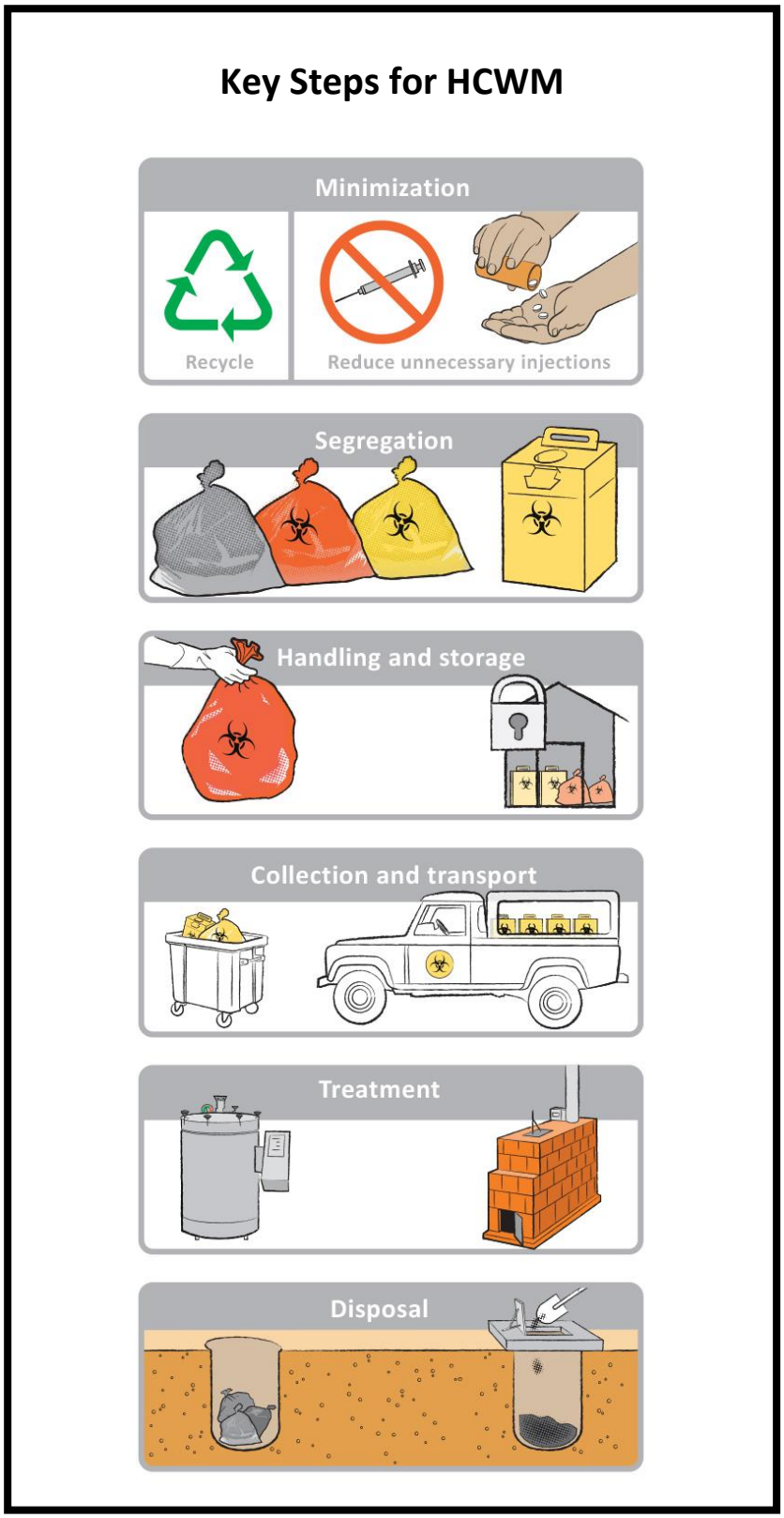
_____

_____

_____

_____

Appendix 6. Key Steps in Health Care Waste Management



Appendix 7. Segregation Guidelines

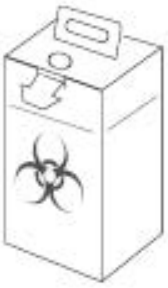
Appendix 8. Using a Safety Box

Using a Safety Box

PATH

Guidelines for safe use

- Place a safety box at each injection station and within arm's reach of the injection provider.
- Use safety box immediately after injection is given.
- Do not recap syringes.
- Do not save syringes for later removal of needles.
- Do not hold the safety box while inserting needle into the opening.
- Do not overfill the safety box.
- Do not empty or reuse the safety box.



Instructions for use

1 After injection, insert syringe into safety box.

2 When the fill line is reached (3/4 full), do not insert more syringes.

3 When safety box is full, close tab to secure box closed.

4 Dispose of safety box immediately or store in secure area.

Keep safety box dry.

Keep record of safety boxes filled and destroyed.

Appendix 9. Assessing risk in our health facilities using the risk assessment tool

Step 1. Ask.

In the case where waste is being mismanaged in your facility, rate the likelihood of an accident occurring involving the waste.

Have the participants give their responses and help them arrive at a common rating for their facility.

Quantitative Rating	Qualitative Rating
1	Extremely unlikely
2	Unlikely
3	Likely
4	Extremely likely
5	Certain

Step 2. Work with the participants to rate the consequences of the accident.

Quantitative Rating	Qualitative Equivalent	Severity
1	Minor	No Injury or damage; near miss.
2	Moderate	First aid injury; minor sickness; damage.
3	Serious	Moderate injury/illness; substantial damage.
4	Major	Major injury/illness; major damage.
5	Catastrophic	Fatality (catastrophic damage).

Step 3. Work with participants to calculate the risk.

Risk = Likelihood x Consequences

Consequences					
	5	10	15	20	25
	4	8	12	16	20
	3	6	9	12	15
	2	4	6	8	10
	1	2	3	4	5

Likelihood →

Key

Grey: Low Risk
White: Moderate Risk
Red: High Risk

Appendix 10. WHO Guidelines on How to Handwash

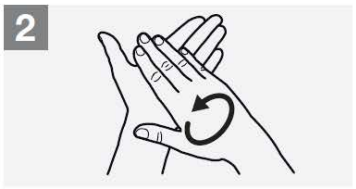
How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

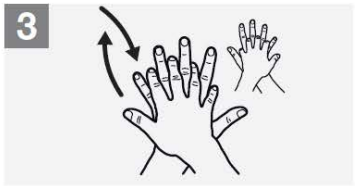
Duration of the entire procedure: 40-60 seconds

Wet hands with water;

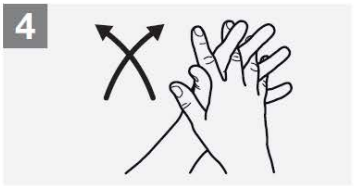
Apply enough soap to cover all hand surfaces;



Rub hands palm to palm;

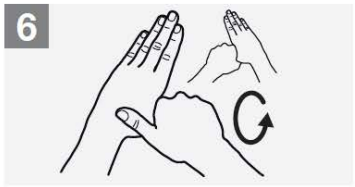


Right palm over left dorsum with interlaced fingers and vice versa;

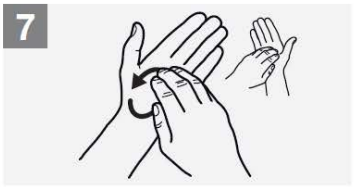


Palm to palm with fingers interlaced;

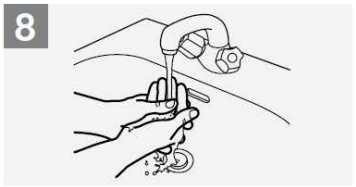
Backs of fingers to opposing palms with fingers interlocked;



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

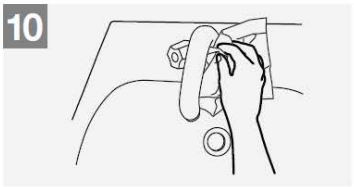


Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

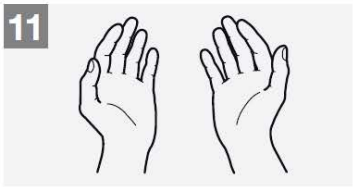


Rinse hands with water;

Dry hands thoroughly with a single use towel;



Use towel to turn off faucet;



Your hands are now safe.

World Health Organization | Patient Safety — A World Alliance for Safer Health Care | SAVE LIVES Clean Your Hands

WHO acknowledges the Hôpitaux Universitaires de Genève (HUG), in particular the members of the Infection Control Programme, for their active participation in developing this material.

May 2009

Appendix 11. General Procedure for Dealing with Spillages

Waste Spill Kit

An infectious waste spill kit should contain at least:

- A broom, pan and scraper, mop, and mop bucket.
- A large (10 liter) reusable plastic container or bucket with fitted lid, containing:
  - Two infectious waste bags for the disposal of clinical waste.
  - Disinfectant containing (1%) 10,000 ppm available chlorine or equivalent.
  - Rubber gloves suitable for cleaning.
  - Detergent and sponges/disposable cloths.
  - Personal protective equipment, including eye protection, an apron or long-sleeved impervious gown, a face mask, and heavy-duty gloves.
  - Incident report form.
  - Waste spill sign.
- Additional clean-up equipment and materials, including:
  - Protective clothing (e.g., heavy-duty rubber gloves, safety boots, or rubber boots).
  - Scoops and dustpans (recommended to be part of the kit).
  - Forceps for picking up broken glass.
  - Mops, cloths, and paper towels.
  - Buckets.
  - Non-flammable detergent**.**

General Procedures

1. Evacuate the contaminated area.
2. Decontaminate the eyes and skin of exposed personnel immediately.
3. Inform the designated person (usually the Safety Officer or the Waste Management Officer), who should coordinate the necessary actions.
4. Determine the nature of the spill.
5. Evacuate all people not involved in cleaning up if the spillage involves a particularly hazardous substance.
6. Provide first aid and medical care to injured individuals.
7. Secure the area to prevent exposure of additional individuals.
8. Provide adequate protective clothing to personnel involved in the clean-up.
9. Limit the spread of the spill.
10. Neutralize or disinfect the spilled or contaminated material if indicated.
11. Collect all spilled and contaminated material (sharps should never be picked up by hand; brushes and pans or other suitable tools should be used). Spilled material and disposable contaminated items used for cleaning should be placed in the appropriate waste bags or containers.
12. Decontaminate or disinfect the area; wipe up with an absorbent cloth. The cloth (or other absorbent material) should never be turned during this process, because this will spread the contamination. The decontamination should be carried out by working from the least to the most contaminated part, with a change of cloth at each stage. Dry cloths should be used in the case of

liquid spillage; for the spillage of solids, a cloth impregnated with water (acidic, basic, or neutral as appropriate) should be used.

13. Rinse the area and wipe dry with absorbent cloth.
14. Decontaminate or disinfect any tools that were used.
15. Remove protective clothing and decontaminate or disinfect it if necessary.
16. Seek medical attention if exposure to hazardous material has occurred during the operation.

Appendix 12. Accidents, Incidents and Spills Report Form

Please complete this form and return to the supervisor.

PERSONAL INFORMATION

Name: _____ Date of birth (dd/mm/yy): _____

Address: _____ Home phone #: _____

Department: _____ Work phone #: _____

Employment category: Staff ( ) Student ( ) Visitor ( ) Contractor ( ) Other ( ) _____

Occupational title: (e.g., technician, electrician, nurse, etc.) _____

Supervisor's name: _____

STATEMENT OF ACCIDENT, INCIDENT, OR SPILL

Date of accident, incident, or spill: _____ Time _____ am/pm

Location of accident, incident, or spill: _____

Type of injury: (e.g., cut, fracture, puncture, etc.) _____

Treatment of injury or exposure: (e.g., first aid, medical treatment, lost work days):

_____

Name of person rendering treatment, if any: _____

Worker's compensation report filed? Yes ( ) No ( )

Did any defects of equipment or tools contribute to this accident, incident, or spill? Yes ( ) No ( )

Was there any property or equipment damage? Yes ( ) No ( )

Was the correct equipment, tools, or material used? Yes ( ) No ( )

What environmental, if any, conditions were contributing factors? (e.g., slippery floors, noise level, illumination, etc.) _____

Was the lack of personal protective equipment (PPE) or safety controls a contributing factor in this accident, incident, or spill? Yes ( ) No ( )

Explain: _____

_____

_____

Was adequate emergency equipment available? Yes ( ) No ( )

Was training in accident prevention given to the injured employee prior to duties performed at the time of the accident, incident, or spill? Yes ( ) No ( )

Specify: _____

_____

_____

_____

_____

Describe how this accident, incident, or spill occurred and the remedial actions. (In the case of a spill, list the name of the material and quantities released.)

_____

_____

_____

_____

What preventive measures will be taken to avoid a reccurrence of this accident, incident, or spill?

_____

_____

_____

_____

The undersigned agree to the accuracy of this report and the preventive measures.

Supervisor's signature:_____ Date (dd/mm/yy): _____

Employee's signature:_____ Date (dd/mm/yy): _____

Reviewed by Medical Director and/or Health Worker -In-Charge of clinic

Director's signature:_____ Date (dd/mm/yy): _____

Comments:

_____

_____

_____

_____

Source: World Health Organization Regional Office for Africa (WHO/AFRO), 2004. Manual of infection prevention and control. WHO: Geneva

Appendix 13. Personal Protective Equipment for Waste Handlers

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.

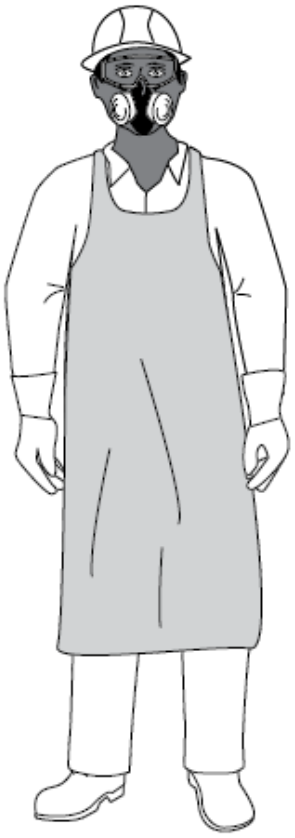
- Face mask
- Heavy-duty gloves
- Plastic apron
- Clothes that cover the body
- Heavy duty boots

Appendix 14. Personal Protective Equipment for Incinerator Operators

Protect yourself by wearing personal protective equipment (PPE) when handling waste and operating an incinerator.

Wearing PPE reduces risk from sharps, germs, exposure to blood and other bodily fluids, splashes from chemicals, inhalation of exhaust, and sparks from the incinerator.

- Helmet
- Safety goggles
- Respirator mask
- Heavy duty, heat-resistant gloves
- Apron
- Clothes that cover the body
- Heavy duty, heat-resistant boots



JANUARY 2015

Appendix 15. Incinerator Burn Log

Date DD/MM/YY	Waste description Kg/Boxes				Maximum Temperatures (˚C)		Incineration time		Total hours	Fuel (liters)	Remarks
	Black bins	Yellow bins	Red bins	Safety boxes	Primary chamber	Secondary chamber	Start time	End time			
TOTAL											

Incinerator operator _____ Sanitation officer _____

Date _____ Date _____

Sign _____ Sign _____

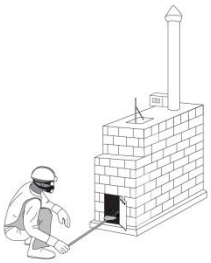
Appendix 16. Standard Operating Procedures: Operation of a Small-Scale Incinerator

Standard Operating Procedures: Operation of a Small-Scale Incinerator

1. **Wear personal protective equipmen (helmet, goggles, respirator, overcoat/overalls, heavy-duty gloves, apron, and boots).**
2. **Ensure fuel is available for operating the incinerator and that the waste to be incinerated is dry.**
3. **Record the number of safety boxes and bags to be burned.**
4. **Clean the incinerator:**
   - Remove the ash and deposit it safely in the ash pit.
   - Place the grate/tray back in the incinerator.
5. **Preheat the incinerator:**
   - Place firewood or other material in the incinerator.
   - Light the wood or other material.
   - After 5 minutes of a steady burn, add more wood.
   - Continue adding wood every 5 minutes for 20 minutes total.
6. **Load and burn the waste:**
   - Load 1 safety box every 8–10 minutes.
   - Alternate loading bags of waste with loading safety boxes.
   - If the temperature drops, load combustable material such as paper.

   ⚠ **If you see smoke, the temperature is too low.**

   ⚠ **If you see fire in the chimney, the temperature is too high.**
   - If the temperature gets too high, add a bag of waste.
7. **Burn down the waste:**
   - Load the last safety box.
   - Wait 10 minutes and add firewood to maintain the fire and ensure the waste is completely burned. This may take up to 30 minutes.
   - When the waste is completely burned, allow the fire to die out.
   - Do not leave the incinerator until the fire has burned down to embers.
8. **Secure the incinerator and leave.**
9. **Remove personal protective equipment; clean the equipment and store it in a secure area.**



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Appendix 17. Maintenance Checklist for a Small-Scale Incinerator

Maintenance Checklist for a Small-Scale Incinerator

Daily Maintenance

- ❑ Check for evidence of cracks on the brickwork. Perform simple repairs but avoid makeshift solutions. Keep the area clean and disinfected.
- ❑ Carefully sweep the area around the incinerator. Clean tools and equipment.
- ❑ Store safety boxes and other health care waste in an orderly manner.
- ❑ Maintain fuel stock levels.

Weekly Maintenance

- ❑ Clean the chimney and remove the soot.
- ❑ Remove lumps of melted glass/plastics and clean grates. Properly reinstall the grates after cleaning.
- ❑ Maintain good housekeeping of the waste disposal site. Ensure the fencing is intact.
- ❑ Check the cement seal to brickwork.

Monthly Maintenance

- ❑ Ensure the fence of the site is intact.
- ❑ Check the vertical fixings of the chimney.
- ❑ Check the top sand seals.
- ❑ Check the external brickwork for evidence of thermal damage. Check the cement seal to brickwork.
- ❑ Check the ash door for corrosion.
- ❑ Check the ash door for damaged hinges.
- ❑ Check the ash door for latch blockage in the door frame.
- ❑ Take an inventory of condition of tools and equipment.

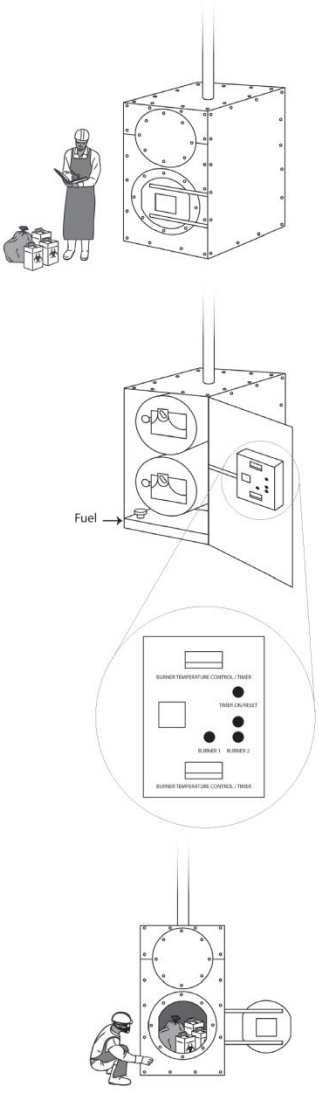
Yearly Maintenance

- ❑ Inspect and replace metal parts, bricks, and consumable parts if necessary. Inspect and replace stay wire/guy ropes.
- ❑ Overhaul the incinerator.
- ❑ Check the status of the ash pit. Perform annual audit of the ash pit.
- ❑ Ensure environmental audits and licenses are obtained.

Appendix 18. Standard Operating Procedures: Operation of a Diesel-Fired Incinerator

Standard Operating Procedures: Operation of a Diesel - Fired Incinerator

1. **Wear personal protective equipment (overcoat/overalls, boots, apron, goggles, respirator, helmet, heavy-duty gloves).**
2. **Ensure fuel is available for operating the incinerator.**
3. **Record waste (weight and type) and used fuel (in liters).**
4. **Clean the incinerator: remove the ash and deposit it safely in the ash pit.**
5. **Check for any cracks and deformities, and record.**
6. **Preheat the incinerator:**
   - Place switch on BURNING position.
   - Ensure phase lamps indicator illuminates.
   - Turn BURNER FAN selector to ON position.
   - Activate second burner by turning switch to ON position.
   - Preheat the incinerator to 850 degrees Centigrade in the primary chamber.
   - Switch off both primary and secondary burners.
7. **Load and burn the waste (make sure that charging door is closed):**
   - Load the waste into the incinerator.
   - Switch on the primary and secondary burners and blowers.
   - Burn the waste for 20 minutes loading every 10 minutes (Poke the waste before reloading; ensure the poke does not damage refractory lining).
   - Watch the incinerator operation until complete, until all the waste burns down.
8. **Cool down:**
   Turn off the burner
   Leave the blower operating for at least one hour.
9. **Turn off the blower and power source.**
10. **Secure the incinerator and leave.**
11. **Remove personal protective equipment; clean the equipment and store it in a secure area.**



Appendix 19. Waste Tracking Document for Offsite Transport

FORM III. TRACKING DOCUMENT

(To be completed in five copies)

A *(Regulation 8)* Transporter	**Serial No.:**	
	Registered name of transporter:	
	Usual municipality/district of operation:	
	License number:	
	Issuing authority:	
CONSIGNMENT NOTE FOR THE CARRIAGE AND DISPOSAL OF SOLID WASTE		
B Description of the waste	**Area collected:**	
	Type of Waste:	
	Description and physical nature of waste:	
	Quantity/size of waste:	
	Number of containers:	
C Disposer's certificate	I certify that I have received the waste as described in A and B above. The waste was delivered in vehicle _____ (Registration No.) at _____ (time) on _____ (date), and the carrier gave his/her name as _____ on behalf of _____. The waste shall be disposed of as per disposal license issued by the Authority. Signed: _____ Name: _____ Position: _____ Date: _____ On behalf of: _____	

Appendix 20. Health Care Waste Management Facility Planning Tool

Name of facility: _____

Supervisors:

Names and designation:

_____

_____

A. Staffing plan

Who is responsible overall for supervising health care waste management at your facility? Attach a copy of the supervision structure and organizational chart of your facility.
Define roles for health care waste management (HCWM) for each cadre of staff: ***Example:*** Medical superintendent: Ensures adequate HCWM supplies, ensures staff are trained, supervises HCWM practices, etc. Nursing officer in-charge: Doctor/Clinician: Nurse: Public health officer: ***Example:*** Patient attendants: Ensure supplies for waste segregation are in the ward. Waste handler: Incinerator operator: Other:

List the number of staff and their designations at your facility in the table below.

Designation	Number
Doctors/Clinicians	
Nurses	
Laboratory staff	
Patient attendants	
Waste handlers	
Incinerator operators	
Others	

B. Quantification of health care waste

Define type and quantity of waste generated. Use the health care waste quantification tool to collect data for one week in order to complete the questions below.

Type	Quantity per week (in kg or number of safety boxes)
Non-infectious waste	
Infectious waste	
Highly infectious waste	
Sharps waste	

C. Health care waste management handling practices

Concept	Practice
Segregation/Separation into different coloured waste bins *Category of waste and colour code (or label)*	Infectious: Highly infectious: Sharps: General: Other:
Storage of waste awaiting disposal	Safety boxes: Infectious waste: Highly infectious/Anatomical: General waste:

Guidelines for bin placement

Designate which wards will have which bins (not all wards will need red bins).

Ward/Department	Black bin	Yellow bin	Red bin	Other (specify)
TOTAL				

D. Disposal procedures

Category of waste	Segregation	Disposal method *(incinerate, autoclave, placenta pit, general waste pit, transport for offsite disposal)*
Sharps	Safety box	
Highly infectious/ anatomical waste	Red bin	
Infectious waste	Yellow bin	
General waste	Black bin	
Food waste	Food waste bin	

E. Schedule for disposal of waste

Day			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

Note:

- Anatomical waste is disposed of immediately after generation into protected pits.
- Safety boxes are collected when ¾ full.
- Food waste is collected after every meal time.

F. Proposed improvements

Item/Activity	Date of introduction	Total cost (Kshs)	Responsible person
1. Construction/Repair of incinerator			
2. Sharps pits			
3. Excavation of waste disposal pits			
4. Fencing of waste disposal area			
5. Other (specify)			

G. Health care waste management supplies

Use the information from the bin placement guidelines to quantify bin and bin liner needs.

Supplies	Quantity	Total Cost (Kshs)
Safety boxes		
Colour-coded bins		
Colour-coded bin liner bags		
Personal protective equipment		
Needle removers		
Wheelbarrows		
Trolleys		
Shovel		
Hard broom		
Ash rake		
Kerosene/Fuel for incinerator (quarterly)		
Other supplies		

H. Health care waste management training

Staff cadre	Training topics	Date (proposed)
Waste handlers		
Incinerator operators		
Health care providers		
Others		

I. Monitoring schedule

Staff cadre	Supervisor	Frequency
Waste handlers		
Incinerator operators		
Health care providers		

J. Budget allocation

What is the current facility budget allocation for health care waste management?
Kshs._____ per quarter (3months).

What steps will you take to begin identifying funds to support this health care waste management plan?

1. _____
2. _____
3. _____

What are potential sources for these funds?

1. _____
2. _____

K. Steps to operationalize the facility health care waste management plan

Detail next steps to operationalize the health care waste management plan

1. Present plan for approval by facility management team.
   _____
   _____
2. Prioritize activities to implement immediately.
   _____
   _____
   _____
3. Budgeting for improvements.
   _____
   _____
   _____
4. Planning for better integration of HCWM into ongoing activities.
   _____
   _____

Date:

Tools

1. Health Care Waste Management Quantification Tool
2. Weekly Summary Sheet
3. Incinerator Operation Log

Appendix 21. Health Care Waste Management Facility Plan: Waste Quantification Tool

Hospital name: _____

Date: _____

		Non-infectious		Highly infectious		Infectious		Sharps		
	Service area/ Department	Kg	No. of black bags	Kg	No. of red bags	Kg	No. of yellow bags	No. of safety boxes	**Other**	**Remarks**
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
	Total per day									

Weekly summary sheet

Waste category	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total	Average per day
Sharps									
Infectious									
Highly infectious									
Non-infectious									
Other categories									

Notes:

_____

_____

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Appendix 22. Status of Health Care Waste Management: A Facility Self-Assessment Tool

Health care waste management (HCWM) activities implemented	Not started	In process	Completed	Next steps
1. HCWM facility plans finalized and approved by facility management.				
2. Steps taken to minimize health care waste. Describe:				
a.				
b.				
c.				
3. HCWM commodities for segregation available in all service delivery points.				
a. Colour-coded bins.				
b. Safety boxes.				
c. Bin liners.				
4. Information, education, and communication materials about segregation posted in the facility.				
5. Health care waste collected and stored in a secure, covered area prior to disposal.				
6. Health care providers trained on segregation when starting in a new position.				
7. Waste handlers trained when starting in new position.				
8. Personal protective equipment provided and in use for all waste handlers.				
9. All incinerator operators trained on proper operation and maintenance.				
10. Personal protective equipment provided and in use for all incinerator operators.				

Health care waste management (HCWM) activities implemented	Not started	In process	Completed	Next steps
11. Quantities of health care waste generated and disposed of in the facility are recorded using a data collection form.				
12. Monitoring and supervision system in place to support the HCWM system.				
Number of activities not begun				
Number of activities in process				
Number of activities completed				

Notes:

_____

_____

_____

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_____

_____

_____

Appendix 23. Key Messages for Managers

Key Messages on Health Care Waste Management

- Active support by management is critical to improving health care waste management (HCWM) systems at the program and facility levels. Key areas that require support include setting up HCWM budget items, strengthening infection prevention and control committees, and designating staff responsible for HCWM.
- Essential HCWM commodities should be available, including colour-coded bins, bin liners, safety boxes, waste transfer trolleys, and personal protective equipment.
- Health care waste should be segregated at the point of generation following the national guidelines described in the medical waste segregation poster (included in this kit). Infectious waste is to be treated appropriately, either by high-temperature incineration, steam sterilization using a medical waste autoclave, or any other recommended method to eliminate risk during handling and disposal. In the absence of an onsite safe treatment and disposal method, the facility should consider transporting waste offsite to where adequate facilities are available.
- Health workers need to be protected with the appropriate personal protective equipment, which includes helmets, goggles, heavy-duty gloves, mackintosh aprons, masks/respirators, and boots.
- All staff who handle health care waste should be vaccinated to protect them from tetanus and hepatitis B and C. When exposed to HIV infection in the course of duty, health workers should know where to obtain post-exposure prophylaxis (PEP). A PEP register should be filled out every time a health worker is provided with the service.
- All staff should be trained on HCWM, including orientation for new hires. Refresher training should be offered when possible and during supportive supervision.
- Information, education, and communication materials focusing on HCWM, injection safety, and infection prevention and control (IPC) should be strategically placed in all departments at the hospital to reinforce HCWM messages.
- Each facility should have a waste management plan and copies of the national policy documents on IPC and HCWM to guide implementation of HCWM activities.

Key Messages on Giving Safe Injections

- A safe injection is one that is given by a certified health care provider in a registered health care facility using a new needle and syringe which is properly disposed of after use.
- Unsafe injections spread disease, including HIV, hepatitis, and others.
- Facility and program managers can prevent unsafe injections by reducing the unnecessary use of injectable medications in health facilities.
- Facilities must be stocked with adequate injection supplies to ensure a new needle and syringe are used for every injection.
- Facilities must be stocked with adequate supplies of safety boxes and HCWM supplies to ensure all syringes are safely disposed of after use.
- Facilities should have established and well-known procedures in place if accidental needle sticks occur.
- Staff at all facilities should know about the importance of PEP.

- All of us have a professional commitment to ***FIRST DO NO HARM***.

Key Messages on Reducing Unnecessary Injections

- Although some injections are necessary, many are unnecessary.
- Other forms of medication that are just as effective as injections include oral medications, inhalers, lotions, pessaries, and suppositories.
- Compared to injections, the benefits of alternative forms of medication include reduced risk of infection, fewer expenses incurred, and reduced medical waste.
- All providers and pharmacists should be trained to counsel patients about the use of other forms of medication.
- All facilities should document their plan to reduce the number of injections, for prescribers to follow. The medicines and therapeutics committees should spearhead these efforts.
- All community health workers attached to the facilities should be trained to facilitate discussions in the community about the effectiveness of other forms of medication.
- Facilities should use all accessible communication channels to pass messages to the community, including health talks within the health facilities and health programs in the media.


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