

Sample Master Curriculum for Healthcare Waste Management Training

Course Content:

TOPIC	DURATION
Module 1: Health and Environmental Impacts of Infectious and Other Hazardous Healthcare Waste, Guiding Principles and the Key Steps of HCWM	
Part A: Health Impacts of Infectious Waste and Infection Control	1 hour
Part B: Health and Environmental impacts of Other Hazardous Healthcare Waste	2 hours
Part C: Key Steps in Healthcare Waste Management	30 minutes
Module 2: The Healthcare Waste Management System	
Part A: Obstacles to a Good HCWM System	1 hour
Part B: Classification and Segregation	2 hours
Part C: Handling and Collection	2 hours
Part D: On-site Transport	1 hour
Part E: Storage	1 hour
Part F: On-site Treatment and Disposal	1.5 hours
Part G: Off-site Transport, Treatment and Disposal	1 hour
Module 3: Review of Healthcare Waste Management	3 hours ¹
Module 4: Management of Specific Waste Streams	
Part A: Specific Infectious Wastes	2 hours
Part B: Chemical waste management	1.5 hours
Part C: Management of Wastewater	1 hour
Module 5: Waste minimization	2 hours
Module 6: Occupational Safety and Health	1 hour
Module 7: Contingency planning	1 hour
Module 8: Legislative, regulatory and policy aspects	1 hour
Module 9: Institutionalizing and sustaining HCWM	
Part A: Organization	2 hours
Part B: Training	1 hour
Part C: HCWM Budgeting	1 hour
Module 10: HCWM planning	3 hours
Module 11: Continuous Monitoring and Quality Improvement	1 hour
Module 12: Models of HCWM Around the World	1 hour
Total	34.5 hours

¹ Including 2 hour site visit but excluding travel time to a healthcare facility and optional quiz

Module 1: Health and Environmental Impacts of Infectious and Other Hazardous Healthcare Waste, Guiding Principles and the Key Steps of HCWM

Part A: Health Impacts of Infectious Waste and Infection Control

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - List who is at risk of exposure to infectious healthcare waste (patients, health workers, waste workers, community)
 - List and define each link in the chain of infection and explain how infectious diseases can be spread through infectious waste
 - Describe biological hazards of healthcare waste and routes of exposure to health workers, waste workers and community
 - List the major sources of disease transmission from healthcare waste (sharps, blood, and body fluids)
 - Discuss the facility's responsibility to protect all of its workers and the community from exposure to infectious healthcare waste hazards
 - Apply the hierarchy of controls to controlling the exposure to healthcare waste
 - Describe how a HCWM system is an integral part of an infection control program.
- **Trainer/Participant Activities**
 - The trainer presents the risks associated with healthcare waste, the chain of infection, routes of exposure, major sources of disease transmission, moral and legal responsibilities, the hierarchy of control, and the link between HCWM and infection control.
 - Activity: The purpose of this activity is for participants to make a list of possible hazards related to infectious healthcare waste within a healthcare facility (their own or another). The trainer asks the participants to pair up with their neighboring course participant and share some strategies for reducing or eliminating exposure to these healthcare waste hazards.
 - The trainer and participants discuss the importance of proper health care waste disposal.
 - The trainer gives an assignment to participants prior to the next session.
- **Resources**
 - Chapter 14 of the WHO blue book

Part B: Health and Environmental impacts of Other Hazardous Healthcare Waste

- **Duration:** 2 hours
- **Methodology**
 - Lecture/Discussion
 - Small group discussion

- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
 - Large sheets of paper for each discussion group
 - Real or hypothetical facility map
- **Expected Outcomes**

Participants will be able to:

 - Describe the environmental impacts of waste treatment and disposal of regular solid waste
 - Describe the environmental impacts of wastewater
 - Describe the environmental impacts of chemical and radiological wastes
 - Describe the interrelationship between environment and health
 - Describe chemical and radiological hazards of other hazardous healthcare waste and routes of exposure to health workers, waste workers, and the community
 - Discuss the facility's responsibility to protect all of its workers and the community from exposure to chemical and radiological hazards
 - Describe the hierarchy of waste management.
- **Participant Assignment Prior to Session:**
 - Each participant brings a facility map, sketch, or floor plan of their healthcare facility. Option: The participant uses a hypothetical facility map.
- **Trainer/Participant Activities**
 - The trainer presents the basic concepts of environmental health; the environmental impacts of incineration and improper disposal of solid and liquid healthcare wastes; hazards associated with chemical and radiological wastes; moral and legal responsibilities; and the hierarchy of waste management (prevent, reduce, reuse, recycle, recover, responsible disposal).
 - Activity: The purpose of this activity is for the HCWM coordinators to identify infectious and other hazardous wastes within a healthcare facility and create strategies for preventing exposure. The trainer divides the participants into groups of 3 to 4 people and asks each group to review a map of a real or hypothetical facility, identify the hazards, and identify the risks of exposure both within the facility and outside the facility. (The map and notes should be kept for discussion throughout the course.)
 - The trainer and participants debrief and the trainer synthesizes the discussions.
- **Resources**
 - WHO policy on safe management of healthcare waste
 - One-page summary of the Stockholm Convention on Persistent Organic Pollutants
 - WHO report on health impacts of healthcare waste
 - Chapter 3 of the WHO blue book

Part C: Key Steps in Healthcare Waste Management

- **Duration:** 30 minutes
- **Methodology**
 - Lecture
- **Training Aids**
 - Projector
 - Power Point presentation

- **Expected Outcomes**
 - Participants will be able to:
 - List the components of HCWM.
- **Trainer/Participant Activities**
 - The trainer presents the different components of HCWM in a step-by-step beginning-to-end (cradle-to-grave) approach. The key steps in HCWM include:
 - Waste minimization
 - Classification and segregation
 - Handling and collection
 - Storage
 - On-site and/or off-site transport
 - On-site and/or off-site treatment
 - Final disposal.

Module 2: The Healthcare Waste Management System

Part A: Obstacles to a Good HCWM System

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Small group discussion
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**
 - Participants are able to:
 - List and prioritize obstacles to HCWM.
- **Trainer/Participant Activities**
 - The trainer begins the training session by asking participants to list and prioritize what they consider to be the obstacles to HCWM.
 - Activity: The purpose of this activity is for the HCWM coordinators to share the prioritized list with their neighboring course participant.
 - The trainer asks each group to present their findings and leads a discussion while summarizing the participants' discussion on the flip chart or board.
 - The trainer gives an assignment to the participants prior to the next session.

Part B: Classification and Segregation

- **Duration:** 2 hours
- **Methodology**
 - Lecture/Discussion
 - Small group discussion
 - Individual participant activity
- **Training Aids**
 - Projector

- PowerPoint presentation
- Flip chart and marker pens and/or board and chalk
- Surrogate waste and different types of color-coded waste containers
- Sample matrix designed to get the participants to think about the segregation requirements
- **Expected Outcomes**

Participants will be able to:

 - List the major classifications and characteristics of hospital waste
 - Define what comprise sharps waste and its contribution in disease transmission
 - Demonstrate basic segregation of hospital waste
 - Demonstration appropriate containerization of healthcare waste, especially sharps waste.
- **Participant Assignment Prior to Session:**
 - Each participant reads the excerpt from the regulations on the country's classification system and segregation requirements.
- **Trainer/Participant Activities**
 - The trainer presents the country's classification system, characteristics of different types of healthcare waste, and segregation requirements for healthcare waste.
 - Group activity 1: The trainer then shows a matrix listing different types of waste and facilitates a discussion with the class regarding which containers each type of waste should be placed in.
 - Small group activity 2: The trainer divides the participants into groups of 3 to 4 people and gives each group different types of surrogate waste items, including sharps, and asks each group to place their waste items in the proper containers.
 - Homework: Each participant writes guidelines on classification and segregation specific to their healthcare facility.
- **Resources**
 - Excerpts from the country's regulations on the classification system and segregation requirements
 - Chapter 2 of the WHO blue book

Part C: Handling and Collection

- **Duration:** 2 hours
- **Methodology**
 - Lecture/Discussion
 - Small group activity/discussion
 - Individual participant activity
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
 - Safety boxes or sharps containers
 - Waste bins and color-coded liners
 - Personal protective equipment or PPE (gloves, gumboots, aprons, masks and eye shields)
 - Real or hypothetical facility map and notes from Module 1 Part B
 - Photos/slides of posters on segregation

- Large sheets of paper for participants' sketches
- **Expected Outcomes**

Participants will be able to:

 - Identify where infectious waste might be found in a healthcare facility
 - Create a floor plan with the appropriate selection, color-coding, labeling, marking, and placement of waste bags and containers
 - Discuss acceptable options for commercial color-coded bags and sharps containers
 - Create informational posters and signage specific to waste segregation
 - Write procedures for the proper closure, removal, and safe handling of waste; the replacement of bags; the 3/4th fill rule requirements; and the frequency of collection
 - Describe appropriate collection and handling procedures for infectious waste.
- **Trainer/Participant Activities**
 - The trainer presents the basic requirements for containerization, color coding, labeling or marking, signage, proper selection and placement of containers, 3/4th fill rule, and PPE usage.
 - The trainer and participants discuss the segregation of sharps and non-sharps healthcare waste and the color coding system; the trainer demonstrates how to use a safety box or sharps container. The trainer and participants discuss acceptable options for color-coded bags and sharps containers in situations where they are not available.
 - The trainer and participants discuss handling of healthcare waste, demonstrate how to use basic PPEs, how to carry a waste bin or bag (focusing on safety and ergonomic issues) and how to replace bin liners. [PPEs will be discussed in greater detail in a later session.]
 - Small group activity 1: The purpose of this activity is for the HCWM coordinators to plan the selection of proper containers and the placement of single or combinations of containers at appropriate locations in a health facility. The trainer divides the participants into the same groups of 3 to 4 people that worked together in Module 1(B) and asks each group to mark the placement of containers on the map created in Module 1(B) of a real or hypothetical facility.
 - The trainer and participants debrief and the trainer synthesizes the discussions. (The map and notes should be kept for discussion in other sessions throughout the course.)
 - Small group activity 2: The purpose of this activity is for the HCWM coordinators to learn to design simple but effective posters related to segregation. The trainer divides the participants into groups of 3 to 4 people and asks each group to create a sketch of a poster on segregation. Each group presents their hand-drawn poster to the class for discussion.
 - Homework: Each participant writes procedures for the proper closure and collection of waste, including the frequency of collection, specific to their healthcare facility.
- **Resources**
 - Excerpts from the country's regulations on handling and collection of healthcare waste
 - Chapter 7 of the WHO blue book
 - Sample posters on segregation

Part D: On-site Transport

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion

- Small group activity
- Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Photos/slides of actual on-site transport equipment
 - Real or hypothetical facility map and notes from Module 1 Part B
 - Optional: actual carts
- **Expected Outcomes**

Participants will be able to:

 - Define the essential elements of on-site transport equipment and evaluate and improve equipment designs
 - Write procedures for the safe routing and on-site transport of waste
 - Write procedures for cleaning and disinfection of on-site transport equipment.
- **Trainer/Participant Activities**
 - The trainer presents the basic requirements or recommendations for on-site transport, safe routing, and maintenance
 - The trainer provides examples of appropriate waste transportation equipment.
 - The trainer and participants examine photos/slides of on-site transport equipment and the group discusses the strengths and weaknesses of each transport system.
 - Small group activity: The purpose of this activity is for the HCWM coordinators to develop routing plans for a health facility. The trainer divides the participants into the same groups of 3 to 4 people that worked together in Module 1(B) and asks each group to delineate on the map a safe route for the collection of waste from the real or hypothetical facility.
 - The trainer and participants debrief and the trainer synthesizes the discussions and summarizes the participants' discussion on the flip chart or board.. (The map and notes should be kept for discussion in other sessions throughout the course.)
 - Homework: Each participant writes procedures for the periodic inspection, cleaning, and disinfection of on-site waste transport equipment specific to their healthcare facility.
- **Resources**
 - Excerpts from the country's regulations on on-site transport
 - Chapter 7 of the WHO blue book

Part E: Storage

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Photos/slides of actual storage areas
- **Expected Outcomes**

- Participants will be able to:
- Define the essential elements of a storage facility according to WHO recommendations
 - Evaluate and improve a healthcare waste storage facility design
 - Develop procedures for storage time limits and maintenance.
- **Trainer/Participant Activities**
 - The trainer presents the basic requirements of a healthcare waste storage facility and shows a typical design.
 - The trainer shows photos or slides of healthcare waste storage facilities and the group discusses the strengths and weaknesses of each.
 - The trainer presents the requirements for storage limits and recommendations for cleaning and disinfection.
 - The trainer gives an assignment to the participants prior to the next session.
 - Homework: Each participant writes guidelines for storage, cleaning, and disinfection of healthcare waste storage areas specific to their healthcare facility.
 - **Resources**
 - Excerpts from the country's regulations on storage of healthcare waste
 - Chapter 7 of the WHO blue book

Part F: On-site Treatment and Disposal

- **Duration:** 1.5 hours
- **Methodology**
 - Lecture/Discussion
 - Small group or large group discussion
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Videos
- **Expected Outcomes**

Participants will be able to:

 - Describe the types of treatment technologies, the advantages and disadvantages of each, and the types of waste appropriate for each technology
 - Describe the legal requirements for treatment in the country
 - List the operating parameters of the on-site treatment technology in their healthcare facility and to describe how to monitor the treatment to ensure compliance with the regulations
 - Describe the personnel responsible for the treatment technology, methods for controlling worker exposure, and recordkeeping requirements for treatment
 - Discuss the training requirements for operators of the treatment technology.
- **Participant Assignment Prior to Session:**
 - Participants whose health facilities operate on-site treatment technologies find out the operating parameters for their treatment technology, how they monitor compliance, what periodic inspection and maintenance procedures are used, and what steps are taken to control worker exposure.
- **Trainer/Participant Activities**

- The trainer presents the legal requirements for healthcare waste treatment in the country, the types of treatment technologies, their advantages and disadvantages, their typical operating parameters, the types of waste appropriate for each technology, and the training requirements for operators; the trainer shows videos of treatment technologies.
- The trainer and participants discuss the different treatment and destruction options for healthcare waste, and which personnel are responsible for treatment, controlling worker exposure, and recordkeeping.
- Small group or whole group activity: Depending on how many participants have on-site treatment technologies, the trainer asks each participant with on-site technologies to present their findings to small groups or the whole class for discussion.
- The trainer gives an assignment to participants prior to the next session.
- Homework: Each participant writes guidelines for treatment, monitoring and compliance of treatment requirements, occupational safety and training for treatment technology operators, periodic inspection and maintenance of the treatment technology, and recordkeeping specific to their healthcare facility or a hypothetical facility (if their facility does not have an on-site treatment system).
- **Resources**
 - Excerpts from the country's regulations on treatment requirements
 - Chapter 8 of the WHO blue book
 - Health Care Without Harm's *Non-Incineration Medical Waste Treatment Technologies*
 - List of Vendors of Treatment Technologies
 - Videos of selected treatment technologies
 - Optional: Brochures of alternative treatment technologies available commercially in the country

Part G: Off-site Transport, Treatment and Disposal

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Small group and/or whole group activity
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Photos/slides of external transport vehicles and centralized treatment facilities
 - Copies of consignment or manifest forms used in the country
- **Expected Outcomes**

Participants will be able to:

 - Describe and discuss the requirements for packaging, labeling, off-site transport, centralized treatment, and final disposal of waste
 - Complete required consignment (manifest) forms for off-site transport, treatment and disposal
 - Discuss waste generator's responsibility under the "duty of care" principle in relation to cradle-to-grave waste management.
- **Participant Assignment Prior to Session:**

- Each participants whose facilities send their waste to off-site centralized treatment facilities obtains the contact information of their waste transporter and off-site centralized treatment facility, obtains records or references to the legal registration of the transporter and centralized facility, finds out what type of treatment system the centralized facility uses, how they monitor compliance with the treatment requirement, and where the treated waste is finally disposed of after treatment.
- **Trainer/Participant Activities**
 - The trainer presents the “duty of care” principle in relation to cradle-to-grave waste management and discusses with the participants the responsibility of the waste generator.
 - The trainer presents the requirements for packaging, labeling, consignment, off-site transport, centralized treatment, and final disposal of waste.
 - The trainer shows photos or slides of external transport vehicles and the group discusses the strengths and weaknesses of each.
 - Group activity 1: Depending on how many participants use off-site centralized treatment facilities, the trainer asks each participant using off-site facilities to present their findings to small groups or the whole class for discussion.
 - Small group activity 2: The purpose of this activity is for the HCWM coordinators to know how to complete consignment or manifest forms. The trainer divides the participants into groups of 3 to 4 people and asks each group to complete a sample manifest form.
 - Homework: Each participant writes guidelines for packaging, labeling, consignment, recordkeeping, and off-site transport of waste specific to their healthcare facility or a hypothetical facility (if their facility does not use an off-site centralized treatment facility).
- **Resources**
 - Excerpts from the country’s regulations on centralized treatment facilities
 - Chapter 8 of the WHO blue book
 - Health Care Without Harm’s *Non-Incineration Medical Waste Treatment Technologies*
 - List of Vendors of Treatment Technologies
 - Videos of selected treatment technologies
 - Optional: Brochures of centralized treatment facilities available commercially in the country

Module 3: Review of Healthcare Waste Management

- **Duration:** 3 hours (including 2 hour site visit and excluding travel time to a healthcare facility and optional quiz)
- **Methodology**
 - Site visit to a healthcare facility
 - Discussion
 - Optional: Quiz
- **Training Aids**
 - Personal protective equipment as needed for the site visit
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Identify where strengths and weaknesses in overall HCWM in a healthcare facility.

- **Trainer/Participant Activities**
 - The participants visit healthcare facilities and ensure all steps of the HCWM process are observed. This includes visiting wards, locations of waste containers, storage areas, observing collection and on-site transport, and treatment operations (approximately 120 minutes).
 - The trainer assigns participants to observe strengths and weaknesses in overall HCWM.
 - After the site visit, the trainer asks participants present their conclusions and recommendations, invites participants to share personal experiences in relation to HCWM, and summarizes the participants' discussion on the flip chart or board.
 - The trainer directs the participants' attention to other relevant resources, especially the national policy guideline for healthcare waste and standard and procedures for HCWM.
 - Optional: Assessment of Learning - Quiz and answer.
- **Resources**
 - National policy guidelines, standards and procedures for healthcare waste management
 - WHO blue book
 - List of resources (books, reports, websites, organizations, etc.) on healthcare waste management

Module 4: Management of Specific Waste Streams

Part A: Specific Infectious Wastes

- **Duration:** 2 hours
- **Methodology**
 - Lecture/Discussion
 - Demonstration
 - Small group activity
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Needleless and safe needle devices (if used in the country)
 - Needle destruction and needle cutting devices (if used in the country)
 - Autodisable syringes
 - Safety boxes, commercial sharps containers, and acceptable alternatives for sharps containers
 - Absorbents for blood and body fluids
 - Personal protective equipment (face mask, goggles, face shield, gloves, arm protectors, aprons, gumboots, N95 respirators)
- **Expected Outcomes**

Participants will be able to:

 - Describe the major sources of disease transmission from healthcare waste, with particular emphasis on sharps waste
 - Identify where sharps waste, bulk blood and body fluids, cultures and biological stocks, and pathological waste might be found in a healthcare facility
 - Describe all aspects of sharps waste management

- Describe special procedures for handling and disposal of bulk blood and body fluids, and for the management of cultures and stocks
- Describe the treatment and disposal options for pathological waste and placenta waste
- Teach patients on proper management of home-based healthcare waste.
- **Trainer/Participant Activities**
 - The trainer reviews the sources of disease transmission from healthcare waste with particular emphasis on sharps waste, and the hierarchy of controls.
 - The trainer and participants discuss where sharps waste, bulk blood and body fluids, cultures and stocks, and anatomical waste might be found in the healthcare facility
 - The trainer gives a presentation on all aspects of sharps waste management, including reduction of unnecessary injections, use of needleless devices, use of safe needle devices, autodisable syringes, the use of needle destruction technologies, the recommendation against recapping, alternatives to commercial sharps containers, placement of sharps containers, 3/4th fill rule, collection, handling, treatment, destruction, final disposal, and emergency response to needle-stick injuries. [Needle-stick injury response will be discussed in another session.]
 - The trainer demonstrates the use jet injectors devices; use of retractable syringes, sheathed syringes, hinged recap syringes, shielded IV catheters and butterfly needles, self-blunting needles, and other safe needle devices available in the country; the use and proper disposal autodisable syringes; the use of needle destruction technologies and electrical or mechanical needle cutters; the construction of safety boxes and acceptable alternatives to commercial sharps containers. The trainer invites the participants to try the devices, and the trainer and participants discuss the advantages and disadvantages of each.
 - The trainer presents the types of body fluids that require universal precautions, and special procedures for handling and disposal of bulk blood and body fluids, including management of suction canister waste, use of absorbents, clean-up procedures, use of PPE to prevent exposure to splashes and aerosols, and emergency response to blood splash. [Post-exposure prophylaxis will be discussed in detail in a later session.]
 - The trainer presents special procedures for the management of cultures and stocks, including on-site steam or chemical disinfection, and use of PPE to prevent exposure to aerosols.
 - The trainer presents treatment and disposal options for pathological waste such as tissues and anatomical parts, as well as placenta waste.
 - The trainer presents the challenges related to home-based healthcare (e.g., diabetics, end-of-life care, HIV/AIDS patients or patients with chronic or disabling conditions in limited resource settings).
 - Small group activity: The purpose of this activity is for the HCWM coordinators to write simple instructions for patients on proper management of home-based healthcare waste. The trainer divides the participants into groups of 3 to 4 people, assigns different patient conditions to each group, and asks each group to draft simple instructions for patients on proper management of home-based healthcare waste. Each group member takes turns explaining the procedures and responding to questions from other group members who play the role of the patients.
 - The trainer gives an assignment to participants prior to the next session.
 - Homework: Each participant writes guidelines for managing sharps, bulk blood and body fluids, cultures and stocks, and pathological waste specific to their healthcare facility.
- **Resources**

- Chapter 12 of the WHO blue book
- Information sheet on different N95 respirators, face masks, and face shields
- Optional: Vendor literature on commercial sharps containers, jet injectors and other needleless devices, retractable syringes and other safe needle devices, needle destruction technologies and electrical or mechanical needle cutters
- Optional: Vendor literature on specialized treatment technologies available in the country for blood and body fluids, cultures and stocks, and pathological waste

Part B: Chemical waste management

- **Duration:** 1.5 hours
- **Methodology**
 - Lecture/Discussion
 - Demonstration
 - Small group activity
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Computer with video media player
 - Examples of mercury free devices
 - Mercury waste spill kit
- **Expected Outcomes**

Participants will be able to:

 - Identify chemical wastes (including mercury, cytotoxic agents, waste laboratory chemicals, spent disinfectants and cleaners, and pharmaceutical waste) and radioactive waste, and where they might be found in the healthcare facility
 - Reflect on the benefits of a mercury-free healthcare facility, design a mercury phase-out plan, and describe appropriate mercury spill response and storage procedures
 - Describe appropriate collection, handling, storage, transport, and if available, treatment of cytotoxic, laboratory, pharmaceutical and other chemical wastes
 - Describe appropriate storage, treatment and disposal methods, if available, of radioactive wastes.
- **Participant Assignment Prior to Session:**
 - Each participant obtains information about how chemical and radioactive wastes are treated and disposed of in his or her healthcare facility.
- **Trainer/Participant Activities**
 - The trainer reviews the hierarchy of waste management and presents different kinds of chemical and radioactive wastes; the trainer and participants discuss examples of chemical and radioactive wastes, where they might be found in a healthcare facility, and options for eliminating chemical waste at the source, such as mercury-free and PVC-free devices.
 - The trainer shows the mercury video and leads a discussion on the health impacts of mercury exposure and the global movement towards mercury-free health care.
 - The trainer presents examples of mercury-free devices available in the country, such as digital, alcohol, galinstan, and IR tympanic thermometers; aneroid and oscillometric

sphygmomanometers; mercury-free fixatives; low-mercury lamps; etc. The trainer and participants discuss advantages and disadvantages of each.

- The trainer presents how to make a simple mercury spill kit, the procedures for handling a mercury spill, and storage options for mercury waste.
 - Small group activity: The purpose of this activity is for the HCWM coordinators to develop a plan to phase out mercury in a healthcare facility. The trainer divides the participants into groups of 3 to 4 people and asks each group to develop a mercury phase-out plan for a healthcare facility. The trainer and participants debrief and the trainer leads a discussion on the merits and possible weaknesses of each group's phase-out plan.
 - The trainer presents the procedures for collection, handling, storage, transport, and if available, treatment of cytotoxic, laboratory, pharmaceutical and other chemical wastes.
 - The trainer presents procedures for storage, treatment and disposal methods of radioactive wastes, if available. These include storage for decay and the design of storage areas for low-level radioactive waste.
 - The trainer gives an assignment to participants prior to the next session.
 - Homework: Each participant writes guidelines on the handling of mercury spills in their facility.
- **Resources**
 - Excerpts from or summary of the country's regulation dealing with hazardous chemical waste
 - WHO policy paper on mercury in health care, WHO's "Replacement of mercury thermometers and sphygmomanometers in health care: Technical guidance"
 - Chapter 9 of the WHO blue book
 - Bowling Green State University video on mercury (available from the UNDP GEF Project website)
 - UNDP GEF Project resources on mercury
 - Health Care Without Harm resources on mercury
 - "Mercury Sphygmomanometers in Healthcare and the Feasibility of Alternatives," by European Commission Scientific Committee on Emerging and Newly Identified Health Risks, September 23, 2009
 - Optional: Chapters 6, 7, 8, 10, and 15 in *Environmental Management in Healthcare Facilities*, K.D. Wagner (Editor), Philadelphia: W.B. Saunders Company, 1998

Part C: Management of Wastewater

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Describe appropriate collection and disposal of wastewater.

- **Participant Assignment Prior to Session:**
 - Each participant obtains information about what happens to the wastewater from his or her healthcare facility.
- **Trainer/Participant Activities**
 - The trainer presents the health and environmental hazards of wastewater from healthcare facilities.
 - The trainer and participants discuss pathways of potential exposure and ways to mitigate exposure, including a discussion of substances that should not be discarded in the wastewater (such as antibiotics and hazardous chemicals).
 - The trainer presents the basic principles of wastewater treatment and different options for on-site treatment in situations where connections to a municipal sewage treatment plant are not available.
 - The trainer and participants discuss how to improve existing wastewater collection and disposal in the participants' healthcare facilities.
 - The trainer gives an assignment to participants prior to the next session.
- **Resources**
 - Excerpts from or summary of the country's regulation on wastewater treatment
 - Chapter 10 of the WHO blue book

Module 5: Waste minimization

- **Duration:** 2 hours
- **Methodology**
 - Lecture/Discussion
 - Small group activity
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Reflect on the primacy of waste minimization in the waste management hierarchy
 - Conduct a general waste assessment, develop and implement a waste minimization plan with stakeholder participation, and launch a campaign on waste minimization including source reduction, recycling, recovery and reuse, environmentally preferable purchasing, inventory control, and composting
- **Participant Assignment Prior to Session:**
 - Each participant obtains information on materials recovery and recycling facilities in his or her area.
- **Trainer/Participant Activities**
 - The trainer reminds the participants of the hierarchy of waste management and leads a discussion on the primacy of waste minimization.
 - The trainer presents case studies showing the benefits of waste minimization.
 - The trainer presents the basic steps for a successful waste minimization program including getting management support, establishing a waste minimization policy, convening a waste minimization team, setting priorities, establishing the baseline,

developing a waste minimization plan, educating and motivating staff, and launching, implementing and sustaining the program.

- The trainer introduces environmentally preferable purchasing, inventory control, and composting as waste minimization approaches.
- Small group activity: The purpose of this activity is for the HCWM coordinators to develop a waste minimization program in a healthcare facility. The trainer divides the participants into groups of 3 to 4 people. For some groups whose members have identified recycling facilities in their area, the trainer asks those groups to develop a plan for creating a recycling program in their facilities. For other groups, the trainer asks those groups to list specific areas in their facilities where waste can be minimized and to develop a plan for waste minimization.
- The trainer and participants debrief and the trainer leads a discussion on the merits and possible weaknesses of each group's recycling or waste minimization plan.
- **Resources**
 - Kaiser Permanente's *Waste Minimization Starter Kit: A Guide for Creating an Integrated Approach to Minimizing Waste* (September 1999)
 - Chapter 6 of the WHO blue book
 - Informational materials and tools from Health Care Without Harm, Hospitals for a Healthy Environment (H2E), and other resources
 - Excerpts from *An Ounce of Prevention: Waste Reduction Strategies for Health Care Facilities*, Chicago: American Society for Healthcare Environmental Services, 1993.

Module 6: Occupational Safety and Health

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Demonstration
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Personal protective equipment (gloves, gumboots, aprons, arm protectors, goggles, face shields, different types of masks and respirators)
- **Expected Outcomes**

Participants will be able to:

 - Demonstrate proper hand hygiene
 - Demonstrate proper selection of appropriate PPE to prevent exposure to healthcare waste hazards
 - Demonstrate the putting on, taking off, cleaning, storage and disposal of PPE
- **Trainer/Participant Activities**
 - The trainer reviews the hierarchy of controls and place of PPEs in the hierarchy.
 - The trainer presents the importance of personal hygiene, hand hygiene practices, immunizations, and management controls to prevent exposures.
 - The trainer presents the types of PPEs, proper selection of PPEs based on the types of hazards, and the procedures for cleaning, storage and disposal of PPE.

- The trainer demonstrates proper hygiene, how to wear and use PPEs, how to remove PPEs, and how to clean them; the trainer asks participants to demonstrate the procedures.
- The trainer presents the basic steps in documentation, assessing risks, analyzing root causes, prioritizing hazards, and controlling the risks. The trainer and participants discuss how to minimize risks related to healthcare waste in their own facilities and the trainer summarizes the participants' discussion on the flip chart or board.
- **Resources**
 - Chapter 12 of the WHO blue book
 - Informational material on PPEs
 - Informational material on risk identification, assessment and control
 - Optional: vendor brochures on commercially available PPEs

Module 7: Contingency planning

- **Duration:** 1 hour
- **Methodology**
 - Presentation/Discussion
 - Group role-playing activity
 - Individual participant activity
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
 - Equipment for role playing activity (using cleaning and disinfecting equipment and imaginary infectious or chemical waste)
- **Expected Outcomes**

Participants will be able to:

 - Define and create procedures to ensure worker's health and safety and what to do in emergencies
 - Describe post-exposure prophylaxis (PEP) procedures for waste-related injuries and procedures related to needle-stick injuries in particular.
 - Reproduce a response to a simulated emergency spill or waste-related exposure
- **Trainer/Participant Activities**
 - The trainer presents basic procedures for responding to contingencies, including infectious waste spills, bulk blood spills, treatment technology breakdown and other emergencies.
 - The trainer presents PEP procedures for waste-related injuries including procedures related to blood splash and needle-stick injuries.
 - The trainer and participants role-play emergency response procedures for various scenarios including infectious waste and chemical waste spills.
 - The trainer gives an assignment to participants prior to the next session.
 - Homework: Each participant writes procedures for responding to waste spills and waste-related injuries, including needle-stick injuries, specific to his or her facility.
- **Resources**
 - Chapters 12 and 14 of the WHO blue book
 - Sample procedures for emergency response to waste spills
 - Sample PEP procedures

Module 8: Legislative, regulatory and policy aspects

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Whole group activity
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Describe the country's obligations under the Basel and Stockholm Conventions as they relate to HCWM
 - Define the environmental principles of "polluter pays", "duty of care" and the "precautionary principle"
 - Describe the World Health Organization's policy on safe management of healthcare waste and the WHO core principles for achieving safe and sustainable management of health-care waste; and identify where a HCWM program is or is not consistent with these principles
 - Explain the structure and specific provisions of national and local laws and regulations specific to HCWM and related laws, and apply the laws to their facility's HCWM program
 - Compare and harmonize facility policies and guidelines with national and local laws and regulations
 - List areas where recordkeeping is required.
- **Participant Assignment Prior to Session:**
 - Each participant brings in all his or her homework materials to the class.
- **Trainer/Participant Activities**
 - The trainer begins with an overview of the topics:
 - Basic environmental principles
 - National and local laws and policy guidelines related to healthcare waste management
 - International laws and healthcare wastes management guidelines and policies.
 - The trainer and participants discuss the environmental principles, national and local laws, and international laws, guidelines, and policies.
 - The trainer asks questions on national and local laws that require participants to find the right sections in the law.
 - Whole group activity: The purpose of this activity is for the HCWM coordinators to harmonize their written guidelines with international, national, and local laws, regulations and guidelines. The trainer asks participants to compile their written guidelines and procedures from past homework assignments and to review them in relation to international, national, and local laws, regulations and guidelines. The trainer and participants discuss how to address any gaps or inconsistencies.
 - The trainer gives an assignment to participants prior to the next session.
- **Resources**
 - Excerpts or summaries of international conventions, principles, and policies
 - Copy of WHO core principle and policy

- Copies of HCWM laws

Module 9: Institutionalizing and sustaining HCWM

Part A: Organization

- **Duration:** 2 hours
- **Methodology**
 - Lecture/Discussion
 - Small group activity
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Communicate the importance and necessity of an effective HCWM program to all levels of the organization
 - Name essential roles and responsibilities for implementing a HCWM program
 - Create and analyze a chart of the HCWM organization for a healthcare facility
 - Present strategies for identifying and nurturing employees who are committed to supporting HCWM initiatives in their departments
 - Identify organizational barriers (such as lack of management commitment, no person given overall responsibility, inadequate financial and human resources, work place traditions and work environment issues, etc.) to implementation of the HCWM plan, and create strategies for overcoming these barriers.
- **Participant Assignment Prior to Session:**
 - Each participant brings or draws up an organizational chart of his or her facility.
- **Trainer/Participant Activities**
 - The trainer gives examples of typical organizational structures for HCWM, and the roles and responsibilities assigned to different staff involved in overall management of healthcare waste at the facility level.
 - The trainer also presents the following:
 - Common obstacles to effective implementation of a HCWM plan
 - Principles of inclusiveness and stakeholder participation/engagement in decision-making as essential in obtaining ownership (buy-in) and increasing the chances of successful implementation and sustainability
 - Basic steps in designing a multi-stakeholder engagement process
 - Importance of identifying and nurturing employees (environmental champions or green advocates) who are committed to supporting HCWM initiatives within each department.
 - Small group activity: The purpose of this activity is for the HCWM coordinators to identify organizational barriers and create strategies to overcome them. The trainer divides the participants into groups of 3 to 4 people and asks each participant to present their organizational structures, describe the duties they currently perform, and describe current or potential organizational barriers. The group then discusses strategies to overcome barriers.

- The trainer and participants debrief and the trainer synthesizes the discussions and summarizes the participants' discussion on the flip chart or board.
- **Resources**
 - Chapter 5 of the WHO blue book
 - HCWH resource materials

Part B: Training

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Small group discussion
- **Training Aids**
 - Projector
 - Power point presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Reflect on training as an essential piece which complements other activities for effective program implementation
 - Define the audiences for training and the appropriate training requirements (content, duration, frequency, etc.) for each audience
- **Trainer/Participant Activities**
 - The trainer presents the essential role of training in successful implementation and sustainability of HCWM programs.
 - The trainer presents the objectives of training, who should be trained, the different content according to the audience, the frequency refresher training, common modes of delivery, and other requirements.
 - Small group activity: The purpose of this activity is for HCWM coordinators to create an outline of a training plan for a healthcare facility. The trainer divides the participants into groups of 3 to 4 people and asks each group to develop an outline of a training plan.
 - The trainer and participants debrief and the trainer synthesizes the discussions and summarizes the participants' discussion on the flip chart or board.
 - Homework: Each participant writes a training plan specific to his or her facility.
 - The trainer gives an assignment to participants prior to the next session.
- **Resources**
 - Chapter 15 of the WHO blue book

Part C: HCWM Budgeting

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Demonstration
 - Small group activity
- **Training Aids**

- Projector
- Power point presentation
- Flip chart and marker pens and/or board and chalk
- Computer with Excel (to run the cost assessment tools)
- **Expected Outcomes**

Participants will be able to:

 - Estimate capital, operating, and maintenance costs for HCWM
 - Monitor, assess, and forecast costs of HCWM
 - Create and analyze an annual budget for HCWM using existing tools, incorporate HCWM costs into the budget process, monitor budget variances, and adjust operating targets to meet the requirements of HCWM
 - Develop strategies for gaining financial and administrative support and how to raise funds and additional resources to support the HCWM work.
- **Participant Assignment Prior to Session:**
 - Each participant talks to the financial officer or treasurer of his or her facility and finds out about the facility's budget process.
- **Trainer/Participant Activities**
 - The trainer and participants discuss WHO's "Core principles for achieving safe and sustainable management of health-care waste"
 - The trainer presents the basics of cost estimation methods, cost monitoring, operating target adjustments, and forecasting.
 - The trainer demonstrates the use of the appropriate WHO cost assessment tool using data typical for the country.
 - Small group activity: The purpose of this activity is for HCWM coordinators to develop ideas on supporting the HCWM work through the budget process and other means. The trainer divides the participants into groups of 3 to 4 people and asks each participant to discuss their budget process and come up with ideas on incorporating HCWM into the budget process as well as raising additional funds.
 - The trainer and participants debrief and the trainer synthesizes the discussions and summarizes the participants' discussion on the flip chart or board.
 - Homework: Each participant estimates costs and develops the first draft of an annual budget for HCWM in his or her facility. The participant highlights costs items that need to be verified in the future.
- **Resources**
 - WHO "Core principles for achieving safe and sustainable management of health-care waste"
 - WHO Cost Assessment Tools: CAT, ECAT-L, ECAT-M, ECAT-H
 - Chapter 10 of the WHO Blue Book

Module 10: HCWM planning

- **Duration:** 3 hours
- **Methodology**
 - Lecture/Discussion
 - Small group activity
- **Training Aids**
 - Projector
 - PowerPoint presentation

- Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Conduct a healthcare waste assessment
 - List the stakeholders essential for developing a comprehensive HCWM plan and discuss the contributions of each stakeholder to the plan
 - Create a program with defined objectives, a timeline, achievable outcomes and measurable indicators for a HCWM program
 - Describe approaches to successful implementation of a HCWM plan.
- **Trainer/Participant Activities**
 - The trainer presents the fundamentals and tools for conducting a healthcare waste assessment.
 - The trainer presents the steps for developing a facility HCWM plan, bringing together all the concepts presented in the course so far. The trainer describes a typical facility healthcare waste management plan.
 - The trainer describes tools for managing a HCWM program, including the setting of clearly defined goals and milestones, who is responsible for aspects of the plan, the use of Gantt charts or timelines, and budget tracking.
 - Small group activity: The purpose of this activity is for HCWM coordinators to create a draft of a HCWM plan for their facility. The trainer asks the participants to compile all the guidelines and procedures from past homework assignments and to develop the elements of a HCWM plan, including goals, milestones, timeline, persons responsible, and an annual budget. The trainer divides participants into small groups of 3 to 4 people and asks each participant to present and discuss their plans in their small groups.
 - The trainer and participants debrief and provide suggestions.
- **Resources**
 - Chapter 5 of the blue book
 - UNDP GEF Project Baseline Assessment Guidance
 - Other resources on training

Module 11: Continuous Monitoring and Quality Improvement

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
 - Small group activity
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
- **Expected Outcomes**

Participants will be able to:

 - Identify sources of information on standards, best practices, and technologies related to HCWM
 - Develop evaluation methods and tools based on a program with defined objectives, a timeline, achievable outcomes and measurable indicators for a HCWM program
 - Define the types of records that must be kept in order to monitor and evaluate a HCWM program

- List existing continuous quality improvement approaches, define their essential components, and adapt existing approaches appropriate for their healthcare facility
- Complete an outline of a report on the status of their HCWM program.
- **Trainer/Participant Activities**
 - The trainer presents the benefits, philosophy, principles, key elements, the steps of the continuous quality improvement process, and the continuous improvement cycle. The trainer also present tools for continuous quality improvement, such as flow charts, cause-and-effect or fishbone diagrams, histograms, and Pareto charts.
 - The trainer presents the benefits, bases, information collection methods, analysis, and reporting of program evaluation.
 - Small group activity: The purpose of this activity is for HCWM coordinators to create an outline of a report on the status of their HCWM program. The trainer asks the participants to develop an outline of a report on the status of their HCWM program. The trainer divides participants into small groups of 3 to 4 people and asks each participant to present his or her outline to the group for discussion.
 - The trainer and participants debrief and the trainer synthesizes the discussions and summarizes the participants' discussion on the flip chart or board.
 - The trainer presents sources of information on standards, best practices, and technologies related to HCWM.
 - Optional: Assessment of Learning - Quiz and answer.
- **Resources**
 - List of resources on HCWM
 - Informational material on continuous quality improvement and program evaluation

Module 12: Models of HCWM Around the World

- **Duration:** 1 hour
- **Methodology**
 - Lecture/Discussion
- **Training Aids**
 - Projector
 - PowerPoint presentation
 - Flip chart and marker pens and/or board and chalk
 - Computer with video media player
 - Photos/slides of HCWM systems
- **Expected Outcomes**

Participants will be able to:

 - Situate their facilities' HCWM systems in relation to the HCWM systems in different countries
 - Identify strengths and weaknesses of HCWM systems by comparison with model facilities around the world.
- **Trainer/Participant Activities**
 - The trainer presents examples of poor HCWM systems and exemplary model systems around the world.
 - The trainer and participants discuss the strengths and weaknesses of HCWM systems in other countries and of existing HCWM systems in the country.
- **Resources**
 - Slides and videos of HCWM systems in different countries

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ENDNOTES:

¹ The WHO blue book is entitled “Safe management of wastes from health-care activities,” WHO, Geneva (1999 or the new edition when released).

² The participants can be requested to bring copies of their health facility map (floor plan) or a hypothetical facility map can be provided by the UNDP GEF Project

³ To be developed by the UNDP GEF Project

⁴ Surrogate waste means imaginary waste, such as gauze with tomato sauce (to represent gauze with blood), unused syringes, IV bags partially filled with red ink (to represent blood), clean cotton, gloves wet with water (to represent body fluids), dry clean gloves, etc. The containers should be color-coded, properly marked, and of the correct type and design; improper containers such as plastic bags marked “sharps” could also be included.

⁵ To be developed by the UNDP GEF Project