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GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

GLOBAL HEALTHCARE WASTE PROJECT

MODULE 17: Management of Specific Infectious Wastes



Module Overview

- Describe sources and types of specific infectious waste
- Describe all aspects of sharps waste management
- Describe procedures for treatment and disposal of specific infectious wastes

Learning Objectives

- Identify specific infectious wastes in a healthcare facility
 - sharps, bulk blood and body fluids, cultures and biological stocks, and pathological waste
- Identify key steps in the management and disposal of these specific infectious wastes

What is Infectious Waste?

“Healthcare wastes that are suspected to contain pathogenic microorganisms (or their toxins) in sufficient concentration or quantity to cause diseases to a susceptible host (after exposure)”

Routes of Disease Transmission

- If infectious waste is inadequately managed, these microorganisms/toxins can be transmitted by:
 - Direct physical contact
 - Blood (e.g. from transfusion or injection)
 - Inhalation
 - Water/food ingestion
 - A variety of vectors to those handling such waste

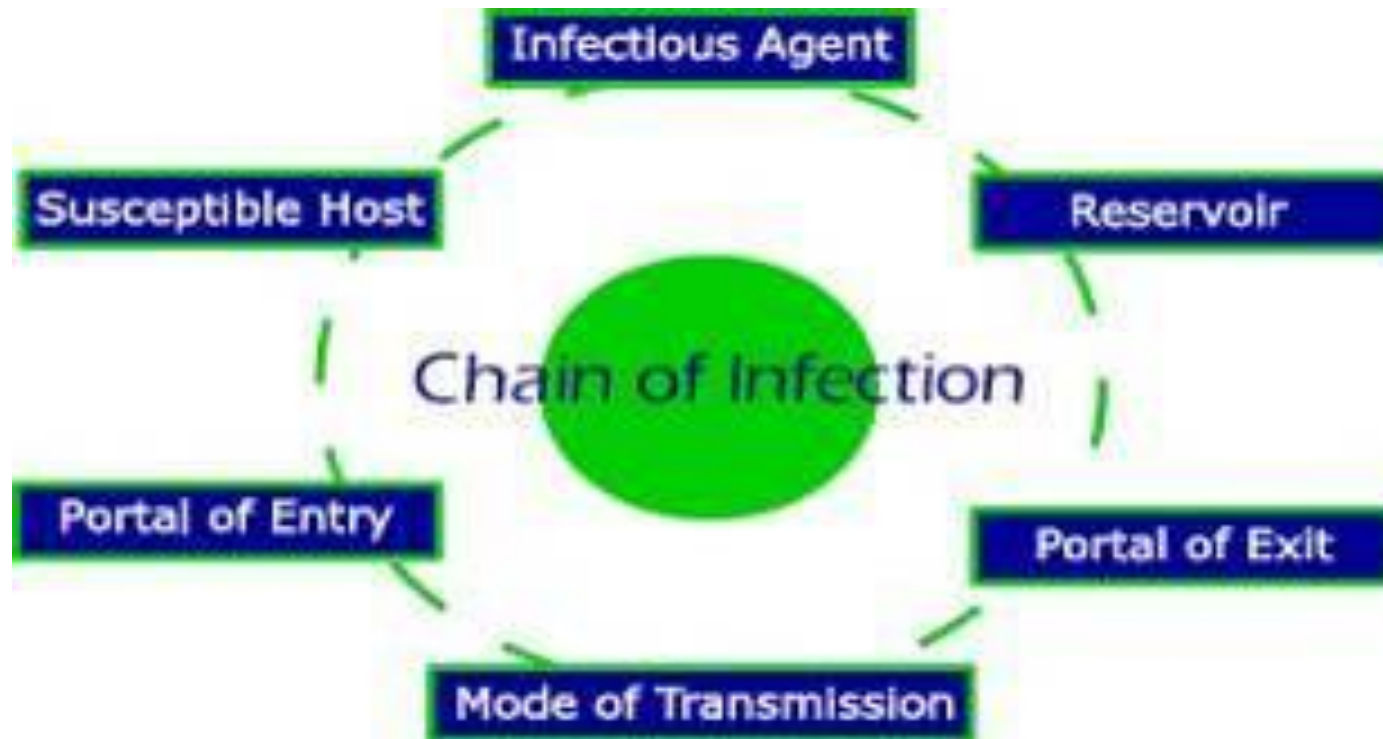
Sources of Disease Transmission

- Main sources for contact transmission of infection to patients:
 - From the hands of medical staff
 - From contaminated equipment used on patients
 - From poorly cleaned surfaces and rooms
- Main source of transmission of infection to medical staff and waste handlers:
 - Needle-stick injuries

Why are healthcare facilities ideal for disease transmission?

- Healthcare staff are constantly **exposed** to potentially infectious materials
- Patients may have **infections** that are easily transmitted
- Patients may be more susceptible to infections due to illness
- Services are provided in a **limited physical space**

Chain of Infection



Numerous actions can be taken to break this chain

Who is at Risk?

- **Staff** (doctors, nurses and waste handlers)
 - Needle-sticks
 - Blood splatter
 - Pathogenic aerosols
- **Patients**
 - Improperly discarded sharps found in linens
 - Exposure to accidental spills
 - Spread of hospital infections

Who is at Risk?

- **Community**
 - Exposure of waste pickers in open dumpsites
 - Unearthing of anatomical remains by animals
 - Residents of illegal recycling sites
 - Exposure to contaminated sharps:
 - Discarded medical waste washing up on beaches
 - Infectious waste bags found by children
 - Reuse of discarded sharps by illicit drug users
 - Waste scavengers

Examples of Potentially Infectious Wastes

Category

Examples

Sharps

Hypodermic needles, syringes, suture needles, scalpel and other blades, lancets, saws, knives, broken or unbroken glass, vials, tubes, pipettes, etc.

Cultures and Stocks

Human and animal cell cultures, stocks of etiologic agents, discarded live and attenuated vaccine or serum, culture dishes and other devices used to transfer, inoculate or mix cell cultures

Human Blood, Blood Products, and Body Fluids

Free-flowing blood or blood components, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, and body fluids contaminated with blood; materials saturated or dripping with liquid blood and body fluids

Pathological Waste

Tissues, organs, anatomical waste (recognizable body parts except teeth) removed during surgery, autopsy or other procedures

Selected Isolation Waste

Swabs, excreta, soiled dressings, drainage sets, items saturated or dripping with human blood, etc. from patients infected with highly communicable diseases

Where is Potentially Infectious Waste Found?

- Operating rooms
- Emergency rooms
- General wards
- Laboratories
- Bins used to collect waste (if not labeled or segregated)
- Hospital linen/laundry

Sharps Waste Management

- Sharps are items that can cause cuts or puncture wounds, including:
 - needles, hypodermic needles, scalpel and other blades, knives, infusion sets, saws, broken glass, and pipettes
- Whether or not they are infected, sharps are considered as highly hazardous health care waste

Sharps Waste Management

- Recommendations for minimization of risk of infection from needle stick injury:
 - reduce any unnecessary injections
 - use needleless devices
 - use engineered needles that automatically retract, blunt, resheath, or disable the sharp



Sharps Waste Management



- Sharps should be disposed of in puncture-resistant sharps containers
 - disposable sharps containers are made of cardboard or plastic
 - reusable sharps containers are plastic or metal
 - Low-cost options include clearly marked reuse of plastic bottles or metal cans



Sharps Waste Management

- Sharps handling recommendations
 - Do not recap needles or bend the needle
 - Always destroy sharps
 - Never pass used sharps from one person to another
 - Locate needle destroyer near point of generation to facilitate disposal



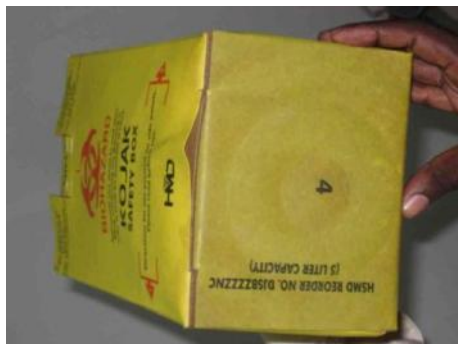
Sharps Waste Management

- Sharps collection
 - Sharps containers should be readily accessible in areas where sharps are used
 - Sharps containers should only be filled up $\frac{3}{4}$ full
- Handling sharps containers
 - Check all sides for any holes or protruding needles before lifting the container
 - If there are holes in the container, carefully place the container inside a larger puncture-resistant container
 - Always ensure new container is available before removing the old one

Options for Sharps Waste Treatment

- Autoclaving followed by shredding of sterilized sharps waste to prevent needle stick injuries
- Autoclaving presents an opportunity for recovery and re-melting of sterilized plastic and metal parts

Example of Autoclaving and Shredding of Sharps Waste in Tanzania



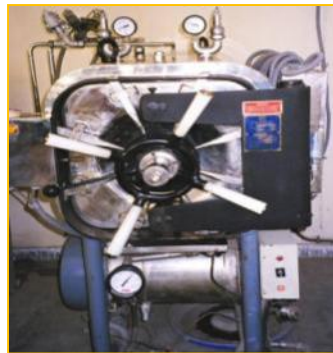
Example of Autoclaves and Re-melting



Himalayan Institute
Hospital Trust, India



Collection of sharps in
autoclavable pails



Source: HIHT

Options for Sharps Waste Management

- Devices for needle destruction

- Needle melters

- could be electrical or battery-operated
- needle is melted and often the plastic nub of the syringe is cut
- syringes still need to be disinfected



- Needle cutters

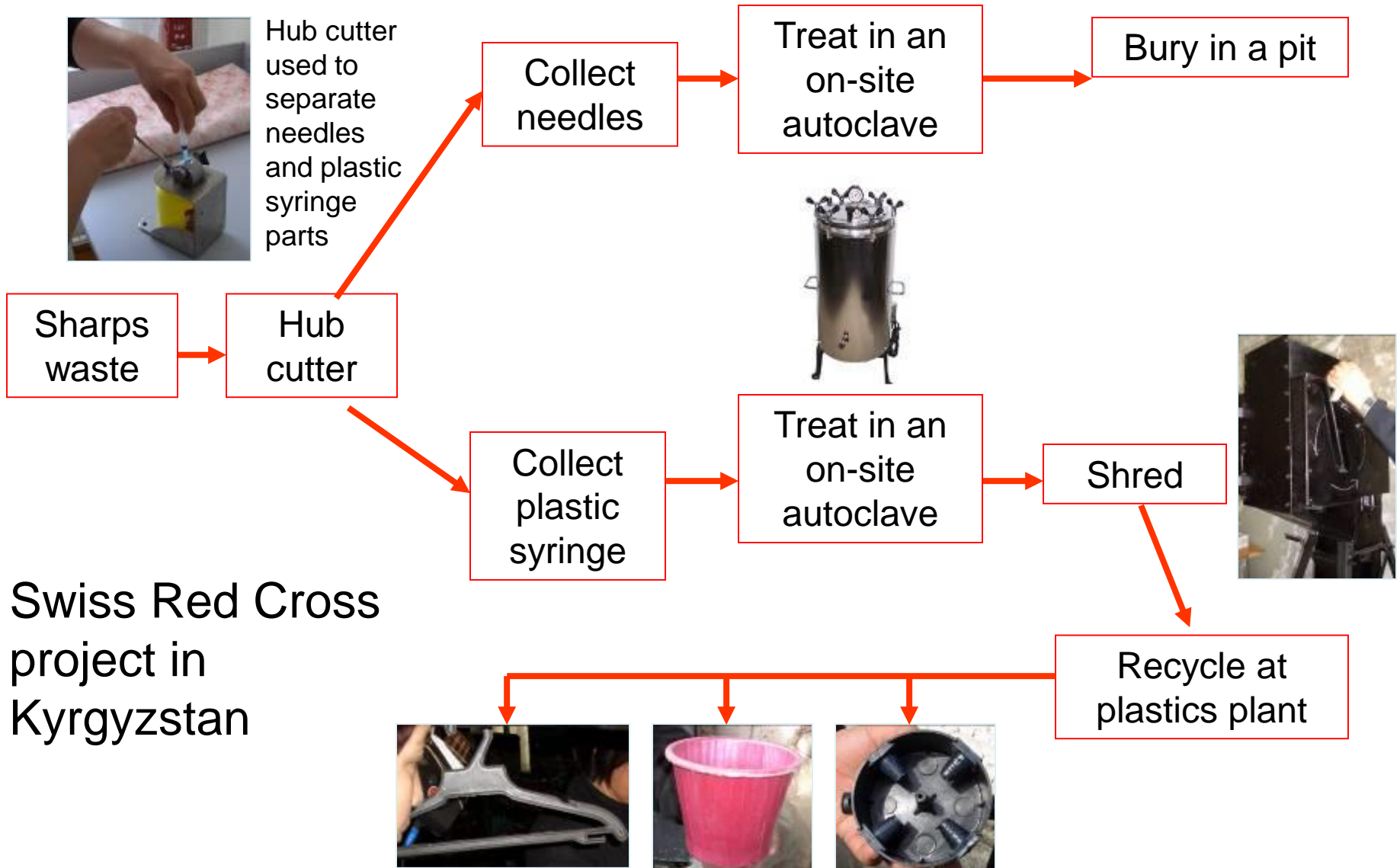
- needle is cut manually and collected in a container
- some needle containers may contain a chemical disinfectant
- syringes are disinfected either by chemical disinfection, autoclaving, or microwaving
- disinfected syringes can be shredded and re-melted



Needle Cutters/Destroyers

Advantages	Disadvantages
Prevents reuse of syringe either inadvertently or illegally	Cost: one will be needed wherever injections are given and will require maintenance. Sharps containers may still be needed for lancets and other sharps waste
Reduces volume of sharps wastes	Some models collect the sharps in containers that need to be capped after filling; potential for spilling of needles and/or NSI during container exchange
Potential for recycling syringe barrels after disinfection	Potential splash of blood during operation
Removes inclination of staff to recap used needles	Busy staff may leave syringes to be cut later, increasing chances of NSI and infection from discarded syringes
Reduces risk of injury from improperly disposed syringes	Some needle destroyers are electrically operated and so not appropriate where power outages are common

Example of Autoclaves and Re-melting



Swiss Red Cross project in Kyrgyzstan

Plastics re-melted to make coat hangers, flower pots and electrical covers

Sharps Waste Management in a Low-Resource Setting

- Disposal of sharps in low-resource settings
 - Encapsulation – concrete vault filled 3/4ths with sharps and the remaining space filled with cement
 - Sharps placed in drums, sealed in cement, and then buried in landfills
 - Burial in special sharps pit in a landfill in a secured area



Demonstrations

- Jet injectors devices
- Retractable syringes
- Sheathed syringes
- Hinged recap syringes
- Shielded IV catheters and butterfly needles
- Self-blunting needles
- Other safe needle devices
- The use and proper disposal of auto-disable syringes
- Needle destruction technologies
- Electrical or mechanical needle cutters
- Construction of safety boxes
- Acceptable alternatives to commercial sharps containers



Blood and Body Fluids

- Waste contaminated with blood or other body fluids includes:
 - free-flowing blood, blood components, and other body fluid-contaminated materials
 - dressings, bandages, swabs, gloves, masks, gowns, drapes, and other material/equipment soaked with blood or other body fluids
 - waste that has been in contact with the blood, feces, urine of patients with highly communicable diseases

Management of Blood and Body Fluids

- Disposal of blood and body fluids in general:
 - Discharge into the sewer or septic system without pre-treatment
 - Avoid coagulation that could block pipes
 - Use PPE to protect against blood splatter
- If the volume of blood poses a risk:
 - Treat in an autoclave using a liquid waste treatment cycle
 - Hypochlorite (bleach) is not effective with high organic content waste such as blood

Management of Blood and Body Fluids

- **Disposal of blood bags:**
 - Treat in an autoclave at 121°C for two hours
 - Use PPE to protect against blood exposure
- **Options for treatment of suction canisters:**
 - Treat with a sanitizing agent such as chlorine and a solidifying agent
 - Install closed disposal systems that dispose suction canister liquids into the drain with little or no human contact
 - Treat in a steam treatment system with internal shredding
 - Treat in an autoclave at higher temperatures and longer exposure times



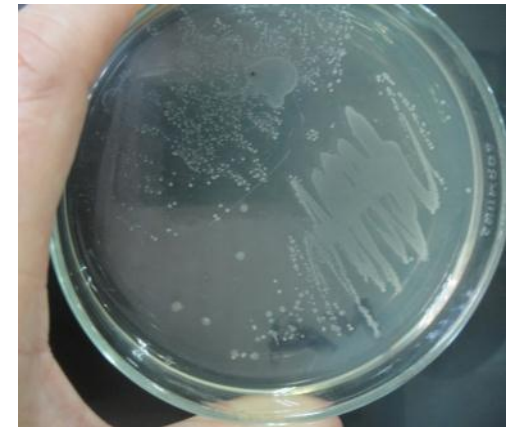
Management of Blood and Body Fluids

- Clean-up procedures or spill response
- Emergency response to blood splash
- Use of PPE
 - Gloves, face masks, goggles



Cultures and Stocks

- Cultures and stocks are highly infectious waste
- Sources:
 - laboratories
 - agar plates
 - human and animal cell cultures
 - stocks of etiologic agents
 - discarded live and attenuated vaccine or serum
 - culture dishes and other devices used to transfer, inoculate, or mix cell cultures



Cultures and Stocks

- Disposal and Management:
 - Use of PPE to prevent exposure to aerosols
 - On-site steam or chemical disinfection
 - Use an on-site autoclave (minimum 121 °C and 30 minutes)



Pathological and Placental Waste

- Treatment of anatomical, pathological, and placental and foetal remain wastes may be bound by socio-cultural, religious, and aesthetic norms and practices
- **Disposal Options:**
 - Interment (burial) in cemeteries or special burial sites
 - Alkaline digestion, especially for contaminated tissues and animal carcasses
 - Burning in crematories or specially designed incinerators
 - Promession (freeze drying), especially for human cadavers
 - Placental waste is sometimes composted or buried in placenta pits designed to facilitate natural decomposition

Summary of Treatment and Disposal Methods

APPLICABLE HEALTHCARE WASTE

Free-flowing blood and body fluids

Cultures and stocks

Body parts (anatomical waste)

TREATMENT METHOD

Direct disposal in a sanitary sewer or disinfection prior to disposal if necessary

On-site autoclave

Interment (burial), cremation, or alkaline digestion

Discussion

- How does your facility manage sharps waste? Are needle cutters/destroyers/melters involved? What are some advantages and disadvantages of these devices in destroying sharps waste?
- How does your facility handle infectious wastes (not including sharps waste)? What guidelines and procedures are in place for patient and worker safety from infectious wastes?
- What types of personal protective equipment are used in the management of infectious/sharps waste in your facility? What PPE is available?
- What are some regulations for management of sharps and infectious waste present in your specific country or region?
- What are some ways to overcome barriers present in your country/region/facility for effective management of infectious and sharps waste?