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Medical Waste Management

GEMS Environmental Compliance-ESDM Training Series
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What is Medical Waste?

➤ The term includes what is commonly described as garbage, refuse and trash. The US EPA's regulatory definition of waste includes any discarded item; things destined for reuse, recycle, or reclamation; sludge and hazardous waste. It is also called *healthcare waste* or *clinical waste*.

➤ Broadly, medical waste is defined as any solid or liquid waste generated in the diagnosis, treatment or immunization of human beings or animals in research pertaining thereto, or in the production or testing of biological (NAN & HCWH, 1999 Medical Waste in Developing Countries).

Sources of Medical Waste

Different
sections of
hospitals and
clinics

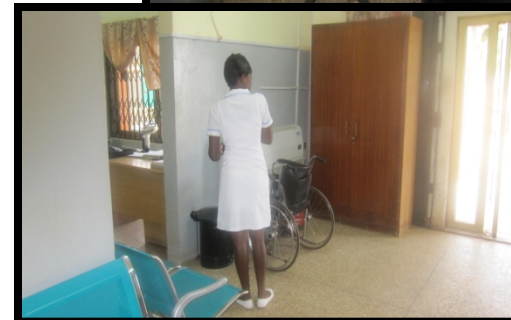
Pathological
laboratories

Diagnostic
centers

Doctors' offices

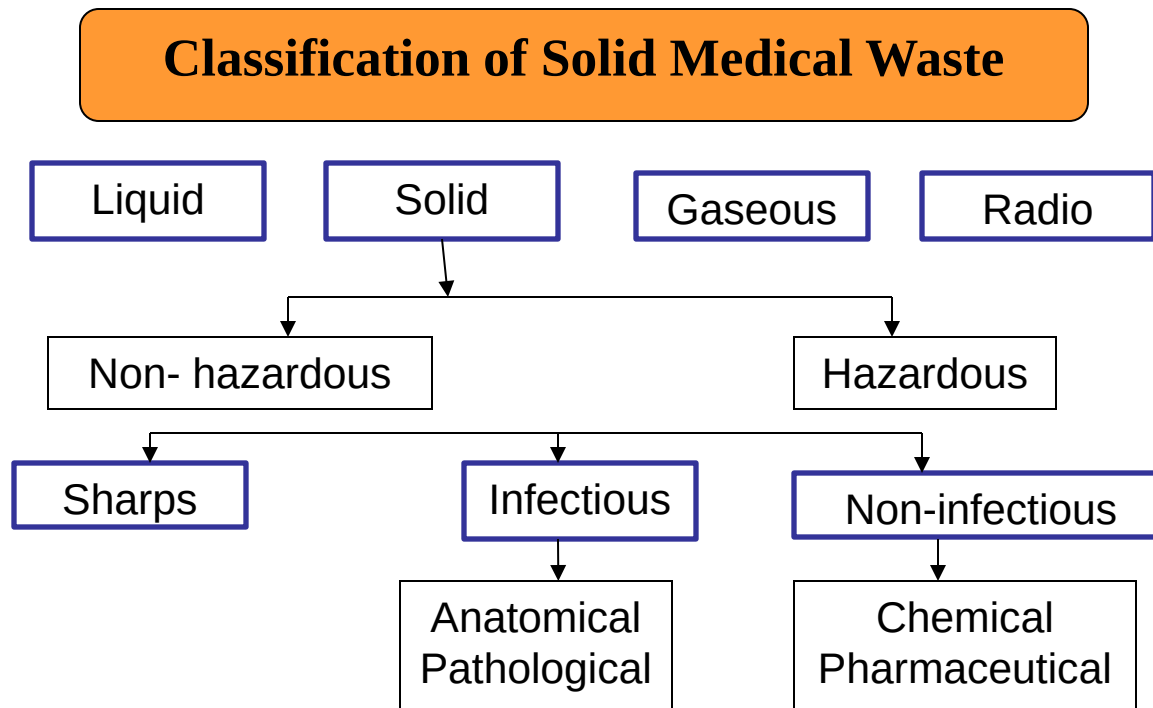
Other medical
and research
facilities

Food facilities
Medical stores



Classification of Medical Waste

- A. Based on content (solid, liquid, gaseous, radioactive)
- B. Based on health impact (general waste and hazardous waste)
- C. Based on WHO classification for developing countries (general waste, sharp waste, infectious waste, chemicals and pharmaceutical waste, other hazardous waste).



Waste Components Generated by Healthcare Activities

These wastes include hazardous (sharps, infectious and non-infectious) and non-hazardous materials (general waste):

Sharps (*used needles, syringes, blades, scalpel, razors, broken glass*)

Soiled dressings

Pathological materials
(*human tissue, organ feces, body parts, biopsy products and autopsy materials*)

Diagnostic samples

Blood

Chemicals (*reagents, developers, and those toxic, flammable, explosive and or carcinogenic*)

Pharmaceuticals
(*expired medication, discarded residual medication used in chemotherapy*)

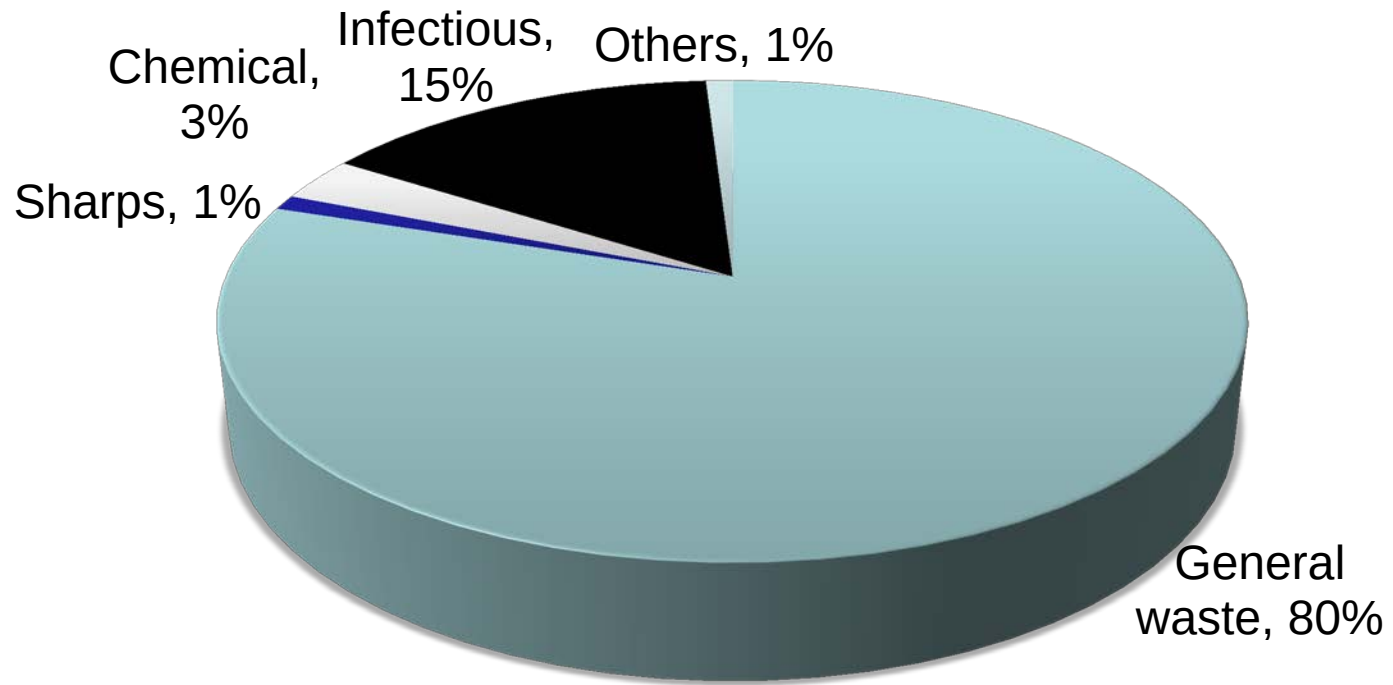
Medical devices

Radioactive materials
(*solid or liquid waste contaminated with radioactive substances*)

Normal kitchen and office waste (*similar to municipal solid waste*)

Composition of Medical Waste

Nature and Composition of Medical Waste



Source: WHO, 2000

Category of Waste, Examples and Environmental Concerns

Category	Examples	Environmental concerns
General or Municipal Solid waste	Paper, packaging, food, floor sweepings and other items not unique to medical waste, commonly managed by municipal collection and disposal	Volume of the waste; Air emissions; Contamination of surface and ground water; Litter; Insects or other vectors; Odors; Injury; Exposure to Pathogens
Infectious waste containing pathogens in sufficient quantity that exposure could result in disease	Lab cultures and stocks of infectious agents, wastes from isolation wards, tissues, materials or equipment that have been in contact with infected patients	Land disposal of active pathogens Human health impacts
Pharmaceutical waste	Expired or unnecessary pharmaceuticals and drugs	Released to land or water Human health impacts
Pathological waste containing human tissues or	Body parts, human fetuses, blood, and other body fluids.	Untreated waste released to land or water; Human health impacts
Chemical waste	Solid, liquid and gaseous chemicals from diagnostic and experimental work, cleaning materials	Released of hazardous air pollutants and releases to land or water; Human health impacts
Sharp wastes	Needles, infusion sets, scalpels, broken glass	Land disposal of active pathogens; Injury
Radioactive waste	Radioactive substances including used liquids from radiotherapy or lab work	Releases to air, land or water; Human health impacts
Pressurized containers	Gas cylinders, cartridges and aerosol cans	Potentially harmful; May explode accidentally
High heavy metal content	Batteries, broken thermometers, blood pressure gauges	Releases to air, land or water; Human health impacts
Genotoxic waste	Waste containing cytotoxic drugs (used in cancer therapy), genotoxic chemicals	Releases to air, land or water; Human health impacts

Source: Medical waste training manual, DGHS, Mohakhali, Dhaka

The Disease Transmission Cycle



Potential Risks and Hazards Associated with Medical Waste

1. Injuries and accidents (Nurses and housekeeping personnel are the main groups at risk associated with cut-injury, punctured wound, laceration, strain and sprain of the joint of limbs and backache).

2. Infectious medical waste and the Associated Risks

Pathogenic Organisms in Infections Waste	Associated Diseases
Bacterial	Tetanus, gas gangrene and other wound infection, anthrax, cholera, other diarrhoeal diseases, enteric fever, shigellosis, plague etc.
Viral	Various hepatitis, poliomyelitis, HIV-infections, HBV, TB, STD rabies etc.
Parasitic	Amoebiasis, giardiasis, ascariasis, ankylostomiasis, taeniasis, echinococcosis, malaria, leishmaniasis, filariasis etc.
Fungal infections	Various fungal infections like candidiasis, cryptococcoses, coccidioidomycosis etc.

Source: WHO, 2000.

3. Hazardous medical waste risk (due to types of chemicals used in medical facilities and pharmaceutical industries)

4. Groups at most risk (Waste pickers, Waste recyclers, Drug addicts (who scavenge for used needles and disposed medicines) and hospital sweepers and other low-grade hospital staff).

Medical Waste Management

Definition

MINIMIZE



Medical waste management is the practice of minimizing, identifying, separating, collecting, handling, carrying, storing and treating and finally disposing of medical waste as per policy of the institution or government.

In-House Medical Waste Management

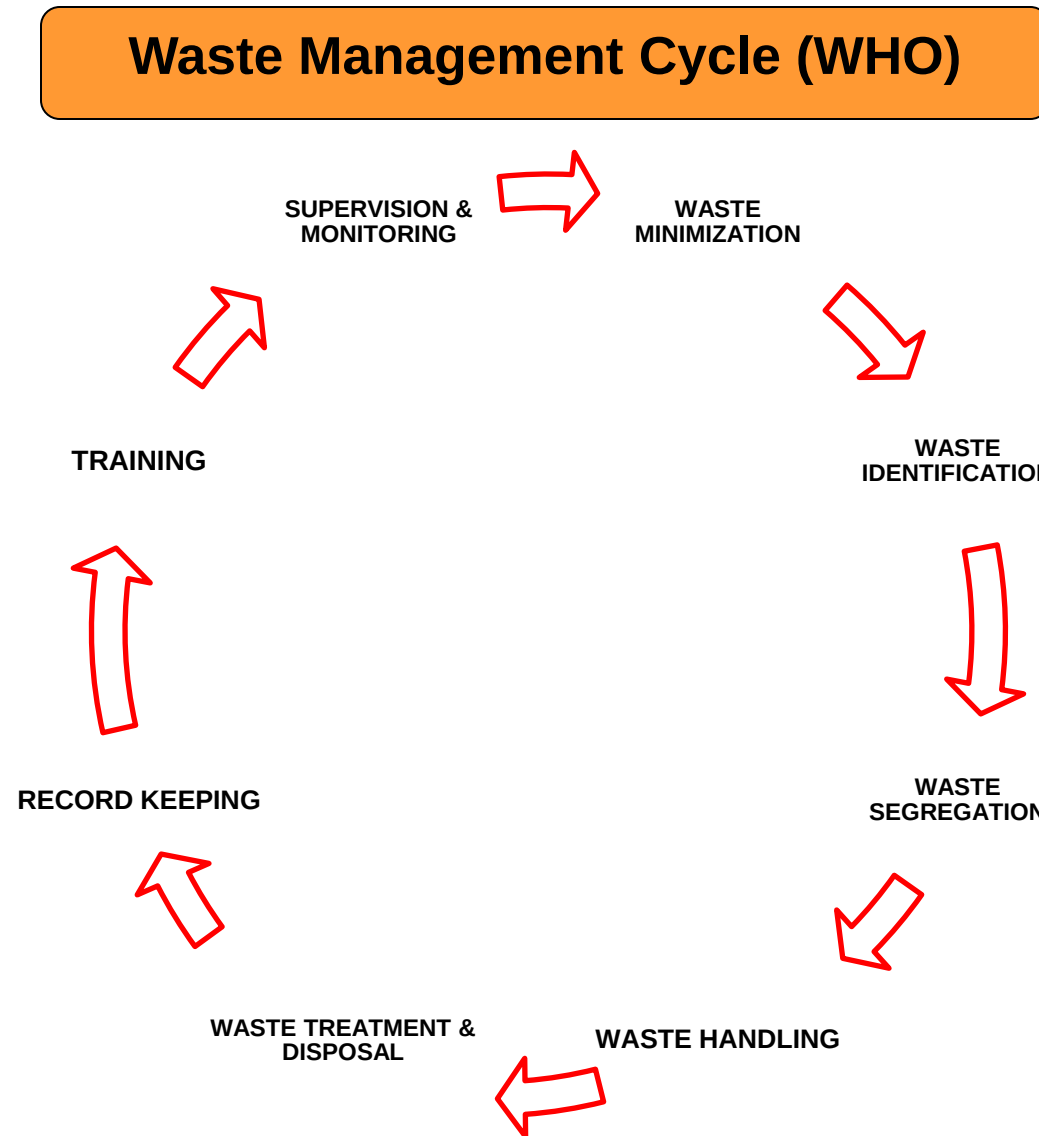
Careful management is required to:



- Minimize occupational health hazards and
- Develop environmentally friendly medical facility.



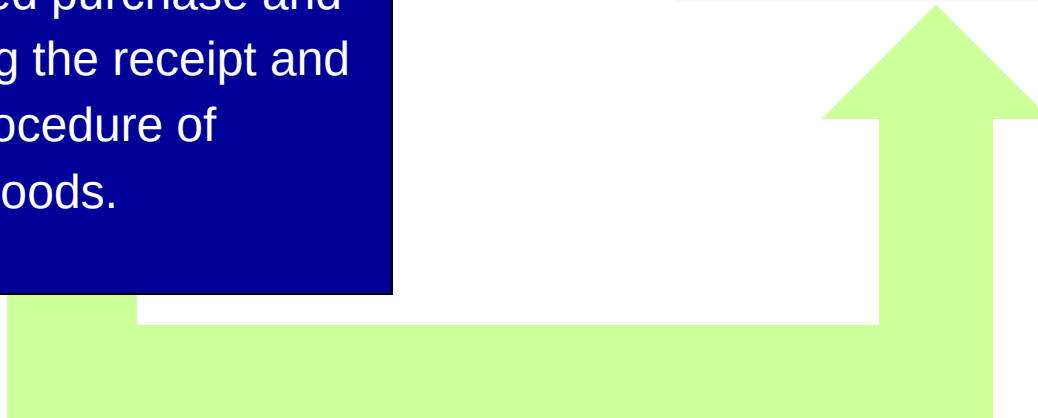
Elements of In-House Waste Management



a. Important Elements for effective in-house waste management

1. Waste Minimization

- *Source reduction*
- *Stock management*
- *Encourage use of Recyclable products*
- *Control at institution level*
- Centralized purchase and monitoring the receipt and supply procedure of medical goods.



b. Important Elements for effective in-house waste management

2. Waste Segregation:



- Waste separation/isolation is a key to effective waste management
- The waste is segregated on the basis of composition/type of waste
- Segregation of waste should occur at the point just after its generation
- Effective segregation ensures that only small quantities rather than large ones are needed for disposal
- Incorrect segregation leads to contamination of a large volume of non-hazardous waste turning the whole pack into hazardous waste

c. Important Elements for effective in-house waste management

3. Waste Identification:

A good way of identifying the waste is by sorting the different components of waste into different COLOR CODE to facilitate easy and safe handling, transportation and waste treatment.

Recommended Color Code for Developing Countries (WHO)

Type of waste	Color code
Highly infectious	Red
Infectious, Pathological, Anatomical	Yellow
Sharp	Yellow colored box
Chemicals, Pharmaceuticals	Brown
Radioactive	Silver
General waste	Black

d. Important Elements for effective in-house waste management

4. Waste Segregation:

- **Waste collection** (*regular and programmed*)
- **Waste collection materials** (*gloves, apron, boots, trolley*)
- **Placement of color bins** (*where the waste is generated*)
- **Labeling** (*containers must be labeled with some basic information*)
- **Security** (*required to prevent scavenging at the generation and disposal sites*)
- **Health and safety of the cleaner in waste management**
- **Personal hygiene** (*continuous water supply and soap/detergent for hand-washing*)
- **Response to injury and exposure** (*need for procedures to deal with accidents*)
- **Emergency response** (*trained personnel and necessary equipment*)

e. Important Elements for effective in-house waste management

5. In-house transportation



- Moving from site of collection to temporary storage area in-house
- There must be equipment for transporting waste containers
- The equipment must be easy to clean, load and unload, leak proof

Should not be used for any work other than waste transportation

f. Important Elements for effective in-house waste management

6. Temporary in-house storage

- The store should be a room, area or building within the healthcare facility- depending on the quantity of waste generated
- Waste must not be stored for more than 24 hours
- Should not be accessible to unauthorized persons and animals
- Must be located away from food preparation, processing and food store
- Should provide easy access to collectors and collection vehicles
- Storage room must be properly ventilated

7. Record keeping

- Accurate record keeping is required for effective medical waste management
- Various records related to risks, failures and problems, cost, quality and quantity of waste etc., must be taken



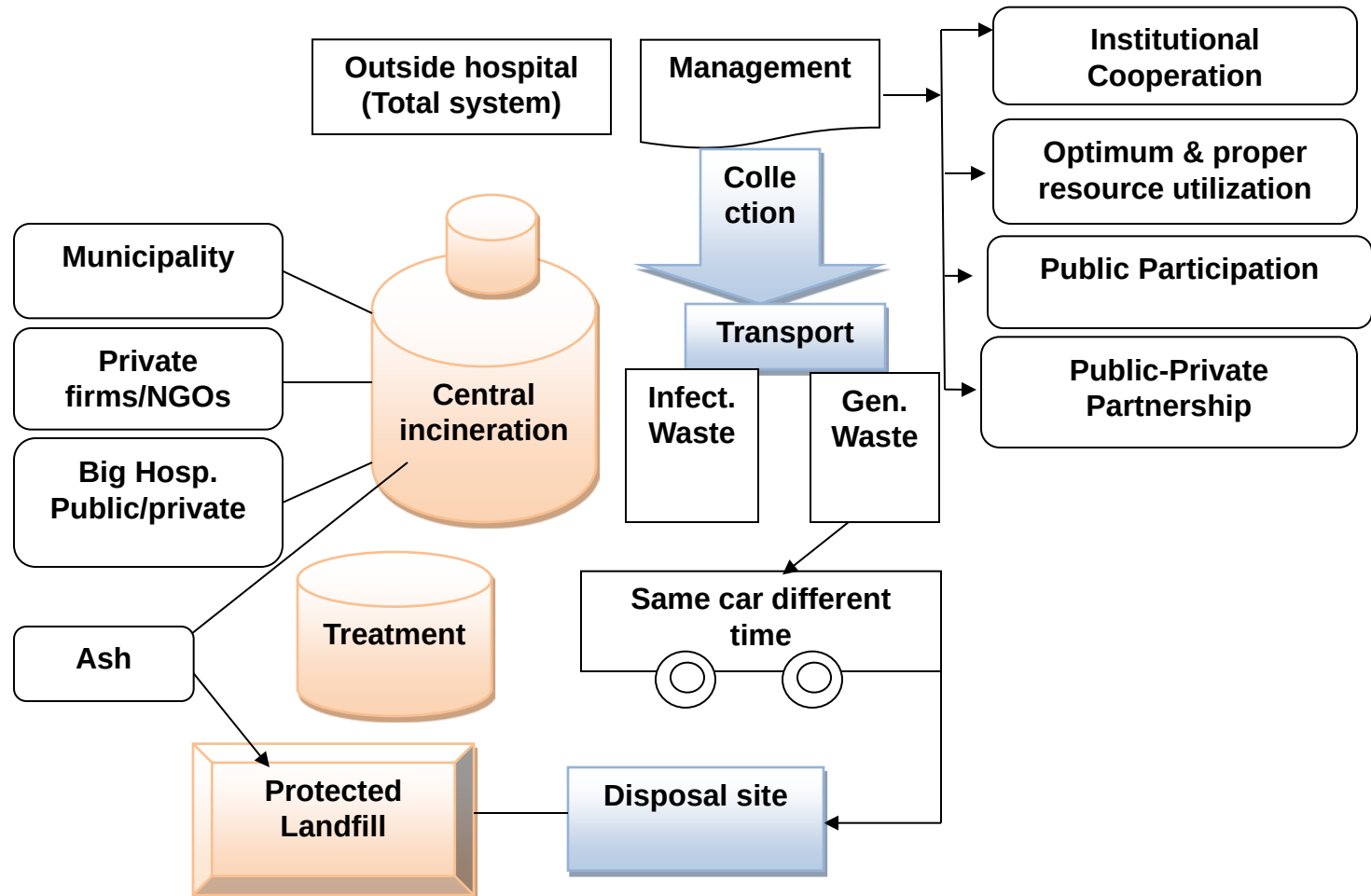
Transportation for Out-House Management

Collection of stored waste (except radioactive waste) from healthcare facilities according to color code to the final disposal site is done in a covered truck.

Collection of waste as per color-coded from different institutions should be in a covered van and the driver area should be totally separated from the waste carrying area



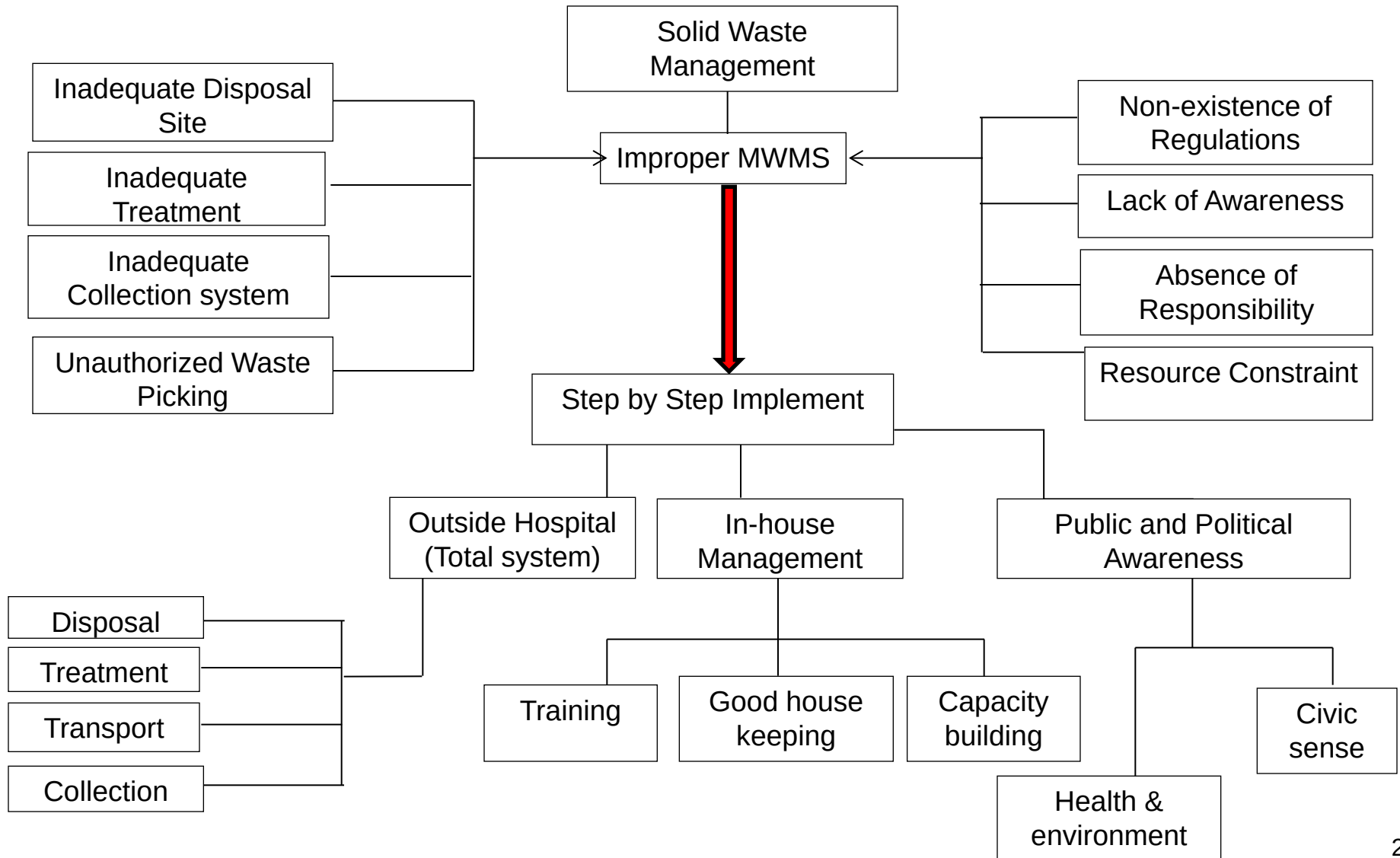
Out-House Management and Final Disposal of Medical Waste



Technologies for Treatment and Final Disposal

Incineration	• <i>(High temperature dry oxidation process to reduce organic and combustible waste to inorganic matter)</i>
Chemical disinfection	• <i>(Chemicals added to waste to kill/inactivate the pathogens)</i>
Rendering inert	• <i>(Mixing waste with cement in order to prevent leaching/migration of toxic substances)</i>
Wet thermal treatment	• <i>-including autoclaving (Exposure of shredded waste to high temperature and pressure to inactivate micro-organisms before discharge into municipal waste)</i>
Microwave irradiation	• <i>(The heat generated destroys microorganisms)</i>
Landfill (Sanitary)	• <i>(Isolates waste from the environment)</i>
Encapsulation	• <i>(pre-treatment involving filling containers with waste, adding an immobilizing material and sealing the container)</i>

External Waste Management and Final disposal of MWM



Requirements for Effective Waste Management





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THANK YOU