



Biological Waste Management



**Sandia
National
Laboratories**

What is waste?

- What can be considered **waste**?



WASTE MANAGEMENT



Small Group Discussion:

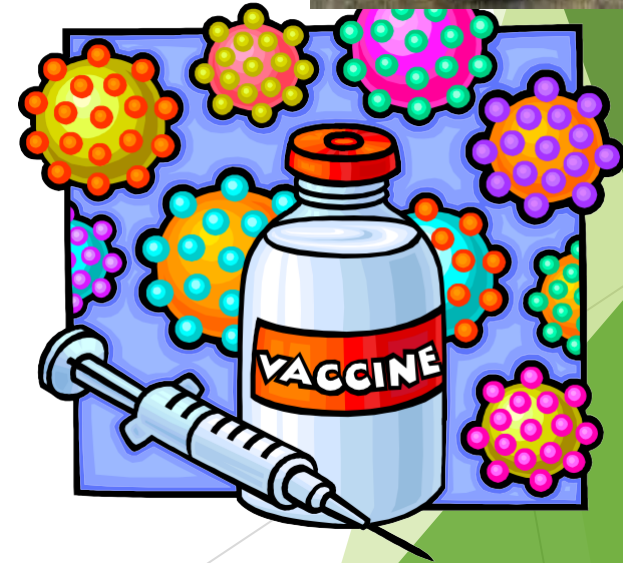
What is biological/infectious waste?

- What can be considered to be **biological/infectious waste**?
- Think of as many examples as you can and write each example on a single **sticky note**
- You have **5 minutes** to discuss



CATEGORIES OF BIOLOGICAL WASTE

- ❑ Solid waste (non-sharp)
- ❑ Sharps
- ❑ Pathological waste
- ❑ Liquid waste
- ❑ Mixed waste



Who Defines Biological Waste in Malaysia?

- Environmental Quality Act (Act No.127,1974)
 - ❖ Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989 (P.U.(A) 294/2005) (as amended)
 - ❖ Guidelines on The Handling and Management of on Clinical Wastes in Malaysia, 3rd Edition, 2009.

BIOHAZARD WASTE

Definition:

Biohazardous waste also called infectious waste (e.g. blood, body fluids, and human cell lines), is waste contaminated with potentially infectious agents or other materials that are deemed to be a threat to public health and the environment

WHAT IS AN INFECTIOUS WASTE?

- Isolation wastes: Wastes generated by hospitalized patients isolated with communicable diseases
- Cultures and stocks of infectious agents and associated biologicals. These include:
 - ❖ Specimens from medical and biological laboratories
 - ❖ Cultures and stocks of infectious agents from clinical, research, and industrial laboratories
- Human blood and blood products: Includes waste blood, serum, plasma, and blood products
- Pathological waste: Tissues, organs, body parts, blood, and body fluids

WHAT IS AN INFECTIOUS WASTE? (Cont.)

- ❑ Contaminated sharps: Contaminated hypodermic needles, syringes, scalpel blades, Pasteur pipettes, and broken glasses
- ❑ Contaminated animal carcasses, body parts, and animal bedding
- ❑ Miscellaneous Contaminated Wastes including:
 - ❖ Wastes from surgery and autopsy
 - ❖ Miscellaneous laboratory wastes
 - ❖ Dialysis unit wastes
 - ❖ Contaminated equipment

WHY PAY ATTENTION TO WASTE?

- Who is at **increased risk** if waste materials contaminated with biological materials are not handled and treated properly?
- What **incidents** can potentially occur?

Why manage hazardous waste?

To:

- protect humans & the environment
- minimize the generation of hazardous waste
- comply with local and/or national regulations on hazardous waste management

RESPONSIBILITY

It is the responsibility of the person generating waste to ensure that all procedures are followed to ensure safe and environmentally responsible disposal of the waste

CASE STUDY

FMD Outbreak UK 2007:

- August 2007: 4 locations
- Detected at routine tests by the government department
- Covers 21 km radius
- Farmers compensated by the government



Investigation

- Two neighboring laboratories were researching FMDV
 - ❖ Institute for Animal Health (IAH)
 - ❖ Merial Animal Health Laboratory (MAHL)
- Hypothesis for the cause of the outbreak:
 - Airborne transmission: Very unlikely
 - Waterborne transmission: Likely, but flooding of lab and transmission via water is not possible (Lab is 4 km from the location of outbreaks)
 - Human transmission (Biosecurity breach): Very possible



Investigation Report

- Traces of FMDV was found in the effluent pipe from MAHL to the government treatment plant
- MAHL has in-house effluent treatment (citric-acid disinfection)
 - ❖ Discovered that the MAHL's FMDV can survive in citric acid
- There was an underground pipe rupture caused by the roots of a tree
- The leakage of water contained the same FMDV from MAHL
- The rupture was close to a roadway leading to a nearby farm
- How did FMDV get transmitted to other farms????

Faulty pipe blamed for UK foot and mouth outbreak



EARTH 7 September 2007

By [Andy Coghlan](#)

A faulty drainage pipe was the most likely source of an outbreak of foot and mouth disease in Britain on 3 August, official investigators concluded today.

The pipe connected two world class research facilities on the same Pirbright facility in Surrey. One, [Merial Animal Health](#), is a manufacturer of foot and mouth and other animal vaccines. The second, the [Institute of Animal Health](#) (IAH), is the world's foremost reference laboratory for identifying and monitoring outbreaks of foot and mouth.

INFECTIOUS WASTE MANAGEMENT PLANS

Components of an Infectious Waste Management Plan:

- Designation of the waste that should be managed as infectious waste
- Segregation of infectious waste from the noninfectious waste
- Packaging
- Storage
- Treatment
- Disposal
- Contingency measures for emergency situations
- Staff training

WASTE MANAGEMENT PROCESS

Segregation



Packaging



Labeling



Handling, storage and transportation



Treatment/Disposal

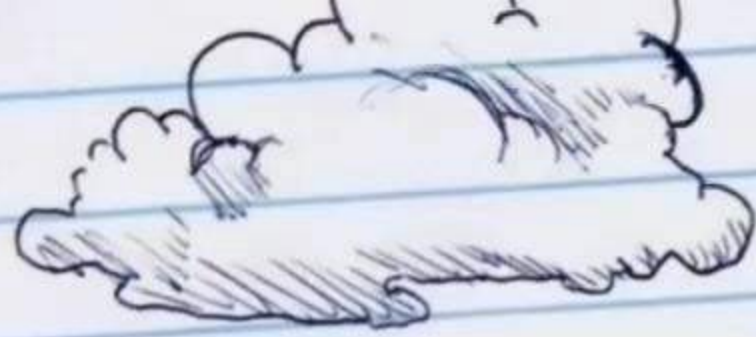
WHAT IS WASTE SEGREGATION?

Segregation means the separation of the entire waste generated in a facility into different waste groups according to the **specific treatment and disposal requirement**



Importance of Segregation

- Segregation is the key to effective waste management
- Without an effective segregation system, the complete waste stream must be considered hazardous
- Create waste streams to ensure that:
 - ❖ you only treat what you have to
 - ❖ each type of waste is treated accordingly
- Only decontaminate what you must



CLINICAL WASTE MANAGEMENT



Know where to dispose waste?



WASTE MANAGEMENT PROCESS

Segregation



Packaging



Labeling



Handling, storage and Transportation



Treatment/Disposal

NON-SHARP SOLID WASTE MANAGEMENT



SHARPS WASTE COLLECTION

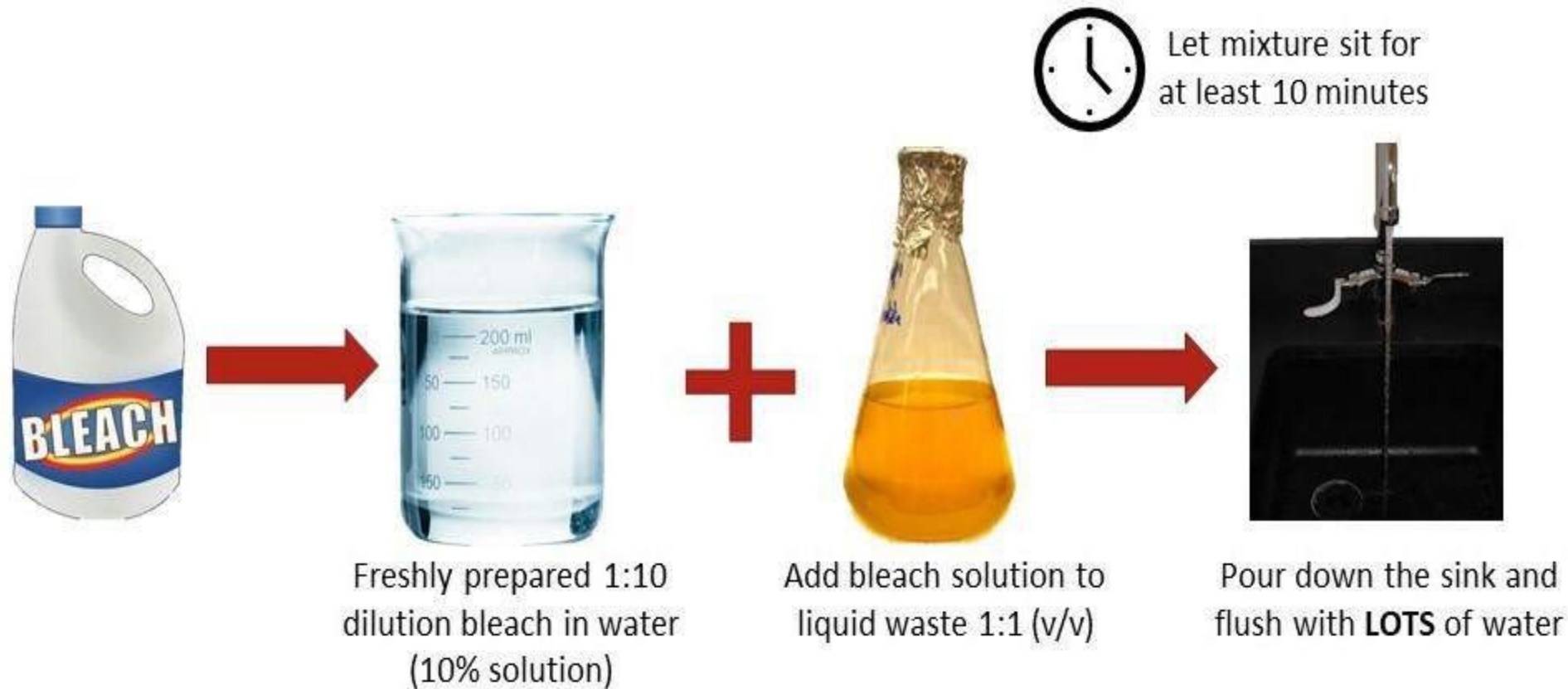
- Sharps Containers
 - ❖ Closable and when closed not re-openable
 - ❖ Puncture-proof
- Container Size & Location are Critical
 - ❖ Minimize handling of used sharps
- Avoid overfilling



HANDLING SHARPS

- According to MOH, in Malaysia from 1998-2005, 74.9% of injuries were needlestick injuries
- In the USA, each year, some 800,000 incidents occurred where people get accidentally pricked/cut by needles and sharps
- The most common causes for the spread of bloodborne pathogens were:
 - ❖ recapping needles (**Do not recap needles**)
 - ❖ failing to properly dispose of used needles in puncture-resistant sharps containers
 - ❖ Accidental breakage of the tubes used for collection of blood in a variety of healthcare settings. Every year an estimated 2,800 injuries were from glass capillary tube breakage

Liquid Waste



WASTE MANAGEMENT PROCESS

Segregation



Packaging



Labeling



Handling, storage, and transportation



Treatment/Disposal

Labelling of waste

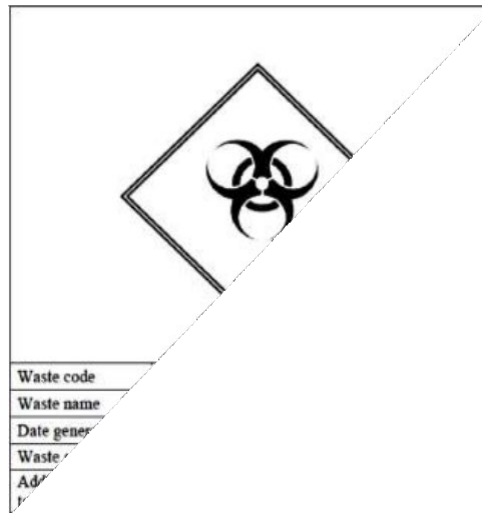
All bags and drum containers must be identified at the point of production and should be indelibly and clearly marked

Biohazard Symbol



INFECTIOUS SUBSTANCES (WASTE)

Symbol (three crescents superimposed on circle) : black Background : White



THROWN INTO THE
RIGHT CONTAINER

Collection of Clinical waste

Blue - Infectious
Waste
Black - General
Waste

Clinical Waste

Sharp
Waste

WASTE MANAGEMENT PROCESS

Segregation



Packaging



Labeling



Handling, storage and transportation



Treatment/Disposal

WASTE STORAGE & TRANSPORT



WASTE MANAGEMENT PROCESSES

Segregation



Packaging



Labeling



Handling, storage and transportation



Treatment/Disposal

ON-SITE TREATMENT OF BIOLOGICAL MATERIAL

- Autoclaving (steam sterilization)
- Incineration

What happens if your infectious waste was thrown in domestic waste?

- ☐ Did you trace the trash?
- ☐ Where did it go?
- ☐ Who handled it?
- ☐ Who can get to access it after it is discarded?

Landfill



Landfill

- Predominant method of waste disposal in developing countries
- Groundwater contamination, air pollution, and pests
- Health hazards



KEY MESSAGES

- **Waste should be segregated** into appropriate waste types, according to the risk it presents
- **Different methods for collection and storage** of biological waste are necessary for different types of waste
- There are **different treatment methods** that should be appropriately employed based on the risk presented by the waste type

Thank You

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