Biosecurity & Biosafety

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- Biosecurity is the process employed for ensuring biological agents are properly safeguarded against theft, loss, diversion, unauthorized access or use/release. Biosafety is those processes that ensure that operations with such agents are conducted in a safe, secure and reliable manner.

- **Biological hazards**, also known as biohazards, refer to biological substances that pose a threat to the health of living organisms, primarily that of humans. This can include medical waste or samples of a microorganisms, virus or toxin (from a biological source) that can affect human health. It can also include substances harmful to other animals

Levels of biohazard

The United States Centers for Disease Control and Prevention (CDC) categorizes various diseases in levels of biohazard, Level 1 being minimum risk and Level 4 being extreme risk.

Risk group classification

Risk Group	Individual risk	Community risk
1	no, low	no, low
2	moderate	low
3	high	low
4	high	high

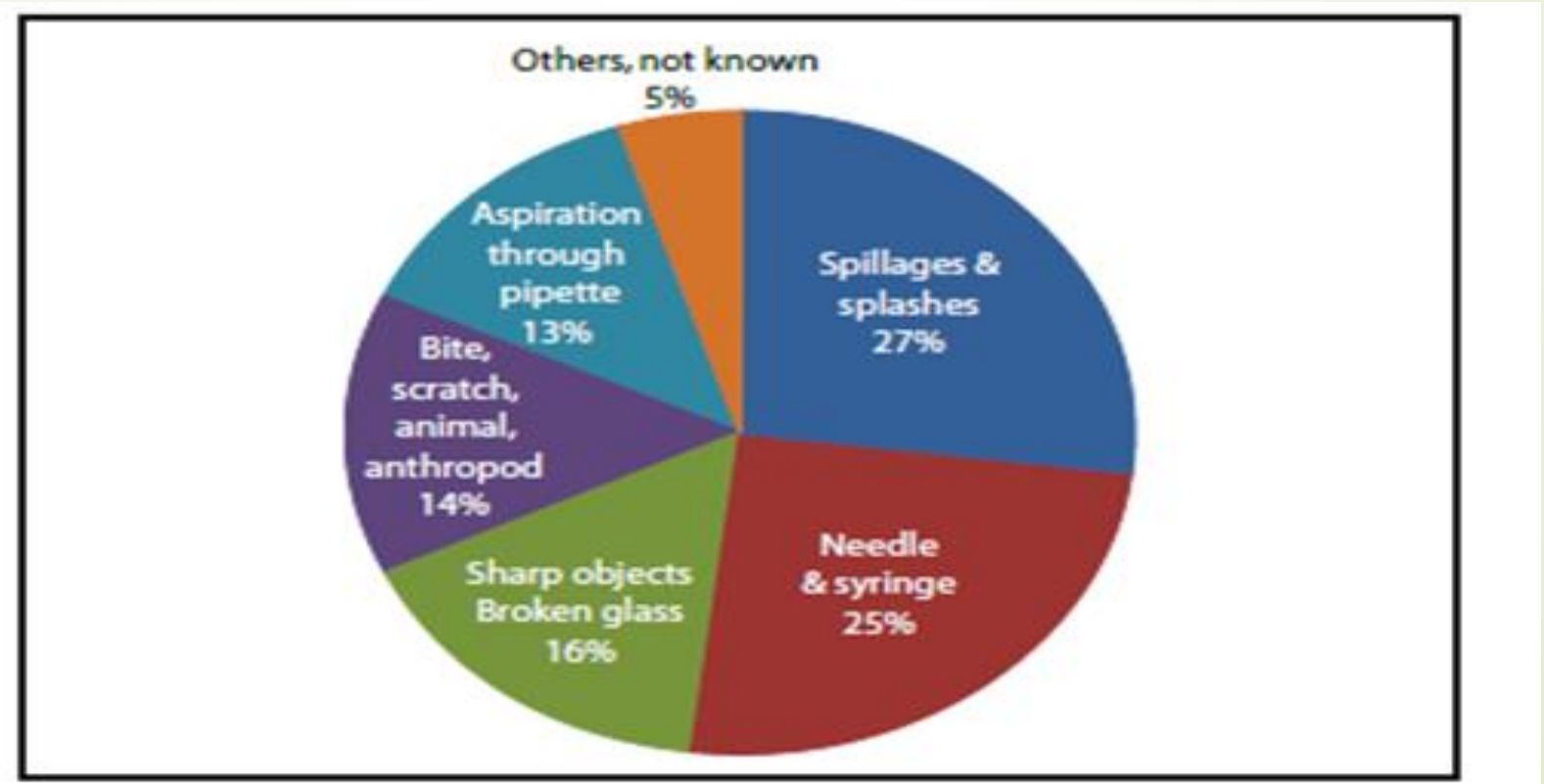
- **Many laboratories handling biohazards employ an ongoing risk management assessment and enforcement process for biosafety.**
- **Failures to follow such protocols can lead to increased risk of exposure to biohazards or pathogens. Human error and poor technique contribute to unnecessary exposure and compromise the best safeguards set into place for protection**

- **The factors involved in the incidents**
- **The following factors are critical to infections that occur with different infectious agents:**
- **The route of infection**

- **through the lungs (inhalation)**
- **through the mouth (ingestion)**
- **by contact with apparently unbroken skin and with mucous membranes (by injection, with hollow-bore needles and other sharps)**
- **through the conjunctiva**
- **through the genitourinary tract and from animals' (including arthropods) bites and scratches**

- The infectivity of the agent.
- The relative concentration of the agent.
- The survival of the agent in the environment

Types of accidents preceding infections in laboratories



Biosafety is related to several fields

- **ECOLOGY:** referring to imported life forms not indigenous to the region (Reggie the alligator)
- **AGRICULTURE:** reducing the risk of alien viral or transgenic genes, or prions such as BSE/"MadCow“; reducing the risk of food bacterial contamination
- **MEDICINE:** referring to organs or tissues from biological origin, or genetic therapy products, virus; levels of lab containment protocols .BSL-1, 2, 3, 4 in rising order of danger
- **CHEMISTRY:** i.e., nitrates in water, PCB levels affecting fertility
- **EXOBIOLOGY:** i.e., NASA's policy for containing alien microbes that may exist on space samples - sometimes called "biosafety level 5"

What is Biosecurity and Biosafety?

- **BIOSAFETY** **“ Laboratory biosafety” the containment principles, technologies and practices that are implemented to prevent the unintentional exposure to pathogens and toxins, or their accidental release.“**
- **The prevention of large-scale loss of biological integrity, focusing both on ecology and human health**
- **These prevention mechanisms include conduction of regular reviews of the biosafety in laboratory settings, as well as strict guidelines to follow**

Biosecurity “Laboratory biosecurity” -Control of accidental and deliberate release of biohazardous material

- describes the protection, control and accountability for valuable biological materials (VBM) within laboratories, in order to prevent their unauthorized access, loss, theft, misuseor intentional release.
- It is all procedures used to prevent the introduction and spread of disease (prevent the entry of disease - control the spread of disease)

biosafety, and biosecurity refer to ability to respond effectively to biological threats and related factors.

Such requirements include

the prevention and control of major emerging infectious diseases.

the prevention of biotechnology abuse.

the protection of laboratory biosafety.

the protection of special biological resources.

- **The final aim of biosafety and biosecurity** is to eliminate or minimise biological contamination, there are three important concepts in the field of biosecurity:
- Biological hazard
- Biocontainment
- Bioprotection

Why is Biosafety Important?

- Laboratories recognize hazards of processing infectious agents
- Guidelines developed to protect workers in microbiological and medical labs through engineering controls, management policies, work practices

Safe Lab Practices

- Access Control
- Use of appropriate
- PPE
- Waste Management
- Practices
- Decontamination/ Disinfection
- Procedures
- Good Personal Hygiene

5 main types of accidents

- Accidents involving the use of needles or syringes
- Spills and aerosols
- Injury from broken glass or sharp objects
- Aspiration into the mouth from a pipette
- Bites by animals or ectoparasites

STANDARD MICROBIOLOGICAL PRACTICES

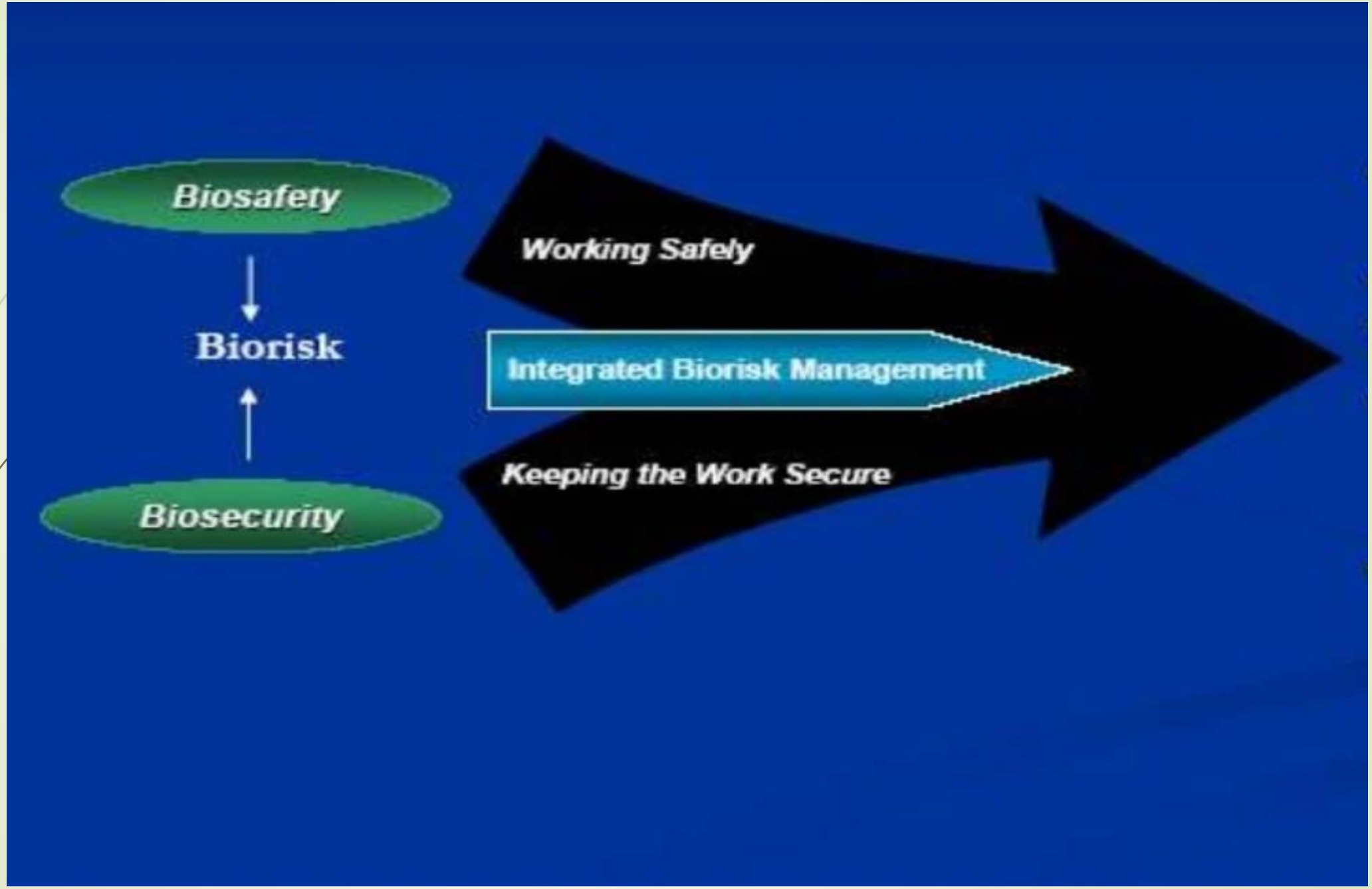
- NOT permitted in laboratories:
  - ➔ Eating
  - ➔ Drinking
  - ➔ Smoking
  - ➔ Handling contact lenses
  - ➔ Pipetting by mouth
  - ➔ Storing food and drink

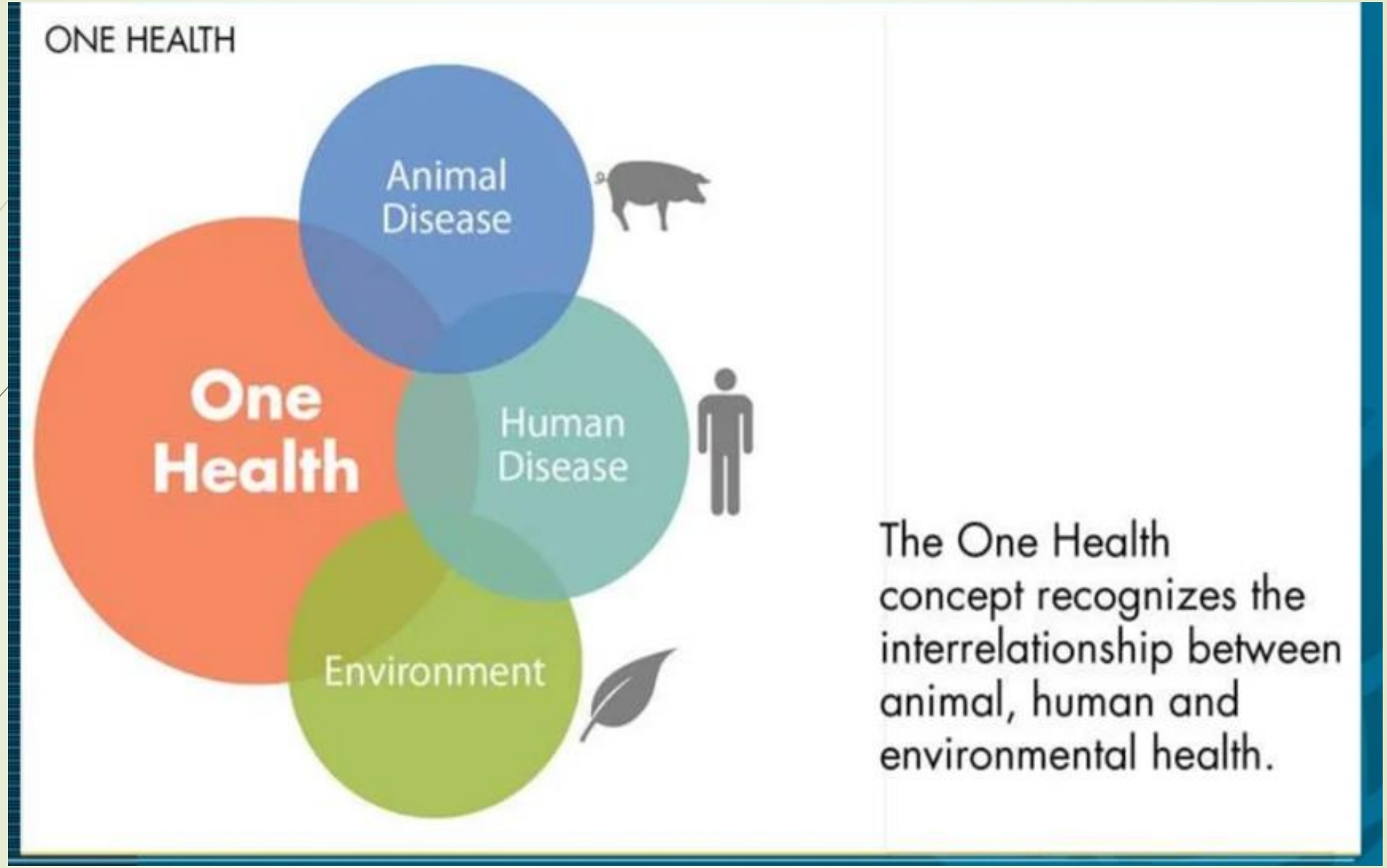
Why We Have To Think About Biosecurity?

- Because those dangerous agent can be:
- Dual-use research of concern (DURC) means can be use either for good or bad purposes.
- terrorist biological weapons.

- Limit access to areas that contain certain biological agents or assets.




Biosafety
Biorisk
Biosecurity
Working Safely
Integrated Biorisk Management
Keeping the Work Secure


ONE HEALTH
Animal Disease
One Health
Human Disease
Environment
The One Health concept recognizes the interrelationship between animal, human and environmental health.