



# BIOSAFETY

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# Outline

- ✓ Biosafety
- ✓ Principles of Biosafety
- ✓ Sources of infection
- ✓ Lab Considerations
- ✓ Biocontainment
- ✓ Primary Barriers



# Objectives

- ❑ Identify and implement principles and practices for safeguarding laboratory personnel and the environment from exposure or infection when handling living organisms, biological materials, or agents.

# Biosafety



➤ **Biosafety** is the safe working practices associated with handling of biological materials, particularly infectious agents. It addresses containment principles, technologies and practices that are implemented to prevent the unintentional exposure to pathogens and toxins, or their accidental release.

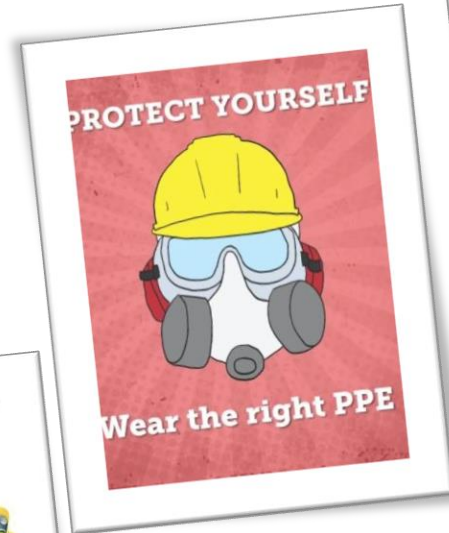


# Principles of Biosafety



To protect:

- Yourself
- The patient
- The environment





# Biological Safety in Laboratories

## Routes of Laboratory Infection:

- Aerosol inhalation
- Ingestion
- Injection by syringe
- Absorption through skin
- Absorption through cuts/ abrasions

# Sources of Laboratory Infection



- These can contain hazardous **bacteria, viruses, fungi** or **parasites**.
- All samples should be treated as potentially dangerous in routine clinical labs.

- Blood samples
- Urine samples
- Sputum samples
- Tissue samples
- Faeces samples

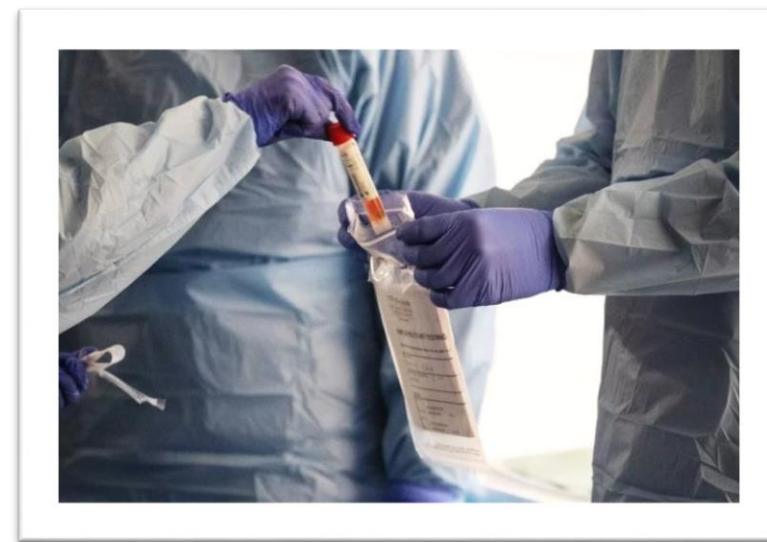
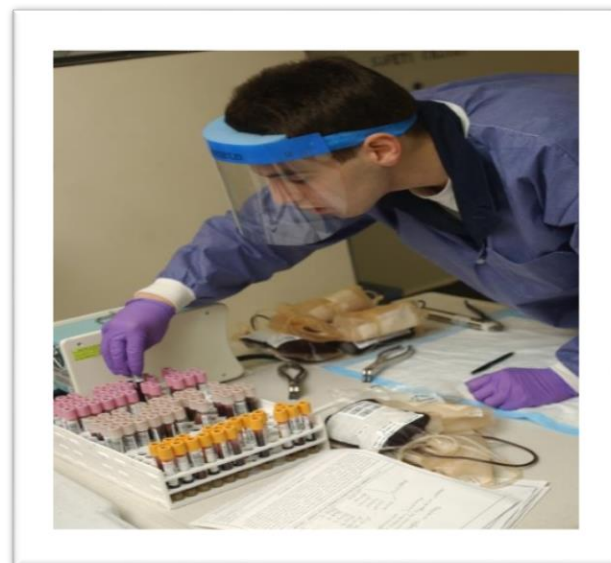
# General Considerations



- Consider ALL patients specimens are a serious source of infection.
- Always wear personal protective materials.
- NEVER EAT, DRINK, SMOKE, CHEW GUM IN THE LAB.
- Always wash your hands thoroughly with an antiseptic, bactericidal soap before and after wearing gloves.
- Never wear the lab coat outside the lab except for work connected with the lab work.
- Dispose off needles and sharp objects in the sharps disposal bin.
- Ensure that the lab has eye-wash kit and solution.
- The lab must have a suitable antiseptic, bactericidal, fungicidal and antiviral solution.



# How to Handle a Patient Specimen of Known Potential Infection Hazard



# Biocontainment



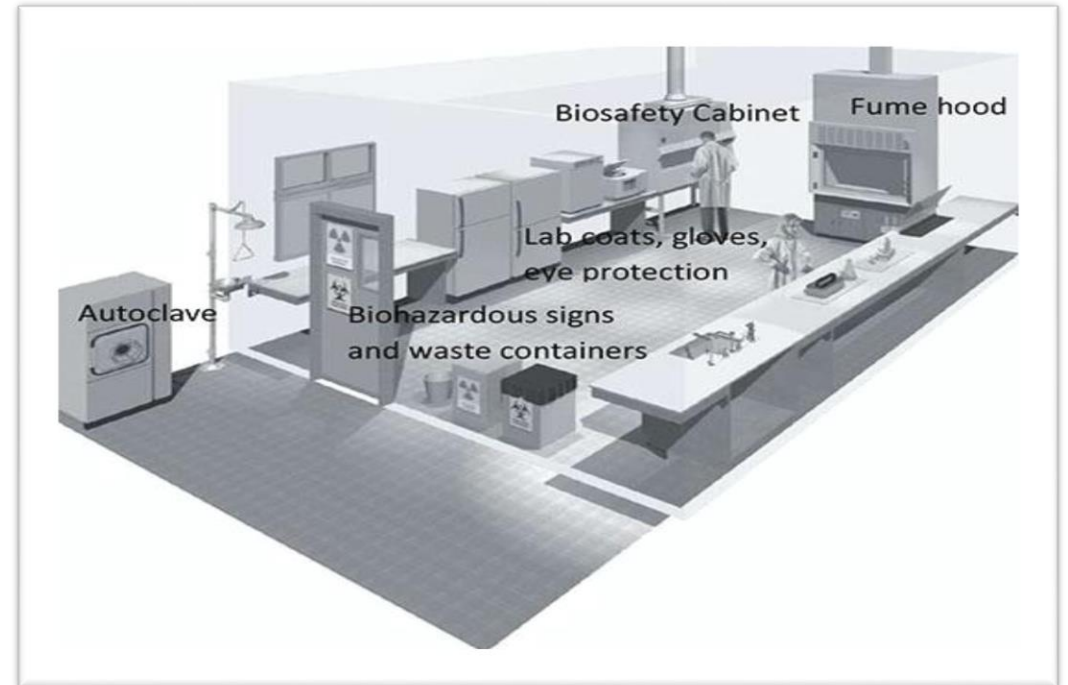
- The overall objective of biocontainment is to confine an infectious organism or toxin, thereby reducing the potential for exposure to laboratory workers or persons outside the laboratory, and the likelihood of accidental release to the environment.
- The containment of extremely pathogenic organisms (such as viruses) is usually by isolation in secure facilities to prevent their accidental release.



# Biocontainment



- Safe methods for managing infectious materials in the laboratory environment where they are being handled or maintained.
- Exposure could involve not only laboratory workers but other individuals working close by and the outside environment.



# Containment Elements

- Safety equipment (Primary barrier).
- Laboratory practice and technique (Primary barrier).

## **Example:**

Personal protective equipment (PPE) such as lab coats, face shields, masks, gloves, biological safety cabinets, and fume hood offer protection when used properly in conjunction with good laboratory techniques.

# Primary Barriers - Equipment



- **Personnel Protection**

Any aerosol generated within the cabinet is contained and kept away from the worker.

- **Product Protection**

Air within the work space of the cabinet has been filtered so that is virtually free of airborne particles and organisms; thus protecting the work from outside contamination.

- **Environmental Protection**

Aerosols generated within the unit are removed from the air before the air is discharged.





# References

Sveinbjornsson, B. R., & Gizurarson, S. (2022). Handbook for Laboratory Safety. 1<sup>st</sup>. Elsevier.