

Biorisk Mitigation Strategies in the Field – PPE, Sample Collection, Waste Disposal and Sample Transport

Student Guide



Biorisk Mitigation Strategies In the Field

Welcome to Biorisk Mitigation Strategies in the Field!



Biorisk Mitigation

Group Activity:

In your groups, please spend **5 minutes** to discuss the following question:

What is **Biorisk Mitigation**?

Based on your discussion, develop a **definition** for **Biorisk Mitigation**. Write your definition on your flip-chart.



Slide 2

Mitigation Control Measures

There are five major categories of measures for controlling biological risks in the laboratory.

1. Elimination or Substitution
2. Engineering Controls
3. Administrative Controls
4. Practices and Procedures
5. Personal Protective Equipment



Slide 4

Mitigation Control Measures

Elimination or Substitution: Removing the hazard, not working with the agent or replacing the hazard with something less dangerous



Slide 5

Mitigation Control Measures

Engineering Controls:

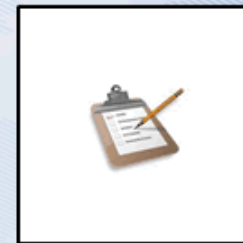
Physical changes to work stations, equipment, materials, production facilities, or any other relevant aspect of the work environment that reduce or prevent exposure to hazards



Slide 8

Mitigation Control Measures

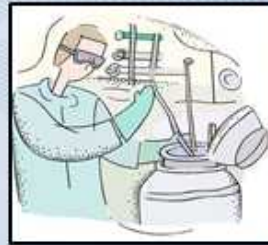
Administrative Controls: Policies, standards and guidelines used to control risks



Slide 7

Mitigation Control Measures

Practices and Procedures: Processes and activities that have been shown in practice to be effective in reducing risks



Slide 3

Mitigation Control Measures

Personal Protective Equipment: Devices worn by the worker to protect against hazards in the laboratory



Slide 4


Mitigation Control Measures

Group Activity:

Considering these categories of **mitigation control measures**:

Elimination or Substitution	Engineering Controls	Administrative Controls	Practices and Procedures	Personal Protective Equipment (PPE)
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Please spend **5 minutes** to categorize your mitigation measures from the previous activity. Place your **sticky-notes** under each category.

Slide 10 

SOP Activity

Activity: Paper Folding SOP

1. Every student, take a piece of paper.
2. Close your eyes.
3. Fold the piece of paper in half.
4. Fold the piece of paper in half again.
5. Remove a corner of the piece of paper.
6. Unfold the piece of paper and raise it above your heads.



Slide 13

Field Biosafety

Discussion:

What went wrong in this **SOP**?

How do you ensure **SOPs** are properly written, and followed?



Slide 14

The goal of an SOP:

- Different people
- Doing the same thing
- Getting the same result
 - *S.G. Kaufman*

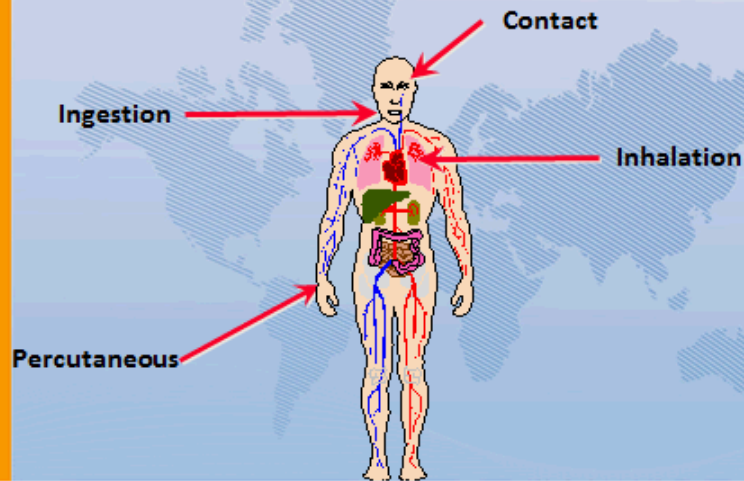


SOP Components

- Conditions
 - Who should use the SOP?
 - When should it be used?
 - Why should the SOP be used?
 - Where should it be used
- Context
 - Input
 - Output
 - Preparation
- Actions
 - Steps to move from the input to the output
- Documentation



What are the routes of exposure?



PPE Selection

- As a group, look at the PPE examples you have
- What routes of exposure do they protect?
 - What are the pro's and con's of each example?
 - Are there other considerations?
 - Storage, maintenance, fit, cost, etc



Lab coats, scrubs, gowns, aprons and coveralls



- Lab Coats and gowns are used to protect from infectious fluids
- Front button cotton lab coats may not be appropriate for working with large amount of infectious liquid
- Rear fastening Gowns may be appropriate for working at higher containment
- Don't wear lab coats outside of the lab or take them home
- Cuffed sleeves can protect the wrists and lower arms



Gloves

- Wear disposable vinyl, synthetic or N-DEX nitrile gloves when working with biohazardous materials
- Avoid latex gloves (may cause allergies)
- Replace torn, soiled or damaged gloves immediately
- Do not reuse gloves
- Do not wear gloves outside of the laboratory
- Wash hands after removing gloves



Unfortunately, gloves can be an effective way to contaminate everyday surfaces. . .

- Phone
- Desks
- Computers
- Door and drawer handles
- Pens, pencils
- Elevator buttons



Remove gloves prior to using "common" equipment or items that might be used by unprotected personnel



Foot/Skin Protection



- Open toed shoes, sandals and other open footwear should be prohibited
- Shorts and other garments that leave skin unprotected are not appropriate



Eye and Face Protection

- PPE can protect mucous membranes and prevent ingestion whenever there is potential for splash to eyes/face especially during the following:
 - Spill Clean up
 - Invasive procedures
 - Tail vein injections
 - Other high risk activities
- Surgical masks with attached face shield protects mouth, nose and eyes from droplets but does not protect from aerosols: It is not respiratory protection!!!



Respiratory Protection



- Designed as last resort or temporary control measure
- Respiratory protection program is necessary to ensure safe and proper use
- Two types: air supplying and air purifying
- Full face, half face, PAPR (Powered Air Purifying Respirator)
- Special considerations: fit testing; facial hair; comfort; care and maintenance
- Surgical masks are not respirators (look for the N95)



PPE Selection

What are some of the key considerations when thinking about what PPE is appropriate?

- Consider routes of infection and routes of exposure
- Consider what the PPE is protecting
- Consider the limitations for use of the types of PPE
 - Fit, Availability, Cost, Storage, etc
- Consider how and where the PPE should be donned and doffed



Donning and Doffing

Is the order you don PPE important? Why

Is the order you doff PPE important? Why

What are the key considerations in creating an order for donning and doffing?



68

What is biological waste?

Small Group Discussion,

Part 1:

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



Slide 29

Why pay attention to waste?

Reflection and Class Discussion:

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

Complete the template in your workbook and then discuss with the class.



Slide 30

Non-Sharps Waste Management



Slide 36

Sharps Waste Collection

- Sharps Containers
 - Closable and when closed not reopenable
 - Autoclavable?
- Container Size & Location are Critical
 - Minimize handling of used sharps
- Avoid Overfilling
- Cautions:
 - Container substitution
 - Container reuse



Slide 37



Waste Storage and Transport



Slide 33



Steps in Waste Management

- Segregation
 - Collection
 - Storage
 - Transport
 - Treatment
 - Final Disposal
- Look at your process. Are all these components included? If not, add them into your process.



Slide 34



Transport Security

The fourth “pillar” is Transport Security

Field Transport Security is the assurance that risk mitigation controls and processes are in place to protect biological materials during transport from the field to the laboratory.



Slide 33

Transport Security

Transport Security

- Aims to reduce the risk of illicit acquisition of *high-risk* biological agents
- Relies on chain of custody principles and end-user agreements



Question: Why might **Transport Security** be *particularly* important for Field Biosecurity?



Slide 40

Transport Security

Chain of Custody (CoC)

Aims to protect sample by documenting...

- All individuals who have control of sample
- Secure receipt of material at appropriate location

Chain of custody documentation includes...

- Description of material being moved
- Contact information for a responsible person
- Time/date signatures of every person who assumes control



Slide 41

Transport Security

External Carrier

If using an external carrier, the same procedures used for securing materials for transport out of a laboratory should be employed in the field, whenever possible.

Field Personnel

If field personnel will be transporting samples, internal guidelines for doing so, in many ways similar to the requirements for MC&A in the field, should be developed to ensure samples are moved securely.



Slide 42

Transport Security

So, we want to keep our high-risk samples secure during transport. What should you do?

- Require a responsible authority to pre-approve all transport
- Advise eligible receiving party of transport
- Document transport in lab records
- Ensure only trustworthy people handle the samples
- Physically secure samples in transit with special packaging and/or locks
- Control movements and document in delivery records
- Use timely shipping methods
- Maintain a Chain of Custody
- Request notification of receipt



Other ideas?



Slide 43

Transport Security

For Example: When Transporting..

Moderate risk agents...

- Internal transport personnel screened
- Recipient screened for legitimacy
- Safe receipt notification

High risk agents...

- Moderate plus
 - Chain of custody
 - Physical controls on storage containers



A proper **Risk Assessment** can help determine transport security needs



Slide 44

Transport Security

Discussion:



How do you secure biological materials in the field during transport?



Slide 48

