



Personal Protective Equipment

Student Guide

2012




GLOBAL BIORISK MANAGEMENT CURRICULUM

Personal Protective Equipment (PPE)


Welcome to Personal Protective Equipment!





Introductions

- Instructors
- Students
 - Your name?
 - Where are you from?



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Action Plan

By the end of this lesson, I would like to:

KNOW		FEEL		BE ABLE TO DO	
<i>Your learning doesn't stop with this lesson. Use this space to think about what else you need to do or learn to put the information from this lesson into practice.</i>					
What more do I need to know or do?	How will I acquire the knowledge or skills?	How will I know that I've succeeded?	How will I use this new learning in my job?		

Use space on back, if needed



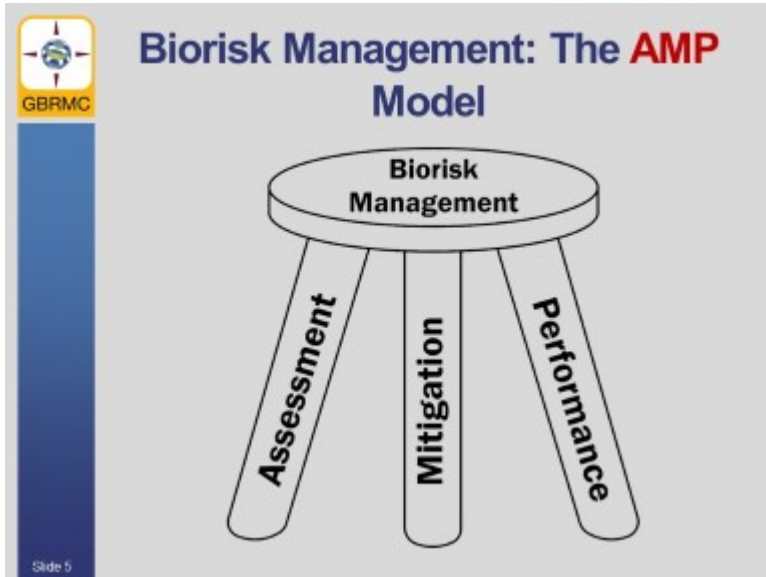
Key Messages

- Understand why PPE is one of the key controls to mitigate biorisks but in the last level in the “Hierarchy of Controls” for several reasons.
- There are many types/kinds of PPE with various advantages and limitations.
- The selection of PPE is based on several factors but most importantly on a thorough risk assessment.
- It is important to plan the order of donning and doffing PPE and follow that plan to reduce risk.


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Personal Protective Equipment (PPE)

Biorisk Management




Record refresher notes on the AMP model and biorisk management.




Key Components of Biorisk Management

- **Biorisk Assessment**
 - Process of identifying the hazards and evaluating the risks associated with biological agents and toxins, taking into account the adequacy of any existing controls, and deciding whether or not the risks are acceptable




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Define Biorisk Assessment:



Key Components of Biorisk Management

- **Biorisk Mitigation**
 - Actions and control measures that are put into place to reduce or eliminate the risks associated with biological agents and toxins



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Define Biorisk Mitigation:



Key Components of Biorisk Management

- **Biorisk Performance**
 - Improving biorisk management by recording, measuring, and evaluating organizational actions and outcomes to reduce biorisk.



Define Performance:

Personal Protective Equipment (PPE)

Biorisk Mitigation Strategies



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
- **Administrative Controls:** Policies, standards and guidelines used to control risks
- **Practices and Procedures:** Processes and activities that have been shown in practice to be effective in reducing risks
- **Personal Protective Equipment:** Devices worn by the worker to protect against hazards in the laboratory

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List examples of the following controls:

Engineering controls:

Administrative controls:

Practice and Procedures:

PPE:


Personal Protective Equipment (PPE)

Biorisk Mitigation Strategies

Record some advantages and disadvantages to PPE:

- Advantages

- Disadvantages



Advantages Disadvantages

Control Measure	Advantages	Disadvantages
Engineering	Efficient, eliminates hazard	Cost, complexity
Administrative	Authority approach	Indirect approach, primarily addresses the human factor
Practices & Procedures	SOP based (standardized approach)	Training and supervision requirements
PPE	What are the advantages?	And disadvantages?

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Personal Protective Equipment (PPE)

Biorisk Mitigation Strategies

Hierarchy of Controls (HOC)

- **Elimination or Substitution**
- Engineering Controls
- Administrative Controls
- Practices and Procedures
- Personal Protective Equipment

Control methods at the top of the list are in general more effective and protective than those at the bottom.

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- **Using personal protective equipment is often essential, but it is generally the last line of defense** after engineering controls, work practices, and administrative controls.
- The use of PPE signifies that the hazard could not be controlled by other methods.
- PPE only protects the person wearing it, unprotected workers in the same area will be exposed.
- PPE compliance depends on human reliability. Failure of PPE means that the worker “will be” exposed.
- PPE may restrict the wearer to some extent by limiting mobility or visibility, or by requiring additional weight to be carried. Thus creating additional hazards.

Personal Protective Equipment (PPE)

Biorisk Mitigation Strategies



Car vs. Motorcycle Safety

- Car safety is all about engineering systems
- Motorcycle safety is all about PPE

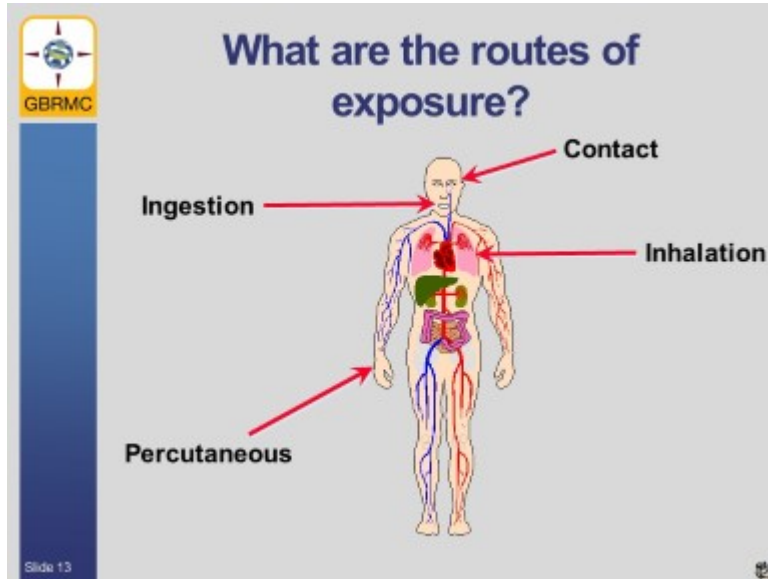


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- Engineering systems are similar to safety systems in vehicles
- Motorcycle safety equipment reflects the role of PPE in biosafety

Personal Protective Equipment (PPE)

Biorisk Mitigation Strategies



Areas of exposure include:

- Ingestion
- Contact
- Inhalation
- Percutaneous



PPE Selection

Group Exercise:

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

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PPE Item:

Protection Provided:


Pro's and Con's:

Other Considerations:

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Personal Protective Equipment (PPE)

Selection of PPE



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



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PPE Item: Lab Coat


Protection Provided:

Pro's and Con's:

Other Considerations:


Personal Protective Equipment (PPE)

Selection of PPE



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



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PPE Item: Gloves, Head, and Foot Protection

Protection Provided:

Pro's and Con's:

Other Considerations:

Personal Protective Equipment (PPE)

Selection of PPE

 **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

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Gloves need to **removed** before handling "common" areas of the lab.

Note some common areas:


-
-
-
-

Personal Protective Equipment (PPE)

Selection of PPE



Proper Glove Removal



- Grasp outside edge near wrist. Careful not to touch wrist with gloved hand
- Peel away from hand turning glove inside-out.
- Hold in opposite gloved hand.
- Slide ungloved finger under the wrist of the remaining glove, be careful not to touch the outside of the glove.
- Peel off from inside, creating a bag for both gloves
- Discard
- Wash hands thoroughly

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Contamination can occur during removal of PPE.

Understanding the purpose of PPE will aid in removal.

- Always be aware of which parts of the equipment are contaminated and which areas are not

Note some common practices of removing PPE:

 **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



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Note appropriate protection:

Personal Protective Equipment (PPE)

Selection of PPE



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!!!

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PPE Item: Eye and Face protection

Protection Provided:

Pro's and Con's:

Other Considerations:



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)




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PPE Item: Respiratory Protection

Protection Provided:

Pro's and Con's:


Other Considerations:



Case Exercise – Step 1

Exercise:
Based upon the agent and activity in your case study, determine what **PPE** is the most appropriate and why.


For this activity please design based upon the following laboratory outline



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What agent and activity were you given?

What PPE did you choose?



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

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Key Considerations:

- Routes of Infection
- Provided Protection
- Limitations
- Donning and Doffing

Personal Protective Equipment (PPE)

Donning & Doffing PPE



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?


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Donning PPE:

- Importance of Order

Doffing PPE

- Importance of Order




Case Exercise – Step 2

Exercise:
After determining what PPE is most appropriate, based upon the agent and activity in your case study create a **donning and doffing order**

- Where is the PPE stored?
- Where is the PPE disposed of or cleaned?
- Are there any other considerations?

For this exercise please design based upon the following laboratory outline



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Where is the PPE stored?

Where is the PPE disposed of or cleaned?

Are there any other considerations?

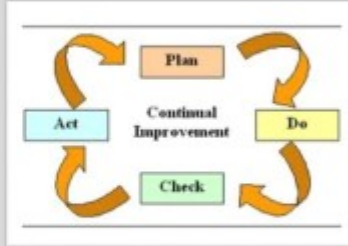
Personal Protective Equipment (PPE)

PPE Program Management



Program Management

- Roles and Responsibilities
- Training Requirements
- Written SOPs



The diagram illustrates the PDCA (Plan-Do-Check-Act) cycle for continuous improvement. It consists of four colored boxes: Plan (orange), Do (yellow), Check (green), and Act (light blue), arranged in a square. Curved arrows connect the boxes in a clockwise direction: Plan to Do, Do to Check, Check to Act, and Act back to Plan. The text 'Continual Improvement' is centered within the cycle.


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Examples of the following:

- Plan
- Do
- Check
- Act

Personal Protective Equipment (PPE)

PPE Program Management



Roles and Responsibilities

Organize the list of responsibilities into the following three categories:

- Top Management
- Scientific Management (Principal Investigator or Lab Director)
- Lab Worker / Technician / Researcher

Note: some responsibilities may overlap

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Record some responsibilities for each category:

Top Management:

Scientific Management:

Lab Worker:

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PPE Training Considerations


- When PPE is necessary
- What PPE is necessary
- How to properly don, doff, adjust, and wear PPE
- The limitations of the PPE
- The proper care, maintenance, useful life, and disposal of the PPE

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PPE Training Program includes:

- When and what PPE is necessary
- Don and doffing procedures
- Understanding the limitations of PPE
- Maintenance


SOP Design



Case Exercise – Step 3

Exercise:
Use the template provided to create a simple written **SOP** for PPE use for your scenario.

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Review of PPE

To wrap-up, let's discuss what we learned about **PPE** including the **different types, selection, proper and donning and doffing** . . .

What did we learn?

What does it mean?

Where do we go from here?

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Key Messages

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