SAND2012-1166C

Laboratory Biosafety Mitigation Strategies

February 29-March 2, 2012 *Regional INH Biorisk Management Workshop*

Day 2 *Instructors: William Pinard, Lora Grainger, and Thamer Imran*

Sandia National Laboratories is a multi-program laboratory operated and managed by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Lesson Objectives

- Understand the role of mitigation in the AMP model for biorisk management
- Define mitigation
- Appreciate that mitigation must be based on a thorough risk assessment

Lesson Objectives

- List the categories of control measures and describe the hierarchy of controls
- Understand the advantages and limitations of each type of biorisk mitigation measure
- Be prepared to learn more details about specific mitigation strategies

The AMP Model

Biorisk Management =
Assessment, Mitigation, Performance

Risk Mitigation

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

What is Biorisk Mitigation?

Based on your discussion, please develop a definition for **biorisk mitigation** and write it on your ***flip-chart***.

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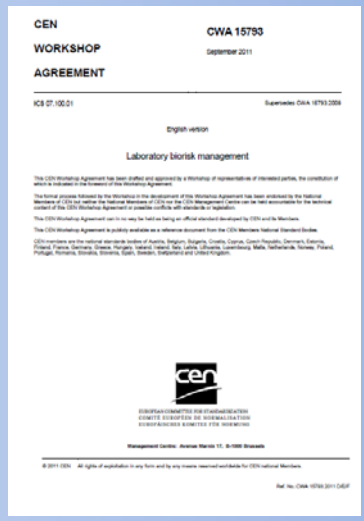
Domains

- Policy and General Management
- Planning and Assessment
- Operational Controls
- Administrative Controls
- Reporting Monitoring Response
- Review and Revision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Laboratory biorisk management

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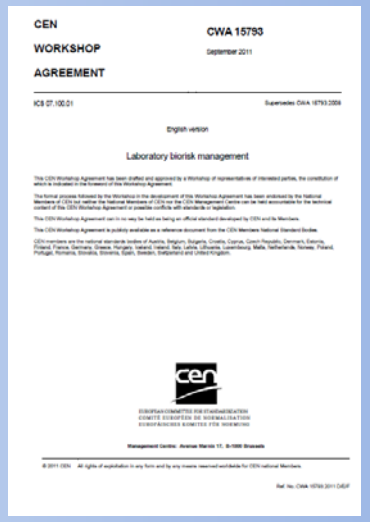
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Operational Controls

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4.4.4 Operational control

The organization shall identify those operations and activities that are associated with possible biological risk and where control measures shall be applied.

The organization shall plan these activities, including maintenance, and ensure that they are carried out under specified conditions.

Operational Controls

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

What are some common operational controls found in a laboratory?

Please come up with as many different **operational controls** as your group can think of, writing each one on a ***sticky note***. Place them on a wall or flip chart.

Operational Controls

A few operational controls may be….

- Work Practices
- Personal Protective Equipment (PPE)
- Decontamination and Disposal
- Facility
- Security
- Transport and Shipping
- SOPs

Operational Controls

This morning, we will be discussing biosafety mitigation strategies of particular importance to laboratories.

Work Practices

Personal Protective Equipment (PPE)

Decontamination and Disposal

Work Practices

The first mitigation strategy we will discuss is…

Work Practices

Personal Protective Equipment (PPE)

Decontamination and Disposal

Work Practices

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

What are good laboratory/work practices?

Please come up with as many different **practices** as your group can think of, writing each one on a ***sticky note***. Place them on a wall or flip chart.

Work Practices

What **good laboratory practices** for biosafety did your groups come up with?

Work Practices

Some **questions** to consider…

- Why are they good practices?
- Why do them?
- Who/what are these practices protecting, and from what?
- How can you ensure people follow them?

Personal Protective Equipment

The second mitigation strategy we will discuss is…

Work Practices

Personal Protective Equipment (PPE)

Decontamination and Disposal

Personal Protective Equipment

Question:

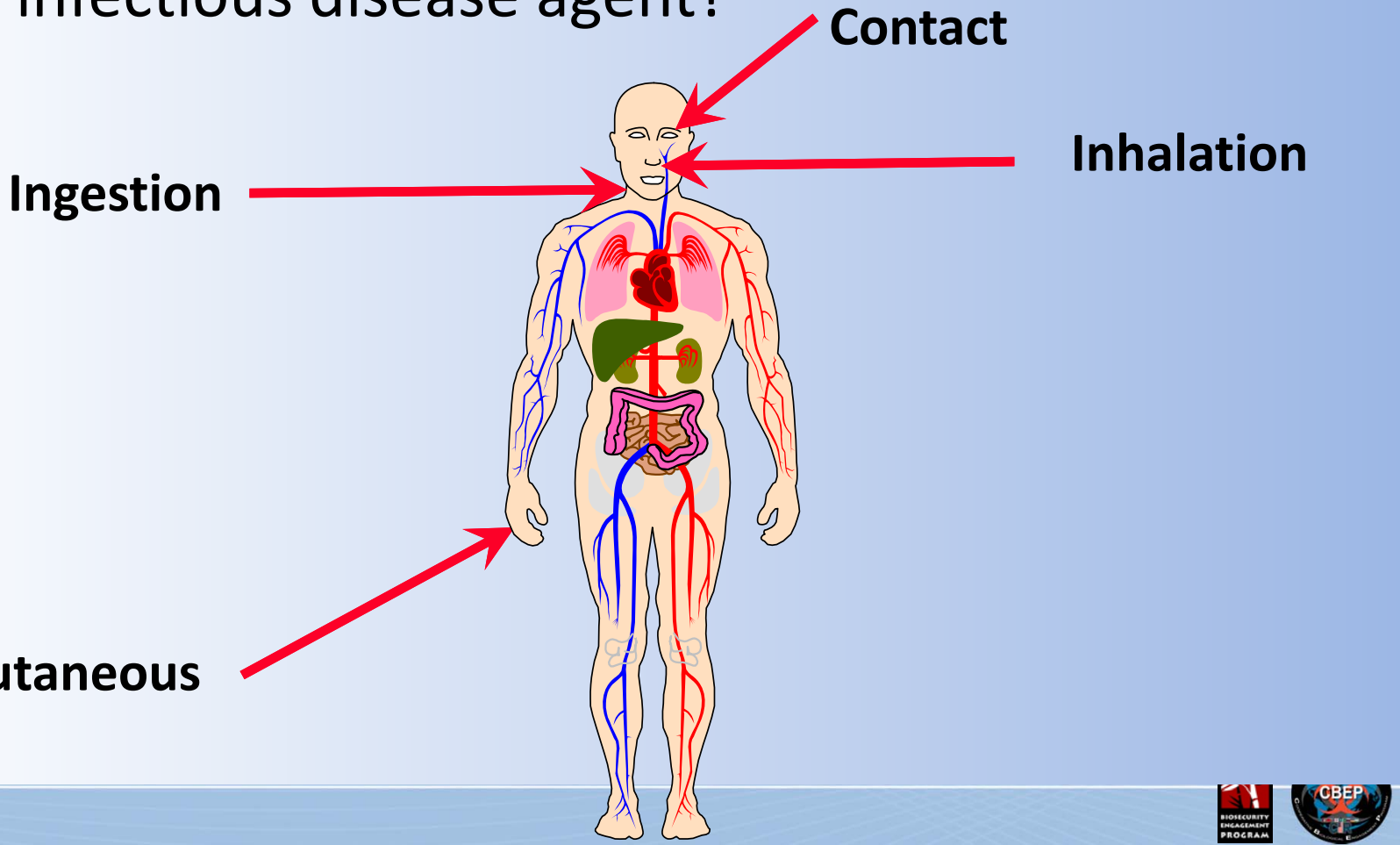
Why use **Personal Protective Equipment (PPE)**?

Personal Protective Equipment

Discussion: What are the possible routes of exposure to an infectious disease agent?

Personal Protective Equipment

Discussion: What are the possible routes of exposure to an infectious disease agent?



Personal Protective Equipment

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

- *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?*

Decontamination and Disposal

The last mitigation strategy we will discuss is…

Work Practices

Personal Protective Equipment (PPE)

Decontamination and Disposal

Decontamination and Disposal

Question: What kinds of waste exist in a laboratory?

Please spend **5 minutes** in your groups and record as many different kinds of waste as you can think of. Please write down each type of waste, one per ***sticky note***.

Decontamination and Disposal

Question: What kinds of waste exist in the laboratory?

Spend **5 more minutes** to place the ***sticky notes*** on your wall and flip chart, and try to **categorize** the waste into groups.

Decontamination and Disposal

Question: What kinds of waste exist in the laboratory?

How did you **categorize**? What are the **risks** for each of the categories of waste you determined?

Decontamination and Disposal

Discussion:

Based upon those **risks** and **waste categories** you created, what will you **process** as infectious waste, and how?

Decontamination and Disposal

Consider also…

- How is waste collected inside the laboratory?
- How is waste processed before, or as it is leaving the laboratory?
- How is waste dispose?
- How is the process validated?

Decontamination and Disposal

Definitions of Terms

- **Sterilization** - act or process, physical or chemical, that destroys or eliminates all forms of life, especially microorganisms

- **Disinfectant** - an agent, usually chemical, that inactivates viruses or kills vegetative microbes
  - Removes ability (or disables) ability to infect

Decontamination and Disposal

Definitions of Terms

- **Antiseptic** - a substance that prevents or arrests the growth or action of microbes, either by inhibiting their activity or by destroying them
  - Septic – containing disease causing organism, anti - remove

Decontamination and Disposal

Definitions of Terms

- **Decontamination** - disinfection or sterilization of contaminated articles to make them suitable for use
  - Remove contamination

Decontamination and Disposal

Consider…

- How in a typical laboratory might you **sterilize**?
- How in a typical laboratory might you **disinfect**?
- How in a typical laboratory might you **decontaminate**?

Break

Why Risk Assessment?

In your groups, please spend **5 to 10 minutes** to **discuss** the following questions:

Why is it important to conduct a Risk Assessment prior to implementing mitigation controls?

What outcomes would you expect when mitigation is based on a thorough risk assessment? What would you expect if mitigation is implemented without conducting a risk assessment?

Be prepared to share your answers with the class.

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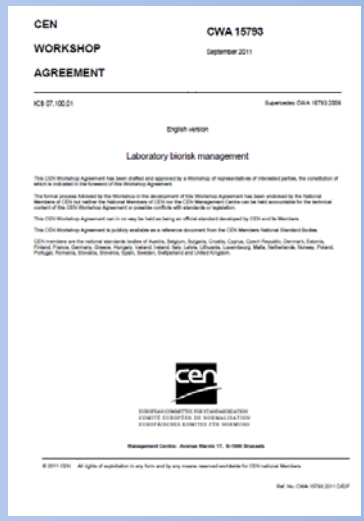
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Laboratory biorisk management

Control Measures

We will now discuss measures for controlling biological risks in the laboratory.

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

Control Measures

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

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

Control Measures

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

Control Measures

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

Control Measures

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

Control Measures

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

Elimination/Substitution ***Administrative Controls*** ***PPE***

Engineering Controls ***Practices & Procedures***

Please spend **5 to 10 minutes** and identify their **advantages** and **limitations** or **disadvantages**. Be prepared to report your findings to the class

Advantages and Limitations

Control Measure	Advantages	Disadvantages
Elimination or Substitution	Immediate reduction of risk	Not always available or possible
Engineering Controls	Efficient, eliminates hazard	Cost, complexity
Administrative Controls	Authority approach	Indirect approach, primarily addresses the human factor
Practices & Procedures	SOP based (standardized approach)	Training and supervision requirements
PPE	Ease of use, relative cost	Does not eliminate hazard, PPE fails exposure happens, uncomfortable, limits ability, only protects the user

Control Measures

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

Elimination/Substitution ***Administrative Controls*** ***PPE***

Engineering Controls ***Practices & Procedures***

Please spend **5 to 10 minutes** and identify their **advantages**, and **limitations** or **disadvantages**. Be prepared to report your findings to the class

Control Measures

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

Elimination/Substitution ***Administrative Controls*** ***PPE***

Engineering Controls ***Practices & Procedures***

Please spend 5 minutes to **prioritize** the four types of controls from the perspective of effectiveness

Most Effective | 1 | 2 | 3 | 4 | 5 | *Least Effective*

Be prepared to report your findings to the class

Hierarchy of Controls

The Hierarchy of Controls

Most Effective

Elimination or Substitution

Engineering Controls

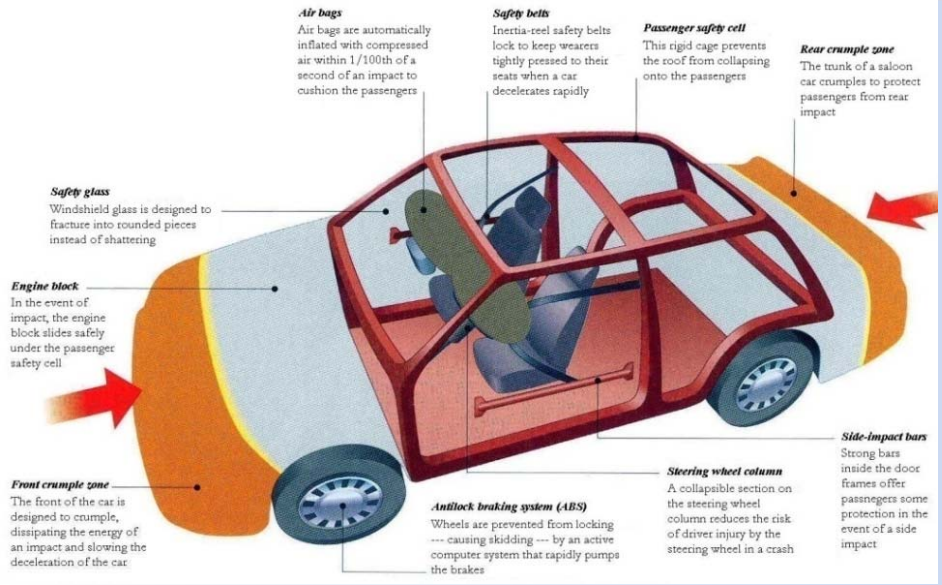
Administrative Controls

Practices and Procedures

Personal Protective Equipment

Least Effective

Car Safety vs. Motorcycle Safety



Car safety is about engineering systems

Motorcycle safety is about PPE

Identifying controls

Please **watch** the following video of an incident/emergency response scenario

Identify and **write down** as many different mitigation measures as you can

Organize these measures under one of the five categories of controls

Video Clip

Lab Biosafety

Any questions?

Lab Biosafety

Review Question: What are the five risk control measures for biosafety?

Lab Biosafety

Review Question: What is the role of risk assessment in **lab biosafety**?

Lab Biosafety

Any further questions?

Review of Lab Biosafety

Review

To wrap-up, let's discuss what we learned about **Laboratory Biosafety**

What did we learn?	What does it mean?	Where do we go from here?