SAND2014-0660P

Personal Protective Equipment

5 February 2014

Albuquerque, New Mexico

Objectives

- Identify personnel in Yemen with expertise to handle biological materials or potentially contaminated items
- Identify personal protective equipment needs for response requires handling of biological materials
- Develop donning and doffing procedure
- Practice working in a potentially contaminated environment

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Risk mitigation

- Risk mitigation occurs after risk assessment
  - Hazard identified
  - Risk characterized and evaluated
- Mitigation measures
  - Address unacceptable risks through use of additional controls
  - Primarily reduce likelihood

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Prioritizing mitigation measures

- Use risk assessment
- Identify available resources
- Identify needs
  - Equipment
  - Personnel
  - Consumables/materials

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Mitigation Control Measures

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

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

Mitigation Control Measures

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

Key considerations when selecting Personal Protective Equipment

- Task being performed
- Route of exposure
  - What is the PPE protecting
- Limitations for use of the types of PPE
- Logistical concerns
  - Fit, availability, cost, storage, training
- How and where the PPE should be donned and doffed

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General PPE limitations

- Hazard is still present
- Can cause physical and psychological stress
- Water-proof compared to water-resistant
- Limit movement and work duration
- Dependent upon human behavior
- Integrity decreases with use
- Proper fit
- Comfort
- Dexterity

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PPE care and storage

- Reusable PPE
  - Clean and decontaminate after usage
    - May require special cleaning procedures
  - Store in separate area to avoid contamination
- Do not use PPE that is damaged
  - INSPECT equipment before use

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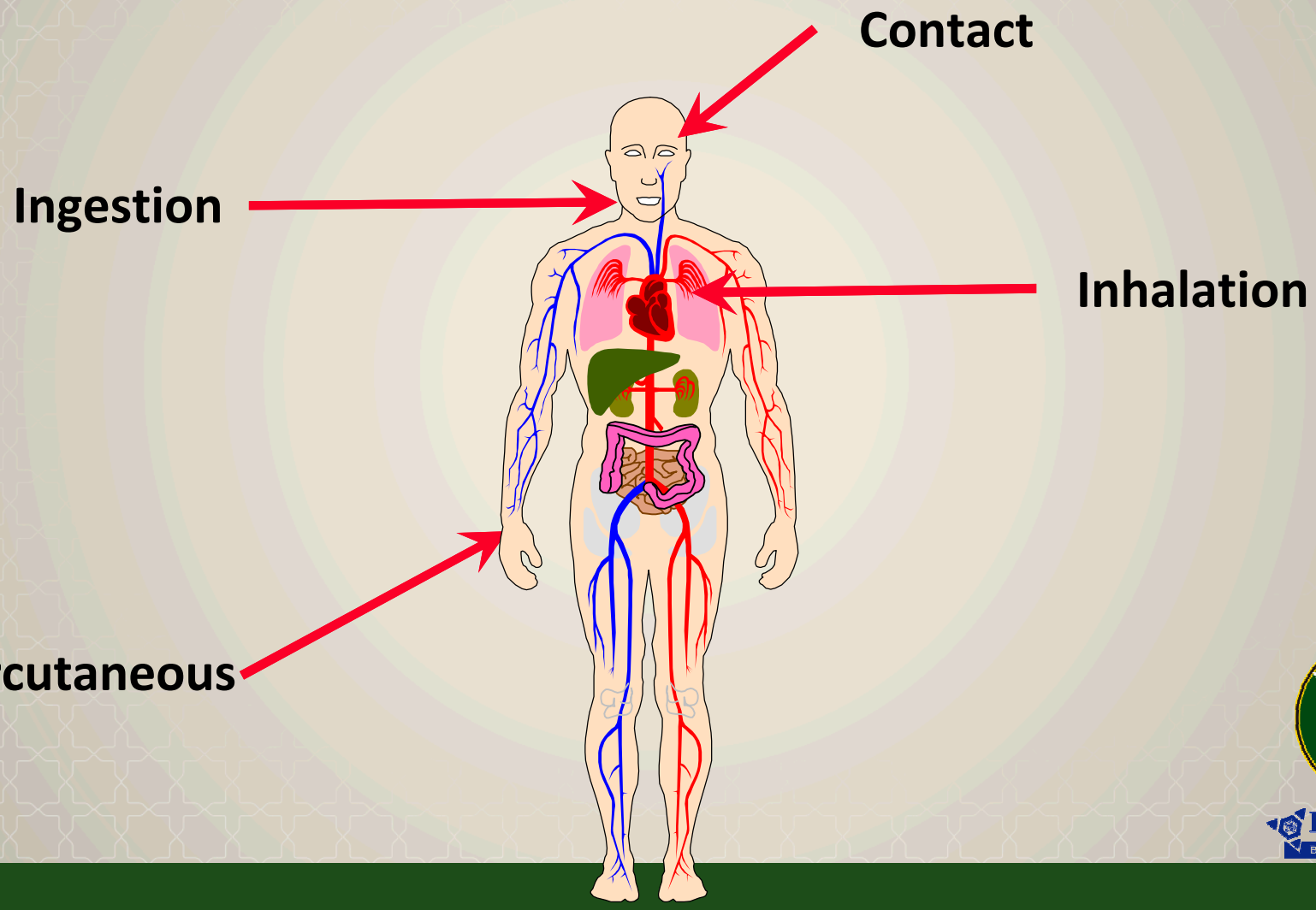
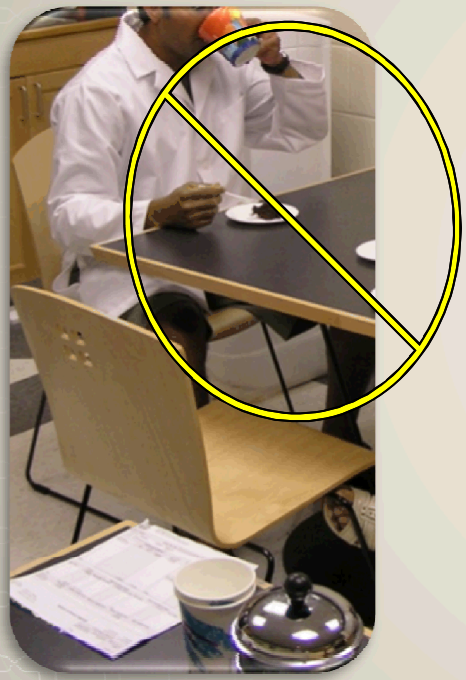
What are the routes of exposure?



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

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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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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)

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Putting on PPE

- PPE selection will vary based on type of protection needed
- **Generally** put PPE on in order of
  - Gown
  - Shoe covers
  - Gloves (inner gloves)
  - Gloves (outer gloves)
  - Mask or Respirator
  - Goggles or Face shield

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Taking off PPE

- **Generally** will remove PPE in order of "most" contaminated to least contaminated
  - Outer gloves
  - Goggles or face shield
  - Gown
  - Shoe covers
  - Mask or respirator
  - Inner gloves
- Wash hands!

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Taping

Tape is never used to:

- Increase protection provided by the ensemble
- Strengthen seams on disposable coveralls
- Patch suits with visible rips, holes, or tears

Tape may be used to:

- Assist in maintaining integrity of the level of protection the suit offers
  - Secure gloves to sleeves
  - Secure boots to pant leg

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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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Group Activity

- Use your assigned scenario to develop a standard operating procedure for donning and doffing personal protective equipment
  - Consider
    - Medical screening requirements
    - Training requirements
    - Personnel needs
    - Material needs

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Know before you go

What routes of exposure need protection?

Why is it important to layout and check PPE prior to putting it on?

What type of protection is missing from this photo?

Personal Protective Equipment: Guided Exercise Part 1

- Select the PPE necessary to follow your SOP written to respond to your scenario
- Make a list of items your group is missing

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Personal Protective Equipment: Guided Exercise Part 2

- Don the PPE using the SOP as written

- How difficult is donning?
- Did donning order impact integrity of PPE?

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Personal Protective Equipment: Guided Exercise Part 3

- Doff the PPE using the SOP

- How difficult is doffing?
- Did doffing order impact integrity of PPE?
- Did any contamination occurred?
  - Identify suspected reasons for contamination

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Personal Protective Equipment: Guided Exercise Part 4

- Revise SOP
- Will be used later in workshop

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Conclusion

- Personnel can face biological risks in many different settings
- Understanding routes of exposure to infectious agents and toxins and thorough risk assessments can guide mitigation measure selection
- There are limitations associated with use of personal protective equipment to mitigate biological risks

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