This course is intended to be applicable to all infectious diseases. However, Ebola Virus Disease (EVD) will be used as an example throughout this course.

Additional Materials and Resources:

• NIEHS Clearinghouse has additional information on Ebola and other infectious diseases:

• Included in this presentation are links to CDC, OSHA, the World Health Organization and other useful guidelines. These materials are available at the Deep South Biosafety WTP website or upon request.

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COURSE GOALS:

The goal of this course is to build on knowledge and skills acquired in the Awareness Course and to provide an opportunity to apply and demonstrate those skills using actual PPE from learner institutions.

PERFORMANCE OBJECTIVES:

1. Compare and contrast the utilization and benefits of PPE available from various learner institutions
2. Identify at least 3 infectious disease resources
3. Don and doff appropriate low and/or high output PPE for EVD using an approved EVD checklist
4. Evaluate adherence to the low and/or high output checklist and ability to don and doff PPE without being contaminated
Agenda

• Course Introduction
• Awareness Content Refresher
• Review of common PPE Available in Healthcare
• Infectious Disease Resources
• Donning and Doffing Demonstration
• Donning and Doffing Practice Session and Evaluation
• Summary Wrap-up
COURSE INTRODUCTION
Emerging Infectious Disease

Emerging infections (EIs) can be defined as “infections that have newly appeared in a population or have existed previously but are rapidly increasing in incidence or geographic range”.

Have occurred since ancient times and shaped history:

- **430 BC**: Plague of Athens ended Greece’s Golden Age
- **1350**: Bubonic Plague ("Black Death") killed ¼ of Europe’s population
- **1500s**: importation of smallpox into Mexico ended Aztec civilization (10.15 million deaths)
- **1918**: influenza pandemic killed at least 50 million worldwide (more than all wars combined)
- **1987**: Approx. 70 million have been infected with HIV (35 million have died)
Global Examples of Emerging and Re-Emerging Infectious Diseases

Factors Driving Risk

- Population is:
  - Growing
  - Increasingly Urban
  - Increasingly Coastal
- Climate Change
- Global Travel
- Antibiotic Use
- Global Conflicts
- Changes in Animal Farming
- Others...
How Do You Fit In?

• As healthcare providers you will be the frontline staff in responding to different disease outbreaks

• Additionally:
  – Exposure in your work setting is possible every day
  – Exposure can change your life forever
  – You need to take precautions
  – You need to know what to do if exposed
  – Your awareness decreases the infection risk for you and your family
Challenges for front-line workers

• Knowing which diseases are of concern

• Knowing the appropriate risk factors for those diseases

• Knowing the route/period of transmission for those diseases

• **Knowing the appropriate PPE** for the route of transmission
CDC update on Dallas Ebola Response, 10-12-2014

• “…at some point there was a breach in protocol and that breach in protocol resulted in this infection.

• “The care of Ebola can be done safely, but it is hard to do it safely. It requires meticulous and scrupulous attention to infection control, and even a single inadvertent innocent slip can result in contamination.”

- Tom Frieden, Director CDC Press Briefing (10/12/14)
AWARENESS CONTENT REFRESHER
Chain of Infection

Pathogen

Mode of Transmission

Route of Exposure

Susceptible Host

Varicella (Virus) photo credit: CDC

Tuberculosis (Bacteria) photo credit: NIAID

Ringworm (Fungus) photo credit: CDC

Direct or Indirect Contact

Inhalation, Contact, Ingestion, Vector
Risk Categorization

• Risk for occupational exposure to an infectious agent varies depending on:
  – Specific pathogen
  – Mode of transmission
  – Nature of job tasks
  – Work environment

• Level of risk may be categorized (for example, high versus low) based on results of an occupational exposure assessment.
Considerations for an Occupational Exposure Assessment

1. Will job tasks include potential exposure to blood and body fluids?
2. What is the proximity of workers to the contagious individual or contaminated waste?
3. Will workers be potentially exposed through contact, inhalation, ingestion, or injection?
4. Will job tasks, work environment, fatigue, and related factors increase risk of exposure?
The Hierarchy of Controls

Substitution
Engineering

Administrative
Work Practices

PPE

More reliance on workers

Why is Personal Protective Equipment at the bottom?
Standard (Universal) Precautions

- **Standard precautions**: minimum infection prevention practices that should be used in the care of all patients all of the time.
  1. Hand hygiene
  2. Use of personal protective equipment (e.g., gloves, gowns, masks)
  3. Safe injection practices
  4. Safe handling of potentially contaminated equipment or surfaces in the patient environment, and
  5. Respiratory hygiene/cough etiquette.
PPE for Expanded Precautions

Contact isolation precautions

- Used for infections, diseases, or germs that are spread by touching the patient or items in the room (examples: MRSA, VRE, diarrheal illnesses, open wounds, RSV).

Droplet isolation precautions

- Used for diseases or germs that are spread in tiny droplets caused by coughing and sneezing (examples: pneumonia, influenza, whooping cough, bacterial meningitis).

Airborne isolation precautions

- Used for diseases or very small germs that are spread through the air from one person to another (examples: Tuberculosis, measles, chickenpox).
Government Standards & Guidelines

• Government agencies and accrediting organizations develop and set standards, regulations, and guidelines for the industries effected by Ebola.
  – CDC
  – NIOSH
  – State OSHA
  – OSHA
  – National Fire and Protection Association
  – Department of Transportation
  – Department of Homeland Security
  – Federal Aviation Authority
  – The Joint Commission

• It is important that site specific Ebola Exposure Control Programs comply with or exceed these benchmarks.
## Relevant OSHA Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Bloodborne Pathogens Standard</strong></td>
<td>Employers must protect workers who may be exposed to blood or other potentially infectious materials.</td>
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<tr>
<td>29 CFR 1910.1030</td>
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<tr>
<td><strong>Personal Protective Equipment (PPE) Standard</strong></td>
<td>Provides additional information about how to select and use appropriate PPE, training and other requirements.</td>
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<tr>
<td>29 CFR 1910.132</td>
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<tr>
<td><strong>Hazard Communication Standard</strong></td>
<td>Employers must comply with this standard when their workers use certain chemicals for cleaning and decontamination.</td>
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<tr>
<td>29 CFR 1910.1200</td>
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<tr>
<td><strong>General Duty Clause (Sec. 5(a)(1)) of the Occupational Safety &amp; Health Act</strong></td>
<td>In some cases where a specific OSHA standard doesn’t apply, the General Duty Clause requires employers to furnish to each employee employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees.</td>
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Components of a Written Respiratory Protection Program

A written respiratory protection program includes:

• Selection
• Medical evaluation
• Fit testing and fit checking
• Procedures for routine and emergency use
• Proper inspection, cleaning, maintenance, and storing
• Training
• Program evaluation
• Mandated by OSHA
CDC Guidelines for Healthcare Workers (HCW)

• Updated Guidance from October 2014

• Three principles:
  – Rigorous and repeated training
  – No skin exposure
  – Trained monitor who watches each worker don (put on) and doff (take off) PPE

For more information, visit:
http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html
Training & Drills

• Must be hands on and frequent
• Should not be primarily computer based or lecture
• Must include an opportunity to drill the actual process of donning and doffing PPE and respirators
  – Must include a trained observer and decontamination
COMMON PPE IN HEALTHCARE
Review of Common PPE Available in Healthcare

CDC RECOMMENDED STANDARD, CONTACT AND DROPLET PRECAUTIONS

ENHANCED PRECAUTIONS FOR HIGH-RISK HEALTHCARE WORKERS
Respirators

Include either N95 respirators, elastomeric or powered air purifying respirators.

- N95 Disposable Respirator
- Elastomeric Full-Face Respirator with HEPA Cartridge
- Elastomeric Half-Face Respirator with HEPA Cartridge
- Powered Air Purifying Respirator (PAPR)
Powered Air Purifying Respirators

PAPRs provide air directly to the wearer.

Additional benefits include:

1) Provide splash protection
2) Greater protection from contaminants
3) No fit testing
4) Wearer can have a beard
5) Are more comfortable
6) Allow for longer working time
PPE Limitations

• Safety Hazards
  – Restricted movement
  – Restricted vision due to visual field limitations
  – Difficulty communicating due to face protection

• Physiological/Psychological stressors
  – Psychological stress resulting from confining nature of full suits
  – Heat stress and risk of dehydration
  – The highest levels of PPE generally cannot be worn continuously for more than 30 minutes
INFECTIOUS DISEASE RESOURCES
Existing Infectious Disease Resources
Existing EVD Resources

National Institute of Environmental Health Sciences

Deep South Biosafety Worker Training Program

NETEC

CDC
15 MIN BREAK
DONNING AND DOFFING DEMO
DONNING AND DOFFING PRACTICE SESSION
Instructions

1. Divide into partners.

2. Inventory & arrange PPE so it is easily accessible.

3. One person acts as Donning Expert (DE) and reads directions while partner dons PPE for low output EVD.

4. After completely donned, DE should check for coverage.

5. **STOP!** Let one of the Evaluators check for any potential breaches. *An Evaluator will apply GloGerm.*

6. DE reads doffing instructions and helps partner remove PPE according to guidelines for low output PPE.

7. Once fully doffed, *an evaluator will use UV flashlight to check healthcare worker for contamination.*

Switch roles!
• Healthcare worker Donning/Doffing PPE
  – Completely don low output PPE while following all instructions from DE as they read from the checklist
  – Check back with expert to confirm instructions as needed
  – Doff PPE without being contaminated

• Donning/Doffing Expert (DE) (observer)
  – Your goal is to successfully don and doff your partner using an approved low output checklist while avoiding contamination to you or your partner
Trained Observer

• When observer and DE are present, the observer’s role also includes:
  – Ensuring DE is available and wearing appropriate PPE
  – DE performs hand hygiene immediately after they provide any direct assistance to HCW

• Remain outside doffing area to observe and guide as DE inspects HCW for any signs of contamination (if assistance is necessary, immediately perform hand hygiene).
Remember!

- Inventory supplies before starting
- DE assist healthcare workers only when needed (minimal contact)
- Slow, deliberate movements
- Closed loop communication
Remember!

• Establish “Red Flag” words
  – breach in protocol requiring a full stop but no immediate hazard, or
  – a breach in protocol and immediate hazard

• Continuously scan PPE and the environment for any risks or hazards

• Doffing expert should always be in the same level of PPE as person doffing
Contact Information

• Deep South Biosafety Worker Training Program

Contact Information

– Phone: 205-934-7140
– Email: dsbwtp@uab.edu
– Website: https://www.soph.uab.edu/dsb/
– Materials: https://www.soph.uab.edu/dsb/materials

• Instructor: Andres Viles, MSN, RN, CCNS

– Simulation Coordinator
– Office of Interprofessional Simulation
– University of Alabama at Birmingham