

1

2

3

# Course Lectures & Tabletop Exercises

**PREPARING**  
Healthcare Workers TO WORK IN  
**Ebola** Treatment Units (ETUs)  
IN AFRICA: Training Toolkit



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

## **Disclaimer**

These Ebola response training materials are intended only for healthcare workers preparing to work in Ebola Treatment Units (ETUs) in Africa in response to the Ebola epidemic. They are not intended to prepare healthcare workers to work in the United States. The information in these materials is accurate as of December 2014. Additionally, the mention of any product name in these materials is not meant to serve as an official endorsement of any such product by the Centers for Disease Control and Prevention (CDC) or any other entity of the United States government.

## **Acknowledgements**

This course was designed by the Infection Control Training Team of the Ebola Response Medical Care Task Force, which is solely responsible for its content. The team is part of CDC's Emergency Operations Center (EOC). The EOC is overseen by CDC's Office of Public Health Preparedness and Response.

CDC would like to acknowledge all people who helped create and develop the course and the toolkit for their expertise, dedication, and personal commitment.

Cover: Healthcare worker donning high-risk PPE.

# CONTENTS

<b>Overview.....</b>	<b>5</b>
▶ Course Lecture and Tabletop Exercise Preparation .....	6
▶ Course Lectures and Tabletop Exercises Summaries and Links.....	7
<b>Course Lectures and Scripts.....</b>	<b>13</b>
▶ Overview of 2014 Ebola Epidemic and Response.....	15
▶ Ebola Virus Disease and Clinical Care Part I: History, Transmission, and Clinical Presentation.....	29
▶ Infection Prevention and Control for Healthcare Workers.....	41
▶ Ebola Treatment Unit .....	55
▶ Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management.....	73
▶ Disinfection and Waste Management in the ETU.....	85
▶ Staff Health and Support.....	99
▶ Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccine .....	113
▶ Interactions with the Community: Health Promotion and Contact Tracing.....	121
<b>Tabletop Exercises.....</b>	<b>135</b>
<b>Designing a Safe Ebola Treatment Unit .....</b>	<b>137</b>
▶ Trainer Guide.....	137
▶ List of Items for ETU Design.....	139
▶ Student Worksheet.....	140
<b>Triage of Persons Presenting to an Ebola Treatment Unit.....</b>	<b>141</b>
▶ Trainer Guide.....	141
▶ Case Study Scenarios .....	143
▶ Student Worksheet.....	150
▶ WHO Screening Algorithm for Healthcare Facilities in Guinea .....	157

## Appendices .....159

### Lecture Resources

- ▶ Appendix A - Ebola Outbreak Public Broadcasting Service (PBS) Frontline Video..... 160
- ▶ Appendix B - Course Abbreviations..... 161
- ▶ Appendix C - Course Alternative Agendas.....162
- ▶ Appendix D - ETU Map.....166
- ▶ Appendix E - High-risk and low-risk zone diagram ..... 167
- ▶ Appendix F - Donning (putting on) Gloves and Doffing (taking off) Gloves.....168
- ▶ Appendix G - WHO Screening Algorithm for Healthcare Facilities in Guinea .....169
- ▶ Appendix H - Heat Illness Spectrum..... 170
- ▶ Appendix I - E-lecture Instructor Information.....171
- ▶ Appendix J - Knowledge Assessment Questions ..... 173
- ▶ Appendix K - Up-to-date Information on the Ebola Epidemic ..... 191
- ▶ Appendix L - Health Protocols, Guidelines, and Recommendations.....192
- ▶ Appendix M - Other Ebola Resources.....194
- ▶ Appendix N - Journal Articles .....195
- ▶ Appendix O - Course Resources.....197

# Overview

The course lectures provide the basic knowledge needed to understand the current Ebola epidemic, disease epidemiology and transmission, and key infection prevention and control principles for working safely in Ebola Treatment Units (ETUs). The tabletop exercises build on the knowledge gained from the course lectures and provide students an opportunity to practice applying that knowledge in a classroom setting.

The following agenda, used in the Centers for Disease Control and Prevention (CDC) course, lists the lecture topics and exercises for the three-day training. Lectures are marked in orange and tabletop exercises in yellow. Alternate agenda options are provided in [Appendix C](#) of this booklet. The toolkit materials and agenda options can be adapted to best fit the training needs of your organization.

Curriculum at a Glance		
Day 1	Day 2	Day 3
Overview of Course	Daily Overview and Reflection	Daily Overview and Reflection
Overview of the 2014 Ebola Epidemic and Response (Lecture)	Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management (Lecture)	Staff Health and Support (Lecture)
Ebola Virus Disease and Clinical Care Part I: History, Transmission, and Clinical Presentation (Lecture)	Triage of Persons Presenting to an Ebola Treatment Unit (Tabletop Exercise)	Resiliency
		Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccines (Lecture)
Break and Medical Evaluation	Break and Vitals Check	Break and Vitals Checks
Infection Prevention and Control for Healthcare Workers (Lecture)	Disinfection and Waste Management in the ETU (Lecture)	Interactions with the Community: Health Promotion and Contact Tracing (Lecture)
Ebola Treatment Units (Lecture)	Public Broadcasting Station (PBS) Ebola Outbreak Frontline Video	
Lunch	Lunch	Lunch
Designing a Safe Ebola Treatment Unit (Tabletop Exercise)	ETU Practical Exercise	ETU Practical Exercise
ETU Practical Exercise		
Field Experience Discussion	Field Experience Discussion	Review First Day Questions

ETU Exercise    
  Lecture    
  Tabletop Exercise    
  Break/Administrative Time

Lectures and tabletop exercises are presented in the toolkit in the same order as they appear in this agenda. The following provides information on lecture and tabletop exercise setup and a description of the lectures and exercises. The included CD also provides e-lectures and PowerPoint materials as well as tabletop exercise directions and resources.

## Overview > Course Lectures and Tabletop Exercise Preparation

E-lectures are provided for each of the programmatic content lectures. Instructions for using the e-lectures can be found in [Appendix I](#). When using e-lectures in a group environment, it is recommended an instructor be on site to answer any questions.

The Appendices of this booklet provides lecture resources, including course abbreviations, graphics used throughout the lectures, resource links for up-to-date information on the Ebola epidemic, and health protocols and guidelines.

### Course Lecture and Tabletop Exercise Preparation

As shown in the agenda, lectures are scheduled each morning followed by ETU practical exercises in the afternoon.

Instructors giving the lectures should have subject matter expertise in the topic areas. They should be able to answer student questions and provide real-life examples to facilitate discussion in the classroom. Please see the [Administration](#) booklet for guidance in selecting qualified instructors. Instructors should review and use the lecture materials in this toolkit to provide the core knowledge students need to participate in the tabletop and ETU practical exercises.

Additional lecture preparations include obtaining the appropriate supplies and resources:

- ▶ Copies of the course materials for students
- ▶ Lapel microphones
- ▶ Projector and screen to display course materials
- ▶ Tables and chairs for students and instructors
- ▶ Name tents
- ▶ Refreshments (water, light snacks, etc.)
- ▶ Flip charts
- ▶ Sticky notes
- ▶ Pens

Detailed information about supply needs can be found in the [Administration](#) booklet.

**Note:** *In the CDC course, materials were provided on tablet computers for students to use during the lectures and tabletop exercises and on a CD for future reference. This reduced the number of paper copies required as well as the time and cost of reproducing the materials.*

### Course Lectures and Tabletop Exercises Summaries and Links

#### OVERVIEW OF COURSE (40 MINUTES)

---

*Lecture slides and script are not included for this presentation.*

At the beginning of the first day, the course director welcomes students and orients them to the course content, schedule, and facilities. The director should introduce instructors and staff and have students introduce themselves. If appropriate, use an icebreaker activity. In the daily review and reflect on Days 2 and 3, students were encouraged to write questions they would like answered on sticky notes that were posted in the room and reviewed.

Give a brief introduction to the course that covers its six goals:

- ▶ Provide information on the epidemiology and transmission of Ebola virus and the current epidemic.
- ▶ Describe infection prevention and control principles as they pertain to working in ETUs in Africa.
- ▶ Demonstrate the skills needed to work safely and efficiently in a well-designed ETU.
- ▶ Describe how to evaluate personal and environmental safety within an ETU.
- ▶ Describe the basic principles of clinical care and management of a patient with Ebola..
- ▶ Describe patient and community assessment and intervention strategies for Ebola treatment and control.

The course director also informs students that the information presented in the lectures will later be applied during the classroom-based tabletop and ETU practical exercises.

The course overview also includes a briefing on the sponsoring organization's medical screening requirements and its medical and administrative requirements. If using technology for instruction, provide information about its use.

#### OVERVIEW OF THE 2014 EBOLA EPIDEMIC AND RESPONSE (1 HOUR)

---

Following the introduction by the course director, the instructor gives a briefing on background and current information on the Ebola epidemic.

As the epidemic evolves, you will need to update the slides to reflect the latest case counts and developments. Presentations provide information through December 31, 2014. Therefore, some content presented in the lecture may have changed. Please refer to the written script for information on where to get the latest updates.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

## Overview > Course Lectures and Tabletop Exercises Summaries and Links

### EBOLA VIRUS DISEASE AND CLINICAL CARE PART I: HISTORY, TRANSMISSION, AND CLINICAL PREVENTION (45 MINUTES)

---

This lecture is Part I of a three-part lecture on *Ebola Virus Disease and Clinical Care*. Students will learn the history of the epidemic, transmission routes, and clinical features of the Ebola virus. Through a description of Ebola virus disease (EVD) clinical features and case definitions, students will be shown how to identify and triage patients with suspected cases of EVD, and how to minimize risk to themselves and others. This lecture will prepare students for *Ebola Virus Disease and Clinical Care, Part II*, which will cover additional information about clinical care, patient triage, and discharge protocols.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

### INFECTION PREVENTION AND CONTROL FOR HEALTHCARE WORKERS (1 HOUR)

---

This lecture covers healthcare worker infection prevention and control principles in managing Ebola virus infections, including hand hygiene, personal protective equipment (PPE), and injection safety. Students will learn key safety precautions to protect themselves and avoid common mistakes and hazards. Students will also learn proper use of PPE in the ETU. Information provided in this lecture will prepare students for the ETU practical exercise.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

### EBOLA TREATMENT UNIT (45 MINUTES)

---

This lecture focuses on how a well-designed ETU should be structured and operated to effectively control infection, prevent further transmission, and maintain healthcare worker safety. Students will learn how the ETU is part of the Ebola system of safety. Students will also learn about the proper flow and operation of the low-risk and high-risk zones of an ETU, with the goal of giving them an appreciation of the infection prevention and control measures required in an ETU environment.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

## Overview > Course Lectures and Tabletop Exercises Summaries and Links

### DESIGNING A SAFE EBOLA TREATMENT UNIT TABLETOP EXERCISE (1 HOUR)

---

To reinforce the concepts taught in the *Ebola Treatment Unit* lecture, students will participate in a small group exercise to design an ETU structure and apply infection prevention and control principles. In this exercise, students are given a blank outline of a structure and collaborate to design the physical layout of an ETU.

[Trainer Guide](#)

[List of Items for ETU Design](#)

[Student Worksheet](#)

### EBOLA VIRUS DISEASE AND CLINICAL CARE PART II: DIAGNOSIS AND CLINICAL MANAGEMENT (1 HOUR)

---

This lecture is the second part of a three-part lecture on *Ebola Virus Disease and Clinical Care*, and builds on what students learned in Part I about clinical features, transmission routes, and screening mechanisms to identify suspected cases. Part II covers the use of samples and diagnostic tests needed to make clinical decisions involving suspected cases. The lecture also provides additional information on the clinical management of suspected and confirmed cases, as well as discharge criteria and measures to improve post-discharge outcomes.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

### TRIAGE OF PERSONS PRESENTING TO AN EBOLA TREATMENT UNIT TABLETOP EXERCISE (1 HOUR)

---

To reinforce the concepts taught in the *Ebola Virus Disease and Clinical Care* lectures, students will practice triage interview techniques and screening methods for patients with suspected cases of EVD. This tabletop exercise is a trainer-led role play where students ask potential patients questions based on a series of triage case study scenarios. Students will decide whether to admit potential patients on the basis of responses given. All cases in the exercise are based on real ETU scenarios.

[Trainer Guide](#)

[Case Study Scenarios](#)

[Student Worksheet](#)

[WHO Screening Algorithm](#)

## Overview > Course Lectures and Tabletop Exercises Summaries and Links

### DISINFECTION AND WASTE MANAGEMENT IN THE EBOLA TREATMENT UNIT (45 MINUTES)

---

This lecture focuses on disinfection principles and practices used in most ETUs, including when and how to use chlorine solution and correct solution strengths based on purpose of use. The lecture summarizes the key principles of safe infection prevention and control. Students will learn how to properly manage and dispose of waste in the ETU, and how to manage human remains to reduce contamination and infection prevention and control risks.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

### STAFF HEALTH AND SUPPORT (45 MINUTES)

---

Physical and mental health support are essential to keep healthcare workers safe from exposure to Ebola virus, as well as other health risks, such as heat illness and severe fatigue. This lecture describes physical and mental issues staff may encounter. It also provides steps staff can take before, during, and after deployment to remain healthy while working in the highly stressful and physically demanding conditions of an ETU. Also covered are specific measures to take if Ebola virus exposure is suspected.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

### RESILIENCY (45 MINUTES)

---

*Lecture slides and script are not included for this presentation.*

This is an unscripted discussion. Providing care and support during the Ebola response can be an enriching professional and personal experience for healthcare workers, but can also be physically and emotionally exhausting. Psychological first aid (PFA) is an evidence-based approach built on the concept of human resilience that aims to reduce symptoms of stress. This facilitated discussion focuses on how healthcare workers build resiliency in the face of stressful situations and employ PFA interventions for themselves, their colleagues, and their patients. Facilitators provide a safe, open environment for instructors and students to share their concerns, questions, and stories about self-care and safety. Resources from the U.S. Department of Veteran Affairs, the World Health Organization, and Médecins Sans Frontières provide students with additional guidance. Links to these resources can be found in the [Appendix L](#) of this booklet.

### EBOLA VIRUS DISEASE AND CLINICAL CARE PART III: EXPERIMENTAL TREATMENTS AND VACCINES (30 MINUTES)

---

This is the last lecture in the three-part lecture series *Ebola Virus Disease and Clinical Care*. It provides a review of current supportive care options for patients with Ebola, as well as basic information on experimental treatments and vaccines that have been used or may soon be available to treat or prevent EVD. As of December 31, 2014, no treatments or vaccines have been approved by the U.S. Food and Drug Administration; all are still in early stages of development with limited clinical testing in humans. The information in this lecture is likely to evolve and will need to be updated. Information for where to access updates is provided in the script.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

### INTERACTIONS WITH THE COMMUNITY: HEALTH PROMOTION AND CONTACT TRACING (45 MINUTES)

---

This lecture provides general guidance on how to interact responsibly and respectfully with the community during health promotion and contact tracing efforts. Information on the importance of health promotion in managing outbreaks will be presented. Students will learn about their role in delivering health promotion messages and facilitating contact tracing.

In addition, this lecture discusses social and cultural lessons learned by healthcare workers who have helped to facilitate working with the community.

[Script and Slides](#)

[PowerPoint Presentation](#)

[E-lecture](#)

**NOTE:** *The links to course e-lectures provide recorded versions of the lectures. When e-lectures are used for the course, an instructor should be available following the e-lecture for a question and answer session with students. E-lectures were prepared in December 2014. Therefore, some content presented in the lectures may not accurately reflect current information. Please refer to the PowerPoint presentations and the [Appendix K](#) of this booklet for information on where to get the latest updates.*



## Course Lectures and Scripts

- ▶ Overview of the 2014 Ebola Epidemic and Response
- ▶ Ebola Virus Disease and Clinical Care Part 1: History, Transmission, and Clinical Presentation
- ▶ Infection Prevention and Control for Healthcare Workers
- ▶ Ebola Treatment Unit
- ▶ Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management
- ▶ Disinfection and Waste Management in the Ebola Treatment Unit
- ▶ Staff Health and Support
- ▶ Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccines
- ▶ Interactions with the Community: Health Promotion and Contact Tracing



# Overview of the 2014 Ebola Epidemic and Response

This lecture will provide an overview of the 2014 Ebola epidemic and response.

**NOTE:** Information at the end of this presentation will change regularly. Please update the slides to provide current information on the Ebola epidemic. The current information can be found at:

- ▶ **CDC website (general):**  
<http://www.cdc.gov/vhf/ebola/index.html>
- ▶ **CDC website (case counts):**  
<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>
- ▶ **WHO website:**  
<http://apps.who.int/ebola/>
- ▶ **MSF website:**  
<http://msf.org/diseases/ebola>

The learning objectives for this lecture are to:

- ▶ Describe major events of the current Ebola virus disease (EVD) epidemic in West Africa,
- ▶ Describe strategies used to control previous outbreaks,
- ▶ Identify aspects of this epidemic that contribute to it being more difficult to control than previous outbreaks, and
- ▶ Explain the role of Ebola Treatment Unit (ETU) healthcare workers in the current control strategy.

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETU) in Africa

## Overview of the 2014 Ebola Epidemic and Response

This presentation is current as of December 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Médecins Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- ❑ Describe major events in the current Ebola virus disease epidemic in West Africa
- ❑ Describe strategies used to control previous outbreaks
- ❑ Identify aspects of this epidemic that contribute to it being more difficult to control than previous outbreaks
- ❑ Explain the role of the Ebola Treatment Unit (ETU) healthcare workers in the current control strategy

This presentation contains materials from CDC, MSF, and WHO

2

### Background on Current Epidemic

This presentation contains materials from CDC, MSF, and WHO

4

Let's begin the course by discussing background information on the current epidemic. The Centers for Disease Control and Prevention (CDC), other U.S. government agencies, the World Health Organization (WHO), Médecins Sans Frontières (MSF) and other international partners, are responding to the rapidly changing situation in West Africa. We are going to talk first about the history of this epidemic.

### Early Events in Ebola Outbreak

- **March**
  - Guinea Ministry of Health (MOH) reports Ebola outbreak
  - Liberia MOH reports Ebola cases
- **April**
  - Cases in multiple jurisdictions in both countries
- **Genetic analysis**
  - Virus closely related to Ebola virus variants previously seen in Gabon and DRC
- **CDC Response**
  - Teams sent to Guinea and Liberia for contact tracing, data management, outbreak coordination, health education



Updated April 24, 2014

MOH = Ministry of Health

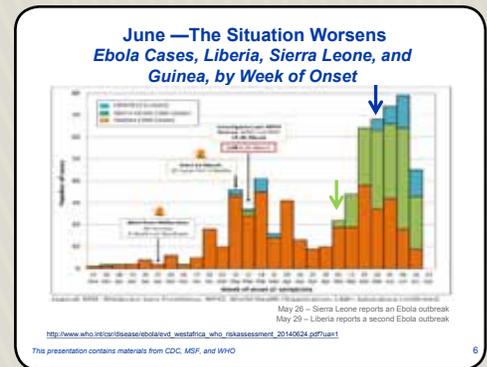
This presentation contains materials from CDC, MSF, and WHO

5

In March 2014, Guinea reports an Ebola outbreak and Liberia reports sporadic Ebola cases. In April, the outbreak continues to grow and CDC and other international partners respond. The map shown is dated April 24, 2014, and displays the affected areas at that time. The dark brown/orange areas of the map show areas reporting suspected and confirmed cases. Note the heavily affected area on the border of Liberia and Guinea and close to the border of Sierra Leone.

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

The graph, or epi curve, pictured here shows the number of cases on the y-axis and the week of onset of symptoms on the x-axis. The x-axis weeks start in late December 2013 and end in late June 2014. Guinea is shown in orange, Liberia in blue, and Sierra Leone in green. The large green arrow shows the start of the Sierra Leone outbreak at the beginning of May. A second outbreak in Liberia in mid-May is noted by the large blue arrow.



The outbreak expanded to Nigeria on July 20, when an ill traveler from Liberia arrived in Lagos, Nigeria. On arrival, he was taken to a hospital and treated for malaria. When his condition did not improve, healthcare workers ordered additional diagnostic tests and EVD was confirmed. Five days later, the patient died. As a result, many people in Nigeria were exposed, resulting in 19 confirmed cases of EVD. Twelve cases recovered and seven died. All identified contacts were physically monitored on a daily basis for 21 days.

WHO declared Nigeria was Ebola free on October 20, 2014.

**July 2014  
Nigeria**

- On July 20, 2014, a traveler from Liberia arrived in Lagos, Nigeria
  - Sick on arrival, taken to a hospital, died 5 days later
  - Ebola Virus Disease (EVD) confirmed
- Many people exposed
  - 19 confirmed cases
  - 12 recovered, 7 died
- All identified contacts physically monitored on a daily basis for 21 days
- World Health Organization (WHO) declared Nigeria Ebola free on October 20, 2014

<http://www.who.int/mediacentre/news/ebola/20-july-2014/en>

This presentation contains materials from CDC, MSF, and WHO

On August 8, WHO declared the current Ebola epidemic a Public Health Emergency of International Concern (PHEIC).

This indicated a need for a coordinated international response.

On August 28, WHO published an Ebola Response Roadmap. It called for a scaled-up response to the epidemic to assist governments and partners in the revision and resourcing of country-specific operational plans for Ebola response. It also called for coordination of international support for full implementation.

**August 2014**

- On August 8, 2014, WHO declared the current Ebola epidemic a Public Health Emergency of International Concern (PHEIC)
  - Need for a coordinated international response
  - WHO Ebola Response Roadmap published 8/28/14

WHO Ebola Response Roadmap 8/28/2014  
<http://apps.who.int/iris/bitstream/10665/131298/1/EbolaResponseRoadmap.pdf>

This presentation contains materials from CDC, MSF, and WHO

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

### August 2014 Senegal

- **Suspect case from Guinea was identified in Dakar, Senegal**
  - Patient had direct contact with patient with Ebola in Guinea before traveling to Dakar
  - Laboratory confirmation of EVD on August 29, 2014
  - Patient survived
- **Multiple contacts followed for 21 days**
- **No secondary cases reported**
- **WHO declared Senegal Ebola free on October 17, 2014**

<http://www.who.int/mediacentre/news/statements/2014/senegal-ends-ebola/en/>

This presentation contains materials from CDC, MSF, and WHO

9

Also in August, a suspected case from Guinea was identified in Dakar, Senegal. The patient had direct contact with a patient with Ebola in Guinea before traveling to Dakar. Laboratory confirmation of Ebola was received on August 29. The patient survived. Multiple contacts were followed for 21 days and there were no secondary cases reported. Therefore, WHO declared Senegal Ebola free on October 17, 2014.

### October 2014 Mali

- **Mali reported its first confirmed Ebola case on October 23, 2014**
- **Two-year-old girl admitted to hospital in Mali on October 22, 2014 died October 24, 2014**
  - No secondary infections linked to this case
- **Imam from Guinea admitted to hospital for renal failure, subsequently died**
  - Diagnosis not made until after one of his caregivers became ill and after thousands attended his funeral
  - 7 additional cases and 5 deaths were linked to this case

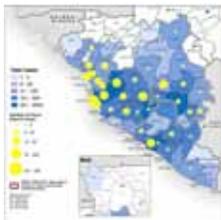
<http://www.who.int/mediacentre/news/ebola/25-november-2014-mali/en/>

This presentation contains materials from CDC, MSF, and WHO

10

In October, Mali reported its first confirmed case of Ebola. The first case was a two-year-old girl who had traveled from Guinea with her grandmother. She died October 24. Later, an imam from Guinea was admitted to a hospital in Bamako, Mali, and treated for renal failure. He subsequently died. However, the diagnosis of Ebola was not made until AFTER at least one of his caregivers became ill, and AFTER his funeral was attended by thousands. Seven additional cases and five deaths were linked to the imam, including a doctor and nurse who had treated him.

### Distribution of Ebola Cases in Countries with Intense Transmission\* Reported to WHO by Ministries of Health



\* WHO Situation Report December 31, 2014  
<http://apps.who.int/ebola/status-of-ebola-situation-reports/ebola-situation-report-31-december-2014>

This presentation contains materials from CDC, MSF, and WHO

11

This map shows active cases of Ebola are being reported across a geographically disperse area involving multiple countries and jurisdictions, occurring in both rural and urban areas. This is a sample taken from December. Shades of blue represent the number of cases reported in each area during the epidemic, with increasing cases represented by darkening color. White areas indicate no reported cases or no information. The yellow circles represent the number of new cases reported in the past 21 days. Larger circles represent more cases.

### Underreporting

- **On a single day in late August 2014, epidemiologists tested a prediction model based on reported cases in Sierra Leone and Liberia**
  - 2.5 times more Ebola patients hospitalized in ETUs than model predicted based on reported cases
- **Underreporting may be even higher because many cases were not in ETUs**

[http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6331a1.htm?\\_c=us333a1\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6331a1.htm?_c=us333a1_w)  
<http://www.cdc.gov/od/oc/ebs/ebola/breaks/2014-est-af-ica-cmwr-estimating-future-cases.htm>

This presentation contains materials from CDC, MSF, and WHO

12

One contributing factor in the epidemic has been the widespread underreporting of cases. In late August 2014, an analysis of patients in ETUs noted there were actually 2.5 times more patients with Ebola than predicted in the model. This likely underestimates actual cases because many persons with Ebola weren't cared for in ETUs.

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

On August 26, a concurrent, but independent, Ebola outbreak was confirmed in the Democratic Republic of the Congo (DRC). There were a total of 66 cases, 38 confirmed and 28 suspected cases, including 8 among healthcare workers (HCWs). This outbreak resulted in 49 deaths, including all 8 HCWs. On October 25, all contacts completed their 21-day follow up. WHO confirmed the country was Ebola free November 14, 2014.

As of December, more than 675 healthcare workers are known to have developed Ebola. Among these, more than 55% have died.

Investigations into healthcare worker exposures are ongoing. Preliminary data suggest a substantial proportion of infections occurred outside the ETU.

A few patients with confirmed cases of Ebola who have been medically evacuated to the United States from West Africa. Most have been healthcare workers. They were all transported in carefully controlled environments to avoid infection of transport and medical personnel. Success of recovery has varied depending on the severity of illness.

This slide highlights information about the first cases of Ebola diagnosed in the United States. The index case of a small outbreak was a Liberian man who developed symptoms soon after flying to the United States from Liberia. He was hospitalized and tested positive for Ebola virus; he eventually died. Contact tracing was performed. Two of the nurses caring for him in the hospital later tested positive for Ebola. Their contacts were traced and none were infected with Ebola. Both nurses recovered and were discharged.

Another case was reported in New York City; that patient was treated and released. Contacts were traced and are Ebola free.

### Concurrent but Independent Ebola Outbreak in the Democratic Republic of the Congo (DRC)

- Outbreak confirmed August 26
- Genetic analysis showed Ebola virus strains in DRC and West Africa are distinct
- As of October 29, 66 cases (38 confirmed, 28 probable), including 8 among HCWs
- 49 deaths including all 8 HCWs
- All contacts completed 21-day follow-up on October 25
- WHO declared DRC Ebola free on November 14



This presentation contains materials from CDC, MSF, and WHO

13

### Distribution of Ebola Cases in Countries with Intense Transmission Cases Among Healthcare Workers\*

- >678 healthcare workers (HCWs) are known to have developed EVD
- >55% of these healthcare workers have died from Ebola
- Investigations into healthcare worker exposures are ongoing
  - Preliminary data suggest a substantial proportion of exposures occurred outside the Ebola Treatment Unit

WHO Situation Report December 31, 2014  
<http://apps.who.int/ebola/situation-reports/ebola-situation-report-31-december-2014>

This presentation contains materials from CDC, MSF, and WHO

14

### United States Situation Patients Evacuated from West Africa

- Several U.S. healthcare workers and a U.S. journalist with confirmed Ebola have been medically evacuated to the U.S. from West Africa
  - Transported in carefully controlled environment to avoid infection of transport and medical personnel
  - Success of recovery has varied depending on the severity of illness

This presentation contains materials from CDC, MSF, and WHO

15

### United States Situation Initial Cases of Ebola Diagnosed in the United States

- First U.S. patient - Liberian man developed symptoms soon after flying to U.S. from Liberia
  - Tested positive for Ebola virus contact tracing performed
- Two healthcare workers who cared for him developed symptoms
  - Tested positive for Ebola virus contact tracing performed
  - Both discharged from hospital
- Doctor who worked in Guinea returned to the U.S. and subsequently became symptomatic
  - Tested positive for Ebola virus contact tracing performed
  - Discharged from hospital

This presentation contains materials from CDC, MSF, and WHO

16

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

### United States Situation Increased Interest and Guidance

- Multiple inquiries to CDC regarding persons who have a history of recent travel to Ebola-affected countries and/or symptoms
  - Some have been tested
- Focus on infection prevention and control practices in U.S. hospitals
  - Updated CDC guidance on personal protective equipment (PPE) for healthcare workers in U.S. hospitals
    - Procedures for donning and doffing
    - Web-based PPE training

[http://www.cdc.gov/inf/ebola/hcp/procedures\\_for\\_ppe.html](http://www.cdc.gov/inf/ebola/hcp/procedures_for_ppe.html)

This presentation contains materials from CDC, MSF, and WHO

17

Because of the U.S. cases and increased awareness about Ebola, CDC has received multiple inquiries regarding persons who had a history of recent travel to Ebola-affected countries and/or Ebola-like symptoms, which are very non-specific; some have been tested for Ebola virus. The U.S. cases have focused attention on infection prevention and control practices in U.S. hospitals. CDC has released updated guidance on personal protective equipment (PPE) to be used by healthcare workers when caring for patients with Ebola in U.S. hospitals, including procedures for donning and doffing.

### United States Situation Traveler Screening

- Entry screening at five U.S. airports that receive >94% of travelers from Guinea, Liberia, and Sierra Leone
- Active post-arrival monitoring of travelers whose travel originates in Guinea, Liberia, and Sierra Leone
  - Travelers without fever or other Ebola symptoms will be followed up daily by state and local health departments for 21 days from the date of their departure from West Africa based on risk level
  - Some states have stricter policies

This presentation contains materials from CDC, MSF, and WHO

18

There is also guidance about air travel into the United States. The Department of Homeland Security is directing passengers flying from Guinea, Liberia, and Sierra Leone to arrive in the United States at one of the five airports with enhanced screening and resources – JFK, Newark, Dulles, Atlanta, and Chicago. Screeners observe passengers for signs of illness. If this screening elicits any concerns, travelers are further evaluated by CDC personnel. Travelers without fever or other Ebola symptoms will be followed up daily by state and local health departments for 21 days. Some states have enacted stricter policies.

### Key Strategies of Ebola Response

- Find suspect cases soon after symptom onset
- Get suspect cases into an ETU
  - Provide care
  - Prevent further transmission
  - Protect healthcare workers
  - If ETU at capacity, home care should prevent further transmission
- Test with real-time virus diagnostics (field lab or regional lab)
  - Diagnose with RT-PCR, no pathognomonic features in Ebola
  - Discharge if test negative >3 days after symptom onset
- Find contacts and follow for 21 days
  - If contact becomes febrile or sick – take to treatment center isolate and test
- Risk reduction messages to the community and health centers
  - Avoid close contact with sick people
  - Report suspect cases
  - Safe burials

This presentation contains materials from CDC, MSF, and WHO

19

Based on experiences in this epidemic and other Ebola outbreaks, key intervention strategies to halt the epidemic include:

- ▶ Find patients with suspected cases soon after symptom onset
- ▶ Get patients with suspected cases admitted to an ETU
- ▶ Test with real-time virus diagnostics in field or regional labs
- ▶ Find contacts and follow them for 21 days
- ▶ Communicate risk reduction messages to the community and health centers

These strategies have a long history of stopping outbreaks.

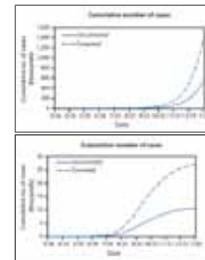
## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

This slide shows disease projection modeling released in the September 26, 2014, MMWR. CDC estimated by January 2015, there could be an approximate total of 550,000 Ebola cases in Liberia and Sierra Leone, or 1.4 million if corrections for underreporting were made. These projections assumed there were no additional interventions or changes in community behavior. However, with intervention, cases could be reduced to approximately 10,000-25,000 and the epidemic would soon end. While projection models continue to evolve, the importance of this slide is to highlight the significant impact intervention strategies can have on halting the epidemic.

Again, this graph is based on modeling projections from September. While projections continue to be readjusted, the graph highlights the devastating impact of delay. For effective intervention, 70% of patients with Ebola should be cared for in an ETU.

A lot has been learned from the challenges and lessons of the current epidemic.

### Intervention Offers Hope for Ending Epidemic CDC Ebola Response Model



- Without additional intervention  
By 1/20/2015
  - ~550,000 - 1.4 million cases
  - Continued exponential increase
- With intervention  
By 1/20/2015
  - ~10,000-25,000 cases
  - Epidemic ends

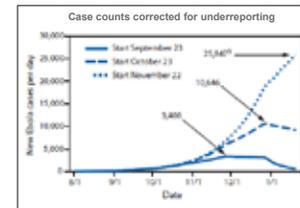
<http://www.cdc.gov/efebolaoutbreak/2014-west-africa/cdc-mmwr-estimating-future-cases.html>  
[http://www.cdc.gov/mmwr/preview/mmwrhtml/su6303a1.htm?s\\_cid=su6303a1\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/su6303a1.htm?s_cid=su6303a1_w)

This presentation contains materials from CDC, MSF, and WHO

20

### Every Day Counts

Estimated impact of delay in implementing intervention on daily case counts -- Sierra Leone and Liberia



<http://www.cdc.gov/efebolaoutbreak/2014-west-africa/mmwr-estimating-future-cases.html>  
[http://www.cdc.gov/mmwr/preview/mmwrhtml/su6303a1.htm?s\\_cid=su6303a1\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/su6303a1.htm?s_cid=su6303a1_w)

This presentation contains materials from CDC, MSF, and WHO

21

### Challenges and Lessons Learned

This presentation contains materials from CDC, MSF, and WHO

22

### Epidemic Challenges Geographic Boundaries

- Porous borders
- High population mobility
- Transmission in densely populated urban settings
- New disease for West Africa
- Civil unrest
- Decentralized response



Photo credit: Meredith Olson

This presentation contains materials from CDC, MSF, and WHO

23

Geographic issues create multiple challenges. This is a picture of the border looking from Guinea across to Sierra Leone. Border control is nonexistent. Sierra Leoneans come across every week to sell items in the Gueckedou market. If someone is sick with Ebola in Guinea, but wants to be with their family in Sierra Leone, that person needs to simply take a boat across.

High population mobility by multiple means, such as buses, boats, and cars, across these porous borders makes it hard to investigate new case leads since cases can migrate easily to another country. Contact tracing is also difficult in these circumstances.

This epidemic is particularly challenging because Ebola is a new disease to these West African countries, many that have a recent history of civil unrest. Also, previous outbreaks in other parts of Africa have been in rural areas, while this epidemic is occurring in rural and urban areas.

The geographic and political issues facing these countries have resulted in a decentralized response to the epidemic.

### Epidemic Challenges Active Community Resistance



Vehicle of contact tracing worker stopped in Gueckedou District, Guinea  
Photo credit: Meredith Olson

This presentation contains materials from CDC, MSF, and WHO

24

Active community reticence is also a challenge. This is a picture from the vehicle of a contact tracing worker as he went into a village in the Gueckedou District.

The vehicle was stopped by men holding wooden sticks and tree trunks across a road and forbidding passage. This negatively impacts the ability to complete 100% contact tracing as well as case identification.

Lack of acceptance that Ebola is real remains a major challenge with the local population. This issue has not been fully surmounted by education. Fear and superstition are commonplace among the population. In one clinic that had health posters concerning a variety of topics on the walls, locals insisted that the Ebola-specific posters, such as this one on the right, be removed out of fear that such posters meant they would get Ebola in the clinic.

Stigma impacts the population negatively as well. One woman, upon discharge from the ETU, was not allowed to return to work despite having had two negative tests. She returned to MSF to request documentation of these negative results because her employer would not permit her entry without it.

There is a strong distrust of outsiders. Some locals believe Ebola was brought to Guinea by outsiders to make money or to harvest organs or blood.

A major challenge in the response is an overburdened healthcare system. There are insufficient numbers of healthcare workers to handle the epidemic and in some instances these workers are not being paid. Healthcare workers and others caring for those with Ebola are not always getting the training they need in infection prevention and control principles. There are also not enough beds available to treat patients along with shortages in PPE and medical supplies.

Healthcare worker infections have also been a challenge. Ebola infections in healthcare workers have been reported in Guinea, Sierra Leone, Liberia, and Nigeria. Factors leading to healthcare worker infections include overburdened and understaffed healthcare centers and ETUs, as well as insufficient triage of patients suspected to have Ebola, resulting in extensive exposure outside ETUs.

### Epidemic Challenges *Lack of Acceptance that Ebola is Real*

- ❑ Fear and superstition
  - Despite health messaging using posters and radio
- ❑ Stigma
- ❑ Distrust of outsiders
  - Rumors that foreigners brought Ebola to make money
  - Rumors that ETUs are harvesting organs or blood



This presentation contains materials from CDC, MSF, and WHO

25

### Epidemic Challenges *Healthcare System*

- ❑ Overburdened public health and healthcare system
  - Not enough healthcare workers
  - Unpaid healthcare workers
  - Insufficient numbers of treatment centers/beds
  - Insufficient training in infection prevention and control
  - Insufficient quantities of PPE
  - Insufficient medical supplies



This presentation contains materials from CDC, MSF, and WHO

26

### Epidemic Challenges *Healthcare Worker Infections*

- ❑ Ebola cases in healthcare workers have been reported in the affected West African countries
- ❑ Factors leading to healthcare worker infections
  - Overburdened and understaffed healthcare centers
    - Insufficient training
    - Inadequate supply of PPE
    - Preventable infections from exposures to patients with Ebola, including needlesticks
  - Insufficient triage of patients with suspected Ebola, resulting in extensive exposure outside ETUs

<http://www.who.int/mediacentre/news/ebola/25-august-2014/en/>

This presentation contains materials from CDC, MSF, and WHO

27

### Epidemic Challenges *Burial Customs*

- Funerals with ritual washing of corpses, touching of bodies without barrier protection (e.g., gloves)
- Acceptance of safe burial practices (e.g., using full personal protective equipment) culturally difficult



This presentation contains materials from CDC, MSF, and WHO

28

Burial customs are a challenge. Funeral rituals consist of washing a corpse and touching a body without barrier protection. Acceptance of safe burial practices, such as using high-risk PPE, is difficult among African cultures.

### Lessons Learned *Outbreak Control*

- Outbreaks can outpace established control methods
  - Continue implementation of infection prevention and control and burial practices in new ways
  - Contact tracing is essential in all areas
  - Therapeutics, vaccines, etc. in development but not yet widely available

This presentation contains materials from CDC, MSF, and WHO

29

Several lessons from the Ebola response have been learned. It has been shown that outbreaks can move faster than the established methods used to control them. New ways of implementing infection prevention and control practices must be established. Contact tracing must become widely accepted and systematic. Therapeutics and vaccines must also be explored and made readily available as soon as possible.

### Lessons Learned *Increase Human Resources*

- National staff: payment, training, equipment (PPE)
- International staff
  - Rapid Response Teams (72 hours) for deployment to newly affected countries
  - Support national staff in ETUs
  - Accelerated training of healthcare workers for ETUs with emphasis on healthcare worker safety and protection
  - Medical care for healthcare workers
    - Specialized medical referral centers in affected countries
    - Medical evacuation

WHO Ebola Response Roadmap  
<http://apps.who.int/iris/bitstream/10665/131596/1/EbolaResponseRoadmap.pdf>

This presentation contains materials from CDC, MSF, and WHO

30

Another important lesson, and one of the reasons you are here today, is the need to increase human resources in West Africa. Support is needed for national staff in the form of payment, training, and sufficient supply of PPE. International staff are needed to participate in rapid response teams to support national staff working in ETUs. Accelerated trainings that emphasize infection prevention and control protocols for healthcare workers and protection are also needed. It is a priority to establish specialized medical referral centers and medical evacuation plans for healthcare workers that may become ill.

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

The WHO Ebola Response Roadmap for West Africa is a needed step in addressing the challenges and lessons learned in West Africa. The roadmap provides the coordinated international response by increasing traditional response activities and strengthening laboratory resources, human resources, and response capacities.

### WHO Ebola Response Roadmap for West Africa

- ❑ Massively scaled and coordinated international response is needed
- ❑ Traditional response activities (isolation and care in ETUs, contact tracing, safe burial teams, etc.)
  - In newly affected countries
  - In highly affected countries as resources allow
- ❑ Adaptation of traditional response activities when necessary
  - In areas of high transmission when resources are inadequate
  - Includes complementary response activities in community
- ❑ Sustainable strengthening of laboratory resources, human resources, and response capacities are priorities

WHO Ebola Response Roadmap  
<http://apps.who.int/iris/bitstream/10665/131096/1/EbolaResponseRoadmap.pdf>

This presentation contains materials from CDC, MSF, and WHO

31

Several partners have critical roles and responsibilities in the response.

- ▶ National governments lead the response.
- ▶ Local political, community, traditional, and religious leaders communicate accurate information to ensure community engagement in control measures.
- ▶ WHO provides technical leadership, operational support, and monitoring.
- ▶ United Nations agencies assist national governments in developing preparedness and operational plans and garner international support. They also provide support for essential services.
- ▶ Non-governmental organizations heighten coordination, mobilize human resources, and establish ETUs.
- ▶ Other national/international technical agencies provide technical expertise, training, capacity building, and expert staff.

### Many Partners are Critically Important Selected Roles and Responsibilities

National governments	• Lead response
Local political, community, traditional, religious leaders	• Communicate accurate information • Ensure community engagement in control measures
WHO	• Technical leadership, operational support, monitoring
UN agencies	• Assist national governments to develop preparedness and operational plans and garner international support • Provide support for essential services
NGOs	• Assist with coordination • Mobilize human resources • Establish Ebola Treatment Units
Other national/international technical agencies (e.g., CDC)	• Provide technical expertise, training, capacity building, expert staff

This presentation contains materials from CDC, MSF, and WHO

32

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

### The Current Status of the Ebola Epidemic

- The links below provide current information on the Ebola epidemic. Slides to provide current information are provided.
  - CDC website (general): <http://www.cdc.gov/vhf/ebola/>
  - CDC website (case counts): <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>
  - WHO website: <http://apps.who.int/ebola/>
  - MSF website: <http://msf.org/diseases/ebola>

This presentation contains materials from CDC, MSF, and WHO

33

Information at the end of this presentation will change regularly. Please update the slides to provide current information on the Ebola epidemic. The current information can be found at:

- ▶ CDC website (general): <http://www.cdc.gov/vhf/ebola/index.html>
- ▶ CDC website (case counts): <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>
- ▶ WHO website: <http://apps.who.int/ebola/>
- ▶ MSF website: <http://msf.org/diseases/ebola>

### 2014 Ebola Epidemic, West Africa



Source: WHO Response Roadmap, December 31, 2014  
<http://www.cdc.gov/vhf/ebola/resources/distribution-map-guinea-outbreak.html>

This presentation contains materials from CDC, MSF, and WHO

34

The situation in Africa continues to evolve. These slides provide a current update on the situation. CDC, along with other U.S. government agencies and international partners, is responding to the rapidly changing situation in West Africa.

Current information for this slide can be found at: <http://www.cdc.gov/vhf/ebola/resources/distribution-map-guinea-outbreak.html>

### Ebola Cases and Deaths (Worldwide)\*

- 20,206 confirmed and suspected cases and 7,905 deaths from Ebola Virus Disease (EVD) have been reported to WHO by 9 countries
  - Guinea
  - Liberia
  - Mali
  - Nigeria
  - Senegal
  - Sierra Leone
  - Spain
  - United Kingdom
  - United States

\*WHO Situation Report: December 31, 2014  
<http://apps.who.int/ebola/en/status/outbreak/situation-reports/ebola-situation-report-31-december-2014>

This presentation contains materials from CDC, MSF, and WHO

35

This slide shows the confirmed and suspected cases and deaths from EVD reported to WHO by 9 countries (Guinea, Liberia, Mali, Nigeria, Senegal, Sierra Leone, Spain, the United Kingdom, and the United States).

Current information for this slide can be found at: <http://apps.who.int/ebola/en/current-situation>

## Course Lectures and Scripts > Overview of the 2014 Ebola Epidemic and Response

This slide shows information about confirmed and suspected cases and deaths in the countries with widespread and intense transmission.

Current information for this slide can be found at:  
<http://apps.who.int/ebola/en/current-situation>

### Ebola Cases and Deaths (Widespread & Intense Transmission)\*

A total of 14,068 confirmed and suspected cases and 5,147 deaths from Ebola have been reported to WHO by the Ministries of Health (MOH) of Guinea and Sierra Leone, and Liberia.

Country	Last Updated	Total Cases	Confirmed Cases	Deaths
Guinea	9 Nov	1,878	1,612	1,142
Liberia	8 Nov	6,822	2,553	2,836
Sierra Leone	9 Nov	5,368	4,523	1,169
<b>Total</b>		<b>14,068</b>	<b>8,688</b>	<b>5,147</b>

\*WHO Situation Report 12 November 2014  
[http://apps.who.int/iris/bitstream/10665/141488/1/10admapstrea\\_12Nov2014\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/141488/1/10admapstrea_12Nov2014_eng.pdf?ua=1)

This presentation contains materials from CDC, MSF, and WHO

36

As shown earlier, country reports fall into two categories:

- ▶ First, those countries with widespread and intense transmission, which are currently Guinea, Liberia, and Sierra Leone
- ▶ Second, those countries with an initial case or cases, or with localized transmission, currently: Mali, Nigeria, Senegal, Spain, United Kingdom, and the United States

Information throughout this presentation will change regularly. While information on this slide should be stable, periodic review is required.

### Ebola Cases and Deaths (Worldwide)\*

#### □ Countries fall into two categories

- Those with widespread and intense transmission
  - Guinea
  - Liberia
  - Sierra Leone
- Those with an initial case or cases, or with localized transmission
  - Mali
  - Nigeria
  - Senegal
  - Spain
  - United Kingdom
  - United States

\* WHO Situation Report December 31, 2014  
<http://www.who.int/csr/disease/ebola/en/>

This presentation contains materials from CDC, MSF, and WHO

37

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-4656) TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



# Ebola Virus Disease and Clinical Care Part I: History, Transmission, and Clinical Presentation

This lecture is on Ebola virus disease (EVD) and clinical care. This is part one of a three-part lecture on this topic.

This lecture will focus on EVD in the West African setting. The training and information you receive in this course will not cover the use of certain interventions such as intubation or dialysis which are not available in West African Ebola Treatment Units (ETUs). You will need supplemental training to care for patients appropriately in countries where advanced care is available.

The learning objectives for this lecture are to:

- ▶ Describe the routes of Ebola virus transmission
- ▶ Explain when and how patients are infectious
- ▶ Describe the clinical features of patients with Ebola
- ▶ Describe screening criteria for EVD used in West Africa
- ▶ Explain how to identify patients with suspected EVD who present to the ETU

A number of different viruses cause viral hemorrhagic fever. Some illness from these infections, such as Lassa fever, dengue, or yellow fever, may be encountered in West Africa and can easily be confused with Ebola virus because symptoms are similar.

For example, because Lassa fever is endemic in West Africa and an accepted drug treatment (Ribavirin) exists, it is important to differentiate this from Ebola virus.

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Ebola Virus Disease and Clinical Care: Part I: History, Transmission, and Clinical Presentation

This presentation is current as of December 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Malware Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- Describe the routes of Ebola virus transmission
- Explain when and how patients are infectious
- Describe the clinical features of patients with Ebola
- Describe screening criteria for Ebola virus disease (EVD) used in West Africa
- Explain how to identify patients with suspected EVD who present to the ETU

This presentation contains materials from CDC, MSF, and WHO

2

### Viral Hemorrhagic Fevers

Arenaviridae	Bunyaviridae	Filoviridae	Flaviviridae
• Lassa HF	• Hantavirus Genus	• <b>Ebola</b>	• Dengue
• Argentine HF	• Congo-Crimean	• Marburg	• Yellow fever
• Bolivian HF	HF	• Lloviu	• Kyasanur
• Venezuelan HF	• Rift Valley Fever		• Omsk
HF			
• Brazilian HF			

This presentation contains materials from CDC, MSF, and WHO

3

### Ebola Virus



This presentation contains materials from CDC, MSF, and WHO

4

This is an electron micrograph of an Ebola virus particle, demonstrating the characteristic filamentous structure of the virus. It is sometimes described as a shepherd's crook or "U" or a "6". The virus has a lipid envelope and the genome only encodes for 7 genes.

As you can see from this picture the virus has an exceptionally large surface area because of its filamentous area. This makes it more susceptible to disruption of the lipid envelope which results in deactivation of the virus.

### Ebola Transmission

This presentation contains materials from CDC, MSF, and WHO

5

Let's address transmission of the Ebola virus.

### Ebola Virus

- **Filoviridae**  
Family of zoonotic RNA viruses:  
*Marburg virus* and  
*Ebola virus* species



- >20 previous Ebola and Marburg outbreaks
- In previous outbreaks, the case-fatality rates have varied by subtype: E. Zaire (57%-90%), E. Sudan (approximately 50%), E. Bundibugyo (32%), and E. Reston (0%—evidence of infection but no clinical illness).
- Previous West African case: Tai Forest Virus, Côte d'Ivoire

This presentation contains materials from CDC, MSF, and WHO

6

Ebola virus belongs to a family of zoonotic RNA viruses, called Filoviridae, which also includes Marburg virus, another hemorrhagic fever virus with similar symptoms and case fatality rates.

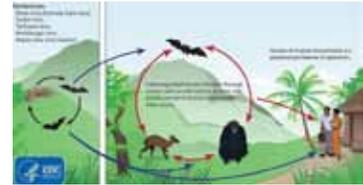
The first Ebola virus species was discovered in 1976 in Yambuku, Zaire, now known as the Democratic Republic of the Congo, along the Ebola River, as shown here on the map. In this first recognized outbreak, there were 318 cases, with a case fatality rate of 88%. Since 1976, there have been more than 20 outbreaks of Ebola and Marburg viruses. Ebola virus species now include Zaire, responsible for this outbreak, Sudan, Bundibugyo, Tai Forest, and Reston. Different fatality rates have been associated with the several species. Ebola Zaire is the most virulent, having a case fatality of 88-99%, while Ebola Reston is not associated with any human deaths.

Based on evidence and the known transmission cycles of other similar viruses, researchers believe that Ebola virus is animal-borne. Bats are the most likely reservoir although the exact species is unknown.

This slide depicts the hypothesized natural life cycle of Ebola virus in bats on the left, and spillover infections of other mammals, including humans, that can occur on the right. Preparation of “bush meat,” a term used to describe meat from any wild animal, including monkeys and bats, might be an important opportunity for a spillover event. The event could then start a person-to-person chain of Ebola virus transmission through contact with blood or body fluids.

### Ebola Virus Transmission Cycle

- Zoonotic virus– bats are the most likely reservoir, although species unknown
- Spillover event from infected animals to humans, followed by person-to-person transmission



This presentation contains materials from CDC, MSF, and WHO

7

Transmission occurs via direct or indirect contact with body fluids from Ebola virus infected persons or animals.

Potentially infectious body fluids include blood, respiratory secretions, urine, feces, vomit, saliva, sweat, breast milk, semen, and vaginal secretions.

Detection in semen by viral culture (up to day 82) or by reverse transcriptase polymerase chain reaction (RT-PCR) (up to day 101) has been reported after illness onset and recovery. The transmission risk from semen after recovery is uncertain. However, seminal fluid is an immunologically protected site, meaning that antibodies might not have access to virus present in semen. Hence, it is recommended men use condoms for three months after the Ebola virus is no longer detectable in the patient’s blood.

### Ebola Virus Transmission Sources

- Transmission occurs via direct or indirect contact with body fluids from Ebola-infected persons or animals
- Potentially infectious body fluids include:
  - Blood
  - Respiratory secretions
  - Urine
  - Feces
  - Vomit
  - Saliva
  - Sweat
  - Breast milk
  - Semen, vaginal secretions
- Prolonged detection by PCR in semen (up to 101 days after infection and recovery)
  - Transmission risk uncertain

This presentation contains materials from CDC, MSF, and WHO

8

### Ebola Virus Transmission Key Concepts

- ❑ Infected persons are not contagious until onset of symptoms
- ❑ Infectiousness of body fluids (e.g., viral load) increases as patients become more ill
- ❑ Corpses are highly infectious
- ❑ Direct contact with an infected person or recently deceased person are the most common routes of transmission
- ❑ Transmission also occurs through contact with objects or surfaces contaminated by blood or other body fluids containing virus

This presentation contains materials from CDC, MSF, and WHO

9

Important concepts about Ebola virus transmission include:

- ▶ Infected persons are not contagious until onset of symptoms.
- ▶ Infectiousness of body fluids (e.g., viral load) increases as patients becomes more ill.
- ▶ Corpses are highly infectious even though viral load stops increasing after death. Fresh corpses are a major problem with customary West African body preparation and burial practices.
- ▶ Direct contact with ill persons or recently deceased persons are the most common routes of transmission.
- ▶ Transmission also occurs through contact with objects or surfaces contaminated by blood or body fluids containing virus.

### Ebola Virus Transmission Routes of Virus Entry

- ❑ Established route – direct contact with blood or other body fluids
  - Eyes or other mucous membranes
  - Breaks in the skin
  - Percutaneous injuries from objects contaminated with infectious materials (e.g., needlestick injury)
- ❑ Possible routes
  - Sexual contact
  - Breastfeeding
- ❑ Aerosol transmission is unlikely
  - Person-to-person transmission of Ebola virus via inhalation (aerosols) has not been demonstrated
  - Epidemiology is not consistent with aerosol transmission

This presentation contains materials from CDC, MSF, and WHO

10

Evidence from this epidemic and previous outbreaks indicates direct contact with blood or other body fluids from an infected person or corpse are the major routes of transmission. Levels of Ebola virus in blood and other body fluids are very high, especially when patients are sickest and near death. Since the infectious dose is very low, even small amounts of blood or other body fluids are potentially very infectious. Virus from contaminated hands or fomites, including contaminated personal protective equipment (PPE), can enter through the eyes or other mucous membranes, or breaks in skin that might not be visible. Percutaneous injuries such as a needlestick can also transmit virus.

Other possible routes of transmission include sexual contact or breastfeeding. However, it is hard to distinguish these contacts from other close contacts that would typically occur in a household.

Aerosol transmission is unlikely. Person-to-person transmission of Ebola virus via inhalation has not been demonstrated. While it is possible in an experimental setting to create an infectious aerosol, aerosols are not typically generated in healthcare settings except under certain circumstances, such as during intubation or bronchoscopy. Viruses typically don't change transmission mechanism under natural conditions.

Direct contact or contact with contaminated fomites can easily explain transmission patterns observed in this epidemic and other Ebola outbreaks.

There are many opportunities for person-to-person transmission when patients are infected with high levels of Ebola virus. Patients often have vomiting and severe diarrhea, and are unable to care for themselves or even get out of bed to use a bathroom. Persons who are providing care for ill family members are at high risk and household transmission is common.

In healthcare settings, providers are potentially exposed whenever they touch a patient. Virus can easily be transferred from contaminated hands or PPE to a healthcare worker's mucous membranes. This is why it is critical to pay careful attention to infection prevention and control practices.

Handling or preparing corpses is a high-risk activity for transmission of the virus.

Contact with objects contaminated by Ebola virus, including soiled linens, soiled clothes, or used utensils, can also result in virus transmission.

And of course, injuries from contaminated sharps are a major risk for transmission.

The incubation period is defined as the time from exposure to development of symptoms or signs of disease. Nine to eleven days is the most common incubation period. However, after a large inoculation such as one that might occur with a needlestick, the incubation period might be as little as two days. The incubation period can be up to 21 days, and that is the standard typically used for contact tracing. However, incubation periods of more than two weeks are unusual.

We will now talk about the clinical presentation and features of patients with Ebola Virus Disease.

### **Ebola Virus Transmission** *Opportunities for Person-to-Person Transmission*

- Providing routine care for infected persons
  - Household or community
  - Healthcare setting
- Handling or preparing corpses
- Contact with objects contaminated by virus (e.g., soiled linen, soiled clothes, or used utensils)
- Accidental injuries from virus-contaminated sharps

This presentation contains materials from CDC, MSF, and WHO

11

### **Ebola Virus Transmission** *Incubation Period*

- The time from the moment of exposure to the virus until onset of symptoms or signs of disease
  - Incubation period is usually 9-11 days
  - Incubation period ranges from 2 -21 days

This presentation contains materials from CDC, MSF, and WHO

12

### **Clinical Presentation**

This presentation contains materials from CDC, MSF, and WHO

13

### Initial Clinical Presentation of Ebola Virus Disease

- Signs and symptoms
  - Fever, chills, myalgia, malaise, weakness, nausea, headache
  - GI symptoms very common: vomiting, diarrhea, abdominal pain
  - Spontaneous abortion/miscarriage
  - Hemorrhage is a late sign, occurring in <50% of cases, and much less common at presentation
- Other possible infectious causes of signs and symptoms similar to EVD
  - Lassa fever, malaria, typhoid fever, meningococemia, and other bacterial infections – all very common in West Africa
- Don't expect all symptoms or consistent sequence in every patient

This presentation contains materials from CDC, MSF, and WHO

14

Some of the most common clinical presentations of patients with EVD are listed in this slide. As you can see, there is a wide spectrum of signs and symptoms which can make it difficult to distinguish EVD clinically from other common illnesses in West Africa.

Fever is a very common early sign of EVD, often accompanied by nausea, fatigue, or headache. Onset is often, but not always, abrupt. GI symptoms such as vomiting and diarrhea often follow the initial symptoms. Hemorrhaging is not usually common at presentation and occurs in less than half of patients with Ebola as a late sign.

According to experts who have seen many cases, early symptoms are those of early sepsis, and non-specific. Other diseases that might present with similar symptoms include Lassa fever, malaria, typhoid fever, and meningococemia. These diseases are commonly found in West Africa and may be a reason some people delay seeking treatment. Co-infections are also possible.

Don't expect all signs or symptoms to be present in every patient, or for signs and symptoms to present sequentially.

### Clinical Features in Severe Ebola Virus Disease

- Sepsis presentation
  - Hypovolemia
  - Oliguria
  - Signs of liver injury
  - Cytokine storm
- Hemorrhagic symptoms (<50%)
  - Ranging from gum "oozing" to (less commonly) epistaxis or mucocutaneous bleeding, GI bleeding
- Neuropsychiatric abnormalities (agitation, confusion)
- Acute malnutrition
- Shock, multiple organ failure

This presentation contains materials from CDC, MSF, and WHO

15

In severe disease, a full-blown sepsis presentation is typical. Signs will include hypovolemia, oliguria, signs of liver injury, and cytokine storm.

Hemorrhagic symptoms are seen in less than 50% of patients, even at this stage. This is a key point. Do not expect to necessarily see hemorrhagic symptoms. Do not discount the possibility of EVD in severely ill patients who do not have hemorrhagic signs. When present, signs of hemorrhagic illness range from gum "oozing" to less commonly frank epistaxis or mucocutaneous bleeding. Gastrointestinal bleeding may be present.

Neuropsychiatric abnormalities such as agitation and confusion are very common in later stages of disease.

In a setting where many persons have poor nutritional status at baseline, acute malnutrition is an issue when patients cannot eat due to GI symptoms or weakness. Illness may be more likely to progress to shock and multiple organ failure, and death.

## Course Lectures and Scripts > Ebola Virus Disease and Clinical Care Part I

Routine lab testing is not available in many ETUs. However, when tests are done, typical findings include low platelet count (thrombocytopenia), and low White Blood Cell (WBC) count (leukopenia). Electrolyte abnormalities from fluid shifts related to diarrhea, fever, and interstitial fluid leak are prominent. Signs of poor end organ perfusion such as transaminitis (AST, ALT) and increased creatinine are seen. Clotting abnormalities can be seen, often later than the changes in electrolytes and cell counts. In short, lab findings are that of early sepsis, and non-specific. Clinical studies in the current epidemic indicate that most patients who have died from EVD had acidosis on admission or acidosis that developed during hospitalization. Among patients who died, levels of blood urea nitrogen and creatinine progressively increased over time, suggesting that dehydration and worsening renal function played a significant role in their hospital course. Patients who died were more likely to have sustained elevations in AST, ALT, or alkaline phosphatase (especially AST) than were patients who survived.

Late stage changes prominently feature the findings typical of hemorrhagic fevers. Here you see a patient with hematemesis.

Note this hemorrhagic patient, who has spontaneous gum bleeding, is not prostrate or immobile.

### Initial Laboratory Findings of Ebola Virus Disease

- Low platelet count (thrombocytopenia)
- Low WBC count (leukopenia)
- Electrolyte abnormalities from fluid shifts (e.g., diarrhea, fever, interstitial fluid leak)
- Transaminitis (AST, ALT)
- Increased creatinine
- Clotting abnormalities

Note: In many ETUs, few lab tests will be available.  
This presentation contains materials from CDC, MSF, and WHO

16

### Clinical Appearance



This presentation contains materials from CDC, MSF, and WHO

17

### Clinical Appearance



This presentation contains materials from CDC, MSF, and WHO

18

### Clinical Appearance



This presentation contains materials from CDC, MSF, and WHO

19

This patient has bleeding from intravenous (IV) site.

### Risk Factors for Death from Ebola Virus Disease

- ▣ Patient characteristics
  - Age <5 years or >45 years (perhaps related to viral load)
  - Pregnancy
- ▣ Exposure characteristics
  - Large inoculum
    - Hollow bore needlestick
    - Exposure to corpse or patient with advanced disease
- ▣ Clinical characteristics
  - Short incubation time
  - Rapid progression of symptoms
  - Liver and kidney involvement
  - Unexplained bleeding
  - Altered mental status

This presentation contains materials from CDC, MSF, and WHO

20

There are various characteristics that predict a higher risk of death from EVD. For example, age is a primary risk factor for death. Patients younger than 5 or older than 45 are at higher risk. Limited evidence suggests pregnant women are at increased risk for severe illness and death when infected with Ebola virus. Pregnant women with Ebola also appear to be at a very high risk of fetal loss and pregnancy-associated hemorrhage.

Larger inoculums that transmit more virus are also a risk factor. This might occur with a hollow bore needlestick injury, or during exposure without protective equipment to a corpse or patient with advanced disease.

Clinical characteristics that predict a higher risk for death include:

- ▶ Short incubation time
- ▶ Rapid progression of symptoms
- ▶ Liver and kidney involvement
- ▶ Unexplained bleeding (specific hemorrhagic symptoms have been rarely reported in the current epidemic (in <1% to 6% of patients). Unexplained bleeding, however, was reported in 18% of cases)
- ▶ Altered mental status

For patients with Ebola who survive, long-term medical issues may occur. These could include:

- ▶ Frequent, severe, and persistent arthralgia or myalgia
- ▶ Cardiac injury
- ▶ Cerebral complications including seizures and encephalopathy
- ▶ Eye problems
- ▶ Malnutrition
- ▶ Mental health issues
- ▶ Prolonged fatigue

Many diseases in West Africa can be similar to EVD. A long list appears on this slide. More common conditions that mimic EVD include Lassa fever, malaria, typhoid fever, and shigellosis. However, be alert for others, such as meningitis, plague, or leptospirosis. It is important to consider and manage other treatable infections including malaria or Lassa fever, when appropriate, in the ETU.

Appropriate and standard screening methods are important for EVD diagnosis.

### Long-term Issues for Surviving Patients with Ebola

- ❑ Arthralgia or myalgia (frequent, severe, and persistent)
- ❑ Cardiac injury (e.g. myocarditis)
- ❑ Cerebral complications (e.g., seizures, encephalopathy)
- ❑ Eye problems
- ❑ Malnutrition
- ❑ Mental health issues
- ❑ Prolonged fatigue

This presentation contains materials from CDC, MSF, and WHO

21

### Other Considerations for Patients with Fever or Hemorrhage

- ❑ Many diseases in West Africa present with fever or have hemorrhagic manifestations
  - Amniotic fluid embolism
  - Gram-negative sepsis
  - Hemolytic-uremic syndrome
  - Lassa fever
  - Leptospirosis
  - Leukemia
  - Malaria
  - Meningitis
  - Plague
  - Rickettsial diseases
  - Staphylococcal sepsis
  - Shigellosis
  - Thrombotic thrombocytopenic purpura
  - Toxic shock syndrome
  - Typhoid fever
  - Viral hepatitis
  - Warfarin poisoning

It is important to consider and manage other treatable infections in the ETU.

This presentation contains materials from CDC, MSF, and WHO

22

### Screening for Ebola

This presentation contains materials from CDC, MSF, and WHO

23

### Case Definition for Screening Patients for Ebola

- Applying a uniform case definition is critical for case identification, tracking, and control of the epidemic
- Case definitions for screening differ by location (e.g., West Africa vs. United States)
- Use the locally relevant case definition

This presentation contains materials from CDC, MSF, and WHO

24

Careful screening of patients who present with symptoms that could be EVD must be conducted as early as possible to distinguish them from persons with other illnesses such as the ones listed on the previous slide. Applying a uniform case definition is critical for case identification, tracking, and control of the epidemic. Adherence to a strict case definition should not prevent astute healthcare workers from using their clinical judgment in assessing the patients. Case definitions for screening differ by location. It is critical to use the locally relevant case definition for your ETU.

### Screening for ETU Referral

- All patients must be screened (triaged) before entering the ETU
  - Not done in high-risk PPE
  - Healthcare workers should perform triage at least one meter (three feet) from potential patients
  - Purpose of triage is to quickly isolate patients who might have EVD then obtain diagnostic tests
- Most ETUs perform screening using case definition recommended by WHO for suspected EVD in Africa
- Slightly different case definitions could be used in different locations
- If screening assessment indicates patient is suspected of having Ebola, isolate immediately and admit to suspect area of ETU or arrange transfer to the ETU

This presentation contains materials from CDC, MSF, and WHO

25

Screening of all patients who might have EVD must occur before they enter an ETU or healthcare facility. This is necessary to reduce the risk to other patients and caregivers. Triage is not done in high-risk PPE, so healthcare workers performing triage should maintain a distance of at least one meter (three feet) from potential cases. Triage means screening by a nurse or other medical staff member at the entry point of the ETU by questioning the patient and/or family. It does not include laboratory testing, which takes many hours before results are available. The goal of triage is to quickly isolate patients who might have EVD and obtain diagnostic testing.

Most ETUs perform triage screening using the case definition recommended by the World Health Organization (WHO) for suspected EVD in Africa. However, slightly different case definitions could be used in different locations.

If the screening assessment indicates a patient is suspected of having EVD, then the screening healthcare workers must isolate the patient immediately. This will mean admitting the patient to the suspect area of the ETU if they are on site, or arranging transfer to the ETU if they are somewhere outside the facility.

## Course Lectures and Scripts > Ebola Virus Disease and Clinical Care Part I

WHO has published screening criteria for EVD in healthcare facilities. Case definitions vary slightly between West African countries. This is an example of a WHO screening algorithm that has been used in Guinea. It is important to use a standard algorithm so patients can be assigned to the proper risk category.

Key points in the WHO case definition include:

- ▶ Presence of fever among persons not feeling well is the first step. Fever and known contact are immediate grounds for classifying as a suspected case.
- ▶ Persons with fever but no known contact become a suspected case if they have three or more of the listed symptoms such as headaches, vomiting, anorexia/loss of appetite, diarrhea, lethargy, stomach pain, aching muscles or joints, difficulty swallowing, breathing difficulties, hiccups.
- ▶ Any unexplained bleeding, regardless of fever, is a suspected case.
- ▶ Finally, even if there is no fever, patients can be classified as suspected if there was contact and other symptoms are present.

Clinical judgment is needed to use an algorithm, and getting a clear history from ill and often frightened patients can be a challenge, as you will see in the triage tabletop exercise.

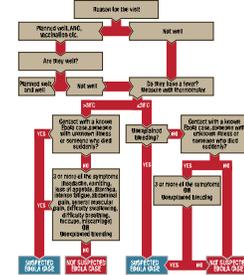
WHO has defined a contact as any person having been exposed to a suspect, probable or confirmed case of Ebola in at least one of the following ways:

- ▶ Has slept in the same household with a case
- ▶ Has had direct physical contact with the case (alive or dead) during the illness
- ▶ Has had direct physical contact with the (dead) case at the funeral
- ▶ Has touched his/her blood or body fluids during the illness
- ▶ Has touched his/her clothes or linens
- ▶ Has been breastfed by the patient (baby)

This list is by no means exhaustive and common sense should always be employed. For example, having shared a meal with a person with suspected, probable, or confirmed Ebola can be defined as contact with that person.

The contact's exposure must have taken place less than 21 days before their identification as a contact.

### Example: WHO Screening Algorithm for Healthcare Facilities in Guinea



This presentation contains materials from CDC, MSF, and WHO

26

### WHO Definition of "Contact"

- Any person having been exposed to a suspect, probable, or confirmed case of Ebola in at least one of the following ways:
  - Has slept in the same household with a case,
  - Has had direct physical contact with the case (alive or dead) during the illness,
  - Has had direct physical contact with the (dead) case at the funeral,
  - Has touched his/her blood or body fluids during the illness,
  - Has touched his/her clothes or linens, or
  - Has been breastfed by the patient (baby).
- Contact's exposure must have taken place less than 21 days before their identification as a contact

<http://www.who.int/csr/resources/publications/ebola/ebola-case-definition-contact-en.pdf>

This presentation contains materials from CDC, MSF, and WHO

27

### Summary

- ❑ Incubation period range is 2-21 days, but most commonly 9-11 days after contact
- ❑ No transmission before symptom onset
- ❑ Transmission by direct contact with ill people, body fluids, contaminated materials, corpses, animals
- ❑ Nonspecific early symptoms progress to signs of sepsis: hypovolemic shock, multi-organ failure, and sometimes hemorrhagic disease
- ❑ Appropriate triage of patients with signs and symptoms that could be EVD is critical to reducing risk for healthcare workers, other patients and the community

This presentation contains materials from CDC, MSF, and WHO

28

In summary:

- ▶ The incubation period range is 2-21 days, but most commonly illness starts 9-11 days after contact.
- ▶ No transmission occurs before system onset.
- ▶ Transmission is by direct contact with ill people, body fluids, contaminated materials, corpses, and less commonly, animals.
- ▶ EVD is characterized by non-specific early symptoms progressing to signs of sepsis: hypovolemic shock, multi-organ failure, and sometimes hemorrhagic disease.
- ▶ Appropriate triage of patients with signs and symptoms that could be EVD is critical to reducing risk for healthcare workers, other patients and the community.

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-4636) / TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

# Infection Prevention and Control for Healthcare Workers

This lecture describes infection prevention and control principles for healthcare workers in Ebola Treatment Units (ETUs) in Africa. Please note infection prevention and control measures described in this lecture are somewhat different from those used in hospitals in the United States. In addition, these infection prevention and control recommendations might be different from those you encounter in the ETU to which you are deployed. However, the principles described should help you understand the rationale underlying infection prevention and control recommendations, and help you stay safe during deployment.

The learning objectives for this lecture are to:

- ▶ Explain the rationale for recommended infection prevention and control principles for Ebola virus
- ▶ Describe infection prevention and control principles currently recommended for Ebola virus
- ▶ Describe the principles of using personal protective equipment (PPE) safely in the ETU

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Infection Prevention and Control for Healthcare Workers

This presentation is current as of December 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Malaria Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- Explain the rationale for recommended infection prevention and control principles for Ebola virus
- Describe infection prevention and control practices currently recommended for Ebola virus
- Describe the principles of using personal protective equipment (PPE) safely in the ETU

This presentation contains materials from CDC, MSF, and WHO

### Routes of Ebola Virus Transmission

- **Established route**
  - Direct contact with blood or other body fluids
  - Eyes or other mucous membranes
  - Breaks in the skin
  - Percutaneous injuries from objects contaminated with infectious materials (e.g., needlestick injury)
- **Possible routes**
  - Sexual contact
  - Breastfeeding
- **No evidence of aerosol transmission**
  - Person-to-person transmission of Ebola virus via inhalation (aerosols) has not been demonstrated
  - Epidemiology is not consistent with aerosol transmission

This presentation contains materials from CDC, MSF, and WHO

3

First, let's review how Ebola virus is transmitted. A primary transmission route is contact transmission. Direct contact means contact with body fluids such as blood, saliva, mucus, vomit, urine, or feces from an infected person, whether alive or dead. This can occur if you touch your eyes, nose, mouth, or abrasion with contaminated hands or other objects. Percutaneous injuries, such as a needlestick, can also transmit the virus.

Sexual contact and breastfeeding may be possible routes for virus transmission.

Ebola can theoretically be transmitted by large droplets generated by coughing, sneezing, or talking. These large droplets may be produced during certain medical procedures, such as resuscitation, suctioning, or bronchoscopy. However, there is no evidence of aerosol transmission (transmission through tiny airborne droplets containing virus that remain suspended in the air for long periods of time, or dust particles containing the virus). Airborne transmission does not fit the epidemiologic pattern seen in this epidemic or other Ebola outbreaks.

By understanding the ways that Ebola virus is transmitted, you will be able to understand why standard, contact, and droplet precautions are recommended.

### Precautions for Managing Ebola Virus Infection Key Elements

- **Standard, contact, and droplet precautions recommended**
  - Hand and respiratory hygiene
  - Personal protective equipment (PPE)
  - Injection and medication safety
  - Appropriate use/cleaning of patient care equipment, instruments, and devices
  - Environmental cleaning
  - Safe management of corpses

This presentation contains materials from CDC, MSF, and WHO

4

The key elements of healthcare precautions that we will discuss today are hand and respiratory hygiene, PPE, and injection and medication safety. However, other infection prevention and control measures are also critically important, including appropriate use and cleaning of patient care equipment, cleaning of the ETU environment, and safe management of corpses. These measures will be discussed in a later lecture.

Standard infection prevention and control principles, similar to those you would routinely follow in a U.S. healthcare setting, are the minimum required in the ETU and in patient intake areas. Triage and rapid isolation of suspected cases are critical to eliminate unprotected contact between patients suspected to have Ebola, staff, and other possibly uninfected persons.

Standard principles you are already familiar with are also used in the ETU:

- ▶ Perform hand hygiene.
- ▶ Use PPE, including gloves, suits, and masks and facial protection (goggles/shields) when you interact with patients suspected to have Ebola.
- ▶ Ensure safe injection practices and safe handling, cleaning, and disinfection of equipment and surfaces.
- ▶ Ensure safe waste management.

For maximum infection prevention and control, placing patients in a single room is optimal. However, in African ETUs, it is far more common to have multiple patients in an open area. If this is the case, then patients suspected to have Ebola and those confirmed to have Ebola should be in separate areas, with beds at least one to two meters, or three to six feet, apart. You will want to restrict movement between the two areas. However, this can be challenging when family cohorts wish to remain together, especially those where young children are involved. And as expected, you will want to use disposable equipment where possible, or disinfect all equipment between patients. You will hear more about ETU setup and design in another lecture.

Hand hygiene cannot be stressed enough. It is a critical component to stop the spread of the Ebola virus disease.

### Principles for Managing Ebola Virus Infection Facilities Where Patients with Ebola Present

- Triage and rapid isolation of suspected cases
- Standard precautions
  - Perform hand hygiene
  - Use of PPE (e.g., gloves, suits, masks)
  - Safe injection practices
  - Safe handling, cleaning and disinfection of equipment and surfaces
  - Ensure safe waste management

This presentation contains materials from CDC, MSF, and WHO

5

### Principles for Managing Ebola Virus Infection Patient Precautions in the ETU

- Place patients in single rooms, if available (if not possible, separate suspected and confirmed patients)
- For cohorts, place patient beds at least one to two meters apart (three to six feet) and arrange to keep this distance between patients
- Limit patient movement and eliminate unprotected contact with non-infected persons (challenging among family cohorts, and with young children)
- Use disposable equipment or dedicated reusable equipment for each patient (clean and disinfect between each patient use)

This presentation contains materials from CDC, MSF, and WHO

6

### Hand Hygiene

This presentation contains materials from CDC, MSF, and WHO

7

### Hand Hygiene Outside the ETU High-risk Zone

- ❑ Regularly wash hands, including before entering and leaving the ETU
- ❑ Soap and water
- ❑ 0.05% chlorine solution
- ❑ Alcohol-based hand rub
- ❑ Contaminated hands are the most common way to transfer contaminated material to mucous membranes (eyes, mouth, nose)



This presentation contains materials from CDC, MSF, and WHO

8

Outside the high-risk zone of the ETU, when hands are ungloved, wash your hands regularly. This includes when entering and leaving the ETU environment. Use soap and water, 0.05% chlorine solution, or an alcohol-based hand rub. Contaminated hands are the most common way to transfer contaminated material to mucous membranes in the eyes, mouth, and nose.

### Hand Hygiene



This presentation contains materials from CDC, MSF, and WHO

9

Handwashing must be very thorough. This slide shows how to perform good hand hygiene and appropriate techniques.

### Hand Hygiene: Gloved Hands in the ETU High-risk Zone

- ❑ Wear double gloves at all times
- ❑ Remove gloves if they become torn or damaged
- ❑ Always perform hand hygiene between patients
- ❑ Perform hand hygiene with first set of gloves still on before donning new gloves

This presentation contains materials from CDC, MSF, and WHO

10

While in the high-risk zone of the ETU, always remember to wear double gloves. Remove any gloves that become torn or damaged. If you suspect you have torn a glove through to skin level, leave the ETU immediately and remove PPE following your ETU's doffing procedures. You can then re-don a new set of PPE following the usual procedures.

Perform hand hygiene with gloves on between patients. Even if your ETU requires you to change your outer gloves between patients, you must perform hand hygiene with the first set of gloves still on before donning the new gloves. You don't want to transfer pathogens between patients, including many other pathogens besides Ebola virus. In the suspect area, note not everyone has EVD, and those who don't are at high risk of acquiring it while in the suspect area. Therefore, healthcare workers must be very careful in practicing hand hygiene between patients.

This slide shows the typical parts of the hands missed due to poor hand hygiene technique. In studies, the black and dark gray areas shown here, including the backs of fingers and hands, are most often missed. Thorough handwashing might seem basic and routine, but it could be a potentially lifesaving step for infection prevention and control. Please pay careful attention to hand hygiene at all times, both inside and outside the ETU.

It is important to note that wearing gloves does not mean you can skip hand hygiene. You must perform hand hygiene after removing your gloves.

Donning and doffing of gloves are important. This slide shows the steps in donning gloves. After removing a glove from the original container, try to touch only the cuff edge of the glove as you put it on. Then use your ungloved hand to take the second glove out of the box. Avoid touching your forearm with your gloved hand by hooking your gloved fingers around the cuff of the second glove, and pulling it onto the second hand. Then put on the second pair of gloves using the same technique. Once you have on gloves, don't touch things not meant to be touched with gloved hands, including your face.

Removing gloves is a critical step in the doffing process. You will be tired and eager to get out of your hot PPE. But you must still pay close attention to removing your gloves to avoid contaminating yourself. Start by pinching one glove at your wrist and peeling it away. Typically, this turns the glove inside out. Hold the glove you removed in your other gloved hand. Slide the fingers of your ungloved hand between glove and wrist; then roll the glove down your hand, folding it into the first glove. Do this gently. Don't snap the gloves off. This can eject droplets of contaminated material onto surfaces or onto you. Discard the gloves safely; then perform hand hygiene. In African ETUs, hand hygiene will often be done with a 0.05% chlorine solution, but soap and water or an alcohol-based hand rub are also effective.

**Hand Hygiene**  
*The Parts Typically Forgotten*

The use of gloves does not replace the need to practice hand hygiene after taking off gloves. Hands must also be washed after removing gloves.

This presentation contains materials from CDC, MSF, and WHO

**How to Don (Put On) Gloves**

This presentation contains materials from CDC, MSF, and WHO

**How to Safely Doff (Remove) Gloves**

This presentation contains materials from CDC, MSF, and WHO

### Personal Protective Equipment (PPE) Principles

This presentation contains materials from CDC, MSF, and WHO

14

Other PPE, in addition to gloves, are essential elements of healthcare precautions in an ETU. PPE will vary depending on the practices of your ETU. However, certain principles are universal.

### Healthcare Worker PPE in the ETU High-risk Zone

□ All persons entering the ETU high-risk zone or in direct contact with patients with suspected or confirmed Ebola should wear :

- 2 pairs gloves
- Disposable fluid-resistant suit or gown
- Waterproof apron
- Face shield or goggles
- Face mask (N95 respirator)
- Hood

Do not touch head near mouth/nose/eyes.



This presentation contains materials from CDC, MSF, and WHO

15

The general infection prevention and control principle for PPE is to cover all mucous membranes and skin. Here is the checklist for PPE you need to be wearing before you start caring for patients who might have Ebola virus disease (EVD). All persons entering the ETU high-risk zone or in direct contact with patients with suspected or confirmed Ebola should wear double gloves, a disposable fluid-resistant suit, and a waterproof apron. The protection of mucous membranes around the face is critically important. ETU workers typically wear a face shield or goggles, a face mask, and a hood for protection. Healthcare workers should also wash hands frequently and not touch their heads near their mouths, noses or eyes.

Although aerosol generating procedures are not common in the ETU, an N95 respirator is typically used. The N95 respirator, in conjunction with a face shield or goggles, the hood and with optional surgical mask, serve to protect skin and mucous membranes from droplet contamination.

### Possible PPE Differences (1 of 3)

- Differences in PPE and protocols depending on the ETU
- Hoods
  - Hood attached to suits
  - Separate hood
- Eye protection
  - Goggles
  - Face shield
- Face mask
  - N95 respirator
  - Surgical mask

This presentation contains materials from CDC, MSF, and WHO

16

There will be differences in PPE and protocols depending on the ETU. For example, the head covering might be a hood attached to a suit, or a separate hood. Eye protection might be goggles or a face shield. The mask used in your ETU might be an N95 respirator or just a surgical mask. As long as mucous membranes are protected, and chances for transfer of virus to your face are minimized, you will greatly reduce your risk of infection, regardless of the equipment you are wearing.

There are at least two types of protective suits commonly used in West Africa. They can be with or without built-in hoods. You might see them referred to by the brand names Tyvek® and Tychem®. Both repel liquids and aerosols. Tychem® is coated to enhance barrier protection against liquids. This makes it hotter to work in, and heat strain is a greater concern. In most suits, you can typically work for less than one hour before heat strain becomes a risk. In some ETUs, gowns may be used in place of suits. In all ETUs, a waterproof apron is used, which might be disposable or reusable.

### Possible PPE Differences (2 of 3)

- ❑ At least two types of protective suits in common use, with or without built-in hoods
  - Both repel liquids and aerosols
  - One type is coated to enhance barrier protection against liquids
    - Heat strain is a greater concern
    - Typically can work <1 hour
- ❑ Gowns may be used in some ETUs in place of suits
- ❑ Apron
  - Disposable
  - Reusable

This presentation contains materials from CDC, MSF, and WHO

17

Use PPE that is standard in the ETU where you work. The PPE used should provide maximum protection for mucous membranes and reduce the chances for getting virus on your skin. Safety is attained through rigorous adherence to systematic infection prevention and control practices. Your goal should be to consistently adhere to the specific detailed steps of PPE donning, and especially doffing, regardless of the style of PPE. Donning should be done with your buddy, the person who will be working in the ETU with you, to ensure you have no exposed skin or PPE tears. Clearly, doffing is a high-risk activity; you should not do it alone. Your ETU should have a doffing coach who directs you as you remove the PPE step by step.

### General PPE Principles

- ❑ Use PPE that is standard in the ETU where you work
- ❑ Safety is attained through
  - Rigorous adherence to systematic infection prevention and control practices
  - Consistent adherence to the specific detailed steps of PPE donning and doffing (regardless of style of PPE)
    - Donning should be done with your buddy and an observer
    - Doffing is a high-risk activity and is done with a doffing coach

This presentation contains materials from CDC, MSF, and WHO

18

As noted before, the primary infection prevention and control principle when donning PPE is to ensure mucous membranes and skin are covered. Remember how many pieces of PPE you need so you always have everything available before donning. Follow the recommended order when donning. This will aid in what is known as muscle memory as well as adherence to the correct PPE. It is also important to have a trained observer to oversee the donning process for all healthcare workers. Ask your buddy to also visually inspect your suit and PPE integrity. And finally, memorize your appearance in the mirror after donning PPE to reinforce adherence to correct practices.

### Principles of Donning PPE

- ❑ The primary infection prevention and control principle is to ensure mucous membranes and skin are covered
- ❑ Remember how many pieces of PPE you need so you always have everything before donning
- ❑ Follow recommended order of donning to aid muscle memory and adherence to the correct PPE, visually inspect PPE components
- ❑ A trained observer should observe the donning process
- ❑ Ask your buddy to visually inspect your suit and PPE integrity
- ❑ Memorize your appearance in the mirror after donning to reinforce adherence

This presentation contains materials from CDC, MSF, and WHO

19

### Principles of Doffing PPE

- ❑ A trained coach should coach you through the doffing process
- ❑ Remove the most contaminated PPE first
  - This is why the apron and the outer gloves are removed first
- ❑ Protect the eyes and mucus membranes
  - This is why you close eyes when removing anything from the head
  - Remove eye protection as late as possible in the doffing process
- ❑ Keep the gloved hands clean so they can remove PPE without spreading contamination
  - This is why the gloved hands are rinsed with 0.5% chlorine solution after each piece of PPE is removed
  - This is why you grasp the back corner of the mask, not the front, to remove it
- ❑ Dirty touches dirty; clean touches clean

This presentation contains materials from CDC, MSF, and WHO

20

Removing, or doffing, PPE is the time when mistakes are easy to make, and they can have severe consequences. Therefore, you should rely on a trained coach to assist you through the doffing process. While you may be hot and eager to remove PPE, it is critical that you carefully remove PPE following directions. Do not rush. The process can take up to 20 minutes.

You will be heavily contaminated when you leave the ETU, even if you have no visible body fluids or blood on your PPE. When doffing, the idea is that dirty surfaces should only touch dirty surfaces, and clean surfaces should only touch other clean surfaces.

Remove the most contaminated PPE first. This is why you should start by removing your apron and outer gloves. Protect your eyes and mucous membranes. Close your eyes when removing anything from your head. Be aware that the doffing sequence may vary based on whether the mask and face shield are worn under the hood (WHO protocol) or placed over the hood (MSF protocol). With the WHO protocol the hood is removed before the mask and face shield; in the MSF protocol the hood is removed after. Keep your gloved hands clean by performing hand hygiene with 0.5% chlorine solution after each step. This helps you remove PPE without spreading contamination. Always use your gloved hands to grasp the back corner of your mask - not the front - to remove it.

### Common PPE Mistakes

- ❑ Healthcare worker (HCW) errors
  - Uncovering wrists with vigorous movement (tall people are particularly prone to this)
  - Adjusting goggles – gloves are contaminated

Removing goggles too early during doffing, risk face contamination

This presentation contains materials from CDC, MSF, and WHO

21

Certain mistakes are easy to make in the ETU. An example is uncovering your wrists with vigorous movement when the suit slides up your wrist. Tall people are particularly prone to this. Adjusting goggles should never be done in the ETU because your gloves will be contaminated. Also removing goggles too early during doffing is a dangerous mistake because you might contaminate your face and mucous membranes.

Other problems can arise from circumstances beyond your control, but you must think before addressing them. Sometimes small flies or bugs come in through holes on the side of the goggles or under the face mask and it's natural to reach for your goggles to deal with this annoyance. Don't do it. Always consider your hands to be contaminated.

Eyeglasses can fall off when removing the goggles. Let them fall, and figure out what to do with the help of your doffing coach. An eyeglass strap can help you avoid pulling your glasses off accidentally.

### Common PPE Hazards

- Situations that can result in hazards for healthcare workers
  - Flies coming in through holes on the side of the goggles
  - Eyeglasses falling off when removing the goggles

This presentation contains materials from CDC, MSF, and WHO

22

We'll now talk about injection safety as an element of healthcare precautions.

### Injection Safety

This presentation contains materials from CDC, MSF, and WHO

23

### Use of Needles and Sharps in the ETU General Rules

- ❑ Handle all needles and sharps with extreme care
- ❑ Dispose in puncture-proof, sealed containers
- ❑ NEVER recap sharps
- ❑ Never direct the point of a used needle toward anyone, including yourself
- ❑ Do not remove used needles from disposable syringes
- ❑ Do not bend, break, or otherwise manipulate used needles by hand
- ❑ Never carry used sharps in your hands
- ❑ Position sharps container at location of procedure

This presentation contains materials from CDC, MSF, and WHO

24

Before talking specifically about phlebotomies, it is important to discuss the extreme care needed while using needles and sharps in the high-risk zone of the ETU.

It is critical to adhere to some general rules.

- ▶ Dispose of used sharps in puncture-proof and sealed containers.
- ▶ Never recap sharps.
- ▶ Never direct the point of a used needle toward anyone, including yourself.
- ▶ Do not remove used needles from disposable syringes.
- ▶ Do not bend, break, or otherwise manipulate used needles by hand.
- ▶ Never carry used sharps in your hands.
- ▶ Position the sharps container near the location of a procedure.

### Preparing to Draw Blood from ETU Patients Key Points

- ❑ Limit phlebotomies to the minimum necessary
- ❑ Ensure all supplies have been gathered and all sample tubes and containers are labeled before entering the high-risk zone
- ❑ Assess safety risk to you vs. patient benefit before attempting a blood draw
  - There are situations when **NOT** to attempt a blood draw  
Example: inadequate PPE available or a combative person
- ❑ Ensure appropriate lighting
- ❑ Two ETU staff are needed: one to perform the procedure, the other to assist in handling the specimen and controlling the patient
- ❑ Establish how the sample will be sent out of the high-risk zone
- ❑ Ensure there is a designated lab ready to receive the specimen and that they are aware that a sample is coming

This presentation contains materials from CDC, MSF, and WHO

25

Understanding the importance of safety measures when handling needles and sharps will help in performing phlebotomies in the ETU.

The first principle of a blood draw in the ETU is to limit phlebotomies to the absolute minimum necessary.

Before entering the high-risk zone to perform a phlebotomy, ensure all supplies have been gathered and all sample tubes and containers are labeled.

Before attempting a blood draw, assess the safety risk to yourself versus the potential benefit to the patient. There are situations when you should not attempt a blood draw - for example, when only inadequate PPE is available, or when the patient is combative.

Be sure you have adequate light. Two staff members are needed for the blood draw. One will perform the procedure, and the other will assist in handling the specimen and controlling the patient.

Also, establish how the sample will be transported out of the high-risk zone. Ensure there is a designated lab ready to receive the specimen and they are aware a sample is coming.

The equipment you will need to have within easy reach includes a sharps container. If there is not one already near the patient's bed, place one there for safety. Have a labeled sample tube, preferably a plastic tube, available. Know the blood sampling system. Note most facilities in West Africa do not have auto-locking IVs or needles. You will need a single-use tourniquet, and a skin antiseptic wipe consisting of either 70% ethanol or iodine. You will also need a gauze pad and adhesive bandage to cover the site after blood is drawn. Have ready a labeled sealable bag and biohazard bag for transport, and a 0.5% chlorine solution sprayer.

### Phlebotomy Supplies Needed at Bedside

1. Sharps container (if not already near patient bed)
2. Labeled sample tube (preferably plastic)
3. Blood sampling system (many facilities in West Africa do not have auto-locking IVs or needles)
4. Tourniquet (single use)
5. Skin antiseptic wipe (70% ethanol or iodine)
6. Gauze pad
7. Adhesive bandage
8. Labeled sealable bag and biohazard bag for transport
9. 0.5% chlorine sprayer (if not already near patient bed)

This presentation contains materials from CDC, MSF, and WHO

26

When preparing to perform a phlebotomy, start by conducting a risk assessment by asking the following questions of yourself and your buddy:

- ▶ Is it safe to draw blood from the patient? (Are they agitated, restless, or combative?)
- ▶ Where is the sharps container located?
- ▶ Where is the handwashing station?
- ▶ What is the protocol for a needlestick injury?

Whenever possible, it is preferable to have the patient sit in a chair for the procedure for safety and to reduce risk of contamination. This is only done if the patient is able to move unassisted or can be moved without risk to the healthcare worker. Sometimes the cots in the ETU are on the floor. The floor or cot could be covered in contaminated materials such as feces, vomit, or blood.

Discuss the procedure with the patient. Then set up the blood draw area so equipment is easily within reach.

### Preparing for a Phlebotomy in the ETU

- Perform a risk assessment
  - Is it safe to draw blood from the patient? (Are they agitated, restless, or combative?)
  - Where is the sharps container located?
  - Where is the handwashing station?
  - What is the protocol for a needlestick injury?
- Discuss the procedure with the patient
- Set up the blood draw area so equipment is easily within reach
  - Place the sharps container directly next to you
  - Instruct your buddy to hold the labeled blood collection tube, 0.5% chlorine spray bottle, and labeled bags

This presentation contains materials from CDC, MSF, and WHO

27

### Performing a Phlebotomy in the ETU

- ❑ Disinfect the area where the needlestick will occur
- ❑ Hold the arm distal to insertion site with one hand and place needle into vein with the other
  - Assure that your hand and your buddy's hands are not near the needle insertion site
- ❑ Ask your buddy to give you the labeled blood collection tube
- ❑ Collect blood in the specimen tube and apply pressure to the site
- ❑ Discard the needle immediately into a sharps container
- ❑ Have your buddy spray the specimen tube with 0.5% chlorine solution and bag specimen, then spray bag
- ❑ Bandage the needle entry site
  - If the patient bleeds profusely, hold pressure for five minutes; then secure the bandage and instruct the patient to hold pressure over the site

This presentation contains materials from CDC, MSF, and WHO

28

To perform a phlebotomy, cleanse the skin where you will be inserting the needle.

Hold the arm distal to the insertion site with one hand and place the needle into the vein with the other. Assure your hand and your buddy's hands are not near the needle insertion site.

Ask your buddy to give you the labeled blood collection tube.

Collect blood in the specimen tube and apply pressure to the site.

Discard the needle immediately into a sharps container. On the next slide we will discuss sharps containers in the ETU. For now, it important to perform the next step in the phlebotomy procedure and have your buddy spray the specimen tube with 0.5% chlorine solution, bag the specimen, then spray the bag.

Bandage the needle entry site. If the patient bleeds profusely, hold pressure for five minutes and then secure the bandage and instruct the patient to keep pressure on the site.

### Sharps Containers in the ETU

- ❑ Used sharps should be immediately placed in designated container
- ❑ Puncture-resistant containers are best but often not available
- ❑ Place containers for sharps as close as possible to where they are used
  - Never carry sharps in your hand, use kidney dish or similar container if used sharps need to be transported
- ❑ Seal puncture-resistant containers with a lid and replace when 3/4 full
- ❑ Ensure the containers are placed in an area that is not easily accessible to visitors, particularly children

This presentation contains materials from CDC, MSF, and WHO

29

Sharps containers in the ETU are also a concern. Used sharps should be immediately placed in a designated container. Puncture-resistant containers are best but often not available. For example, cardboard containers are used in some MSF facilities so the container and waste can be more easily incinerated.

Ensure containers for sharps are placed as close as possible to the immediate area where the objects are being used to limit the distance between use and disposal. Ensure the containers remain upright at all times. If the sharps container is not nearby, place sharps in a kidney dish or similar container to carry to the sharps container. Never carry sharps in your hands. Replace the containers when they are three quarters full, and when appropriate, seal the containers with a lid. Never force additional sharps into the container to make room. Also, never leave sharps on the floor and make sure others don't do it. Sharps on the floor can make you stumble and fall.

Ensure the containers are placed in an area not easily accessible to visitors, particularly children. For example, containers should not be placed on floors, or on the lower shelves in areas where children might have access.

Once the blood specimen is obtained, have your buddy spray the inside and the outside of a sealable labeled bag with 0.5% chlorine solution. Then place the specimen bag into a biohazard bag which is also sprayed. The bag should be transported to the lab using the protocol determined for your ETU. Do not recap needles. Ensure all sharps are in a sharps container, and collect disposable materials and place in a waste container. All healthcare workers involved must wash gloved hands in 0.5% chlorine solution.

In summary, successful infection prevention and control in the ETU requires care, attention to detail and protocol, and cooperation among staff.

The ETU in a resource-limited setting is a higher-risk environment than a U.S. hospital. Infection prevention and control principles must balance best feasible patient care with maintaining healthcare worker safety. All personnel in a single facility should adhere to the same infection prevention and control rules. WHO, MSF, and CDC infection prevention and control guidelines are updated frequently and might differ slightly. But all are based on experience, the clinical care environment, science, and expert opinion.

The key to protecting your health is consistent adherence to infection prevention and control practices and appropriate use of PPE.

Whenever you are in the ETU, carefully observe the actions of other healthcare workers as well as your own, and don't hesitate to bring any actions that increase risk to the attention of your buddy, supervisor, or team.

### Transporting Specimen to the Laboratory and Phlebotomy Clean-up

- ❑ **Bagging the Specimen**
  - Spray the inside and outside of the sealable labeled bag with 0.5% chlorine solution
  - Place the specimen bag into a biohazard bag
  - Transport the bag to the lab using the ETU protocol
- ❑ **Do NOT recap needles**
- ❑ **Ensure all sharps are in a sharps container**
- ❑ **Collect disposable materials and place in a waste container**
- ❑ **All healthcare workers involved must wash gloved hands in 0.5% chlorine solution**

This presentation contains materials from CDC, MSF, and WHO

30

### Summary

- ❑ **The ETU in a resource-limited setting is a higher-risk environment than a United States hospital**
- ❑ **All personnel in a single facility should adhere to the same infection prevention and control practices**
  - WHO, MSF, and CDC infection prevention and control guidelines are updated frequently, and might differ slightly
  - All are based on experience, the clinical care environment, science, and expert opinion
- ❑ **Consistent adherence to infection prevention and control practices and appropriate use of PPE will mitigate risk of HCW infection**

This presentation contains materials from CDC, MSF, and WHO

31

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-4636) TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



# Ebola Treatment Unit

This lecture is on Ebola Treatment Units (ETUs). It will focus on principles of ETU structure and function, and how they work to maximize infection prevention and control, prevent ongoing Ebola transmission, and maintain healthcare worker safety.

It is important to note this talk does not cover everything that is needed to build an ETU. Instead, we will focus today on important points to allow healthcare workers to function safely in the ETU environment.

The learning objectives for this lecture are to:

- ▶ Recognize the ETU's place in the system of safety designed to prevent transmission of Ebola
- ▶ Describe the organization design and operating principles of the ETU
- ▶ Explain staff and patient flow through the ETU
- ▶ Describe infection prevention and control practices in the ETU

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Ebola Treatment Unit

This presentation is current as of December, 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Médécins Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- Recognize the Ebola Treatment Unit's (ETU) place in the system of safety designed to prevent transmission of Ebola
- Describe the organization design and operating principles of the ETU
- Explain staff and patient flow through the ETU
- Describe infection prevention and control practices in the ETU

This presentation contains materials from CDC, MSF, and WHO

2

### Ebola System of Safety

- Personal Protective Equipment (PPE)
- Buddy system
- ETU
  - Structure
  - Infection prevention and control practices and protocols
- External ETU support structure
  - Supply chain
  - Transportation
  - Communication
  - Other needs (e.g., security)

This presentation contains materials from CDC, MSF, and WHO

3

It's important to remember that healthcare worker safety relies on more than just personal protective equipment (PPE).

There are several layers of protection that surround each healthcare worker. Each layer must be functioning correctly to ensure the safety of the healthcare worker. PPE is the layer of safety closest to the worker.

The next layer is the healthcare worker's buddy. Buddies should work with each other at all times. The buddy system provides each ETU healthcare worker with an immediate back-up in case a problem arises while in PPE. The buddy also serves as a second monitor to ensure the healthcare worker doesn't miss signs of impending heat stress, fatigue, or exhaustion.

Then there is the ETU itself. The ETU is physically designed to protect staff and patients, but there are infection prevention and control practices and protocols that must be adhered to as well. We will focus on this system of safety layer in this lecture.

However, there is one more layer in the system of safety outside the ETU. The ETU itself must be supported through

- ▶ A functional supply chain,
- ▶ A transportation system for supplies, staff, and patients, and
- ▶ Good communication with the sponsoring organization, contact tracers, the Ministry of Health, and other healthcare facilities.

There may be other needs as well (for example, security).

## Course Lectures and Scripts > Ebola Treatment Unit

Community acceptance is an essential component of ETU design and one of the many challenges of this epidemic. Although patient isolation is a principle of ETU operation, the term “isolation unit” should be avoided. Instead, use the term “Ebola Treatment Unit” or another term with a more positive connotation.

Additionally, messaging about ETUs should stress these are facilities where good supportive care is provided to patients with Ebola, such as medicine and nutritious food.

Along those lines, it is important to try to keep the ETU clean and comfortable for patients as much as possible and to maintain transparency. For example, most ETUs use low or mesh fences. Visitor access areas should be outside the ETU, but close enough to patient quarters so visitors can talk to patients through these fences.

Patients often feel alone and stigmatized with this disease. Within the ETU, there is no physical contact with uninfected persons and the healthcare workers surrounding them are in high-risk PPE. Therefore, visitors become especially important for patient morale. In addition, visitor areas allow community members to observe the activities within the ETU. This is important to dispel myths and rumors that can impede healthcare worker access to the community.

The ETU is designed to address the mechanism of person-to-person Ebola virus transmission. To review, the Ebola virus is present in high quantities in body fluids of symptomatic patients, such as blood, vomit, diarrhea, and saliva. Transmission occurs through direct contact with these infectious body fluids, through broken skin or unprotected mucous membranes, or through indirect contact which might happen through contaminated objects, like syringes, other medical equipment, and soiled linens.

### ETU Design: Community Acceptance

- Avoid term “isolation unit,” prefer Ebola Treatment Unit
- Deliver good supportive care (e.g., medicine, food)
- Keep environment clean and comfortable
- Maintain transparency
  - Use low or mesh fences
  - Place visitor access areas outside of, but close enough to, the ETU so visitors can talk to patients
    - Improves patient morale
    - Enhances community awareness and helps dispel rumors

This presentation contains materials from CDC, MSF, and WHO

4

### ETU Design: Transmission Principles

- ETU designed to address person-to-person Ebola virus transmission
- Virus presents in high quantities in body fluids of symptomatic patients (blood, vomit, diarrhea, saliva)
- Transmission through contact with infectious body fluids
  - Direct contact through broken skin or unprotected mucous membranes
  - Indirect contact with contaminated objects
    - Syringes
    - Other medical equipment
    - Soiled linens

This presentation contains materials from CDC, MSF, and WHO

5

### ETU Design: Infection Prevention and Control Principles

- ETU infection prevention and control principles
  - Patient isolation
    - Sick patients heavily contaminate their immediate environments
    - ETU admission reduces community transmission and improves survival
- Patient cohort
  - Suspected patients separated from confirmed patients
- Staff and patient flow
- Waste management
- Disinfection protocols
- PPE

This presentation contains materials from CDC, MSF, and WHO

6

There are several ETU infection prevention and control principles used to control person-to-person transmission of Ebola virus within the ETU.

One of those principles is patient isolation. Sick patients with diarrhea or heavy vomiting contaminate their immediate environments, whether they are at home or in the ETU. Therefore, ETU admission not only improves patients' chances of survival, it also reduces community transmission. Once inside the ETU, patients are placed according to risk for transmitting the disease. That is, patients suspected of having Ebola are separated from patients confirmed to have Ebola, and we'll talk more about this later.

Staff and patient flow are also important regimented aspects of a well-functioning ETU, as are waste management and disinfection protocols.

PPE is also an important part of ETU design and operation. Staff need to understand which parts of the ETU pose a risk of exposure to live virus and therefore require high-risk PPE and which do not.

### ETU Risk Areas

- Outside the ETU
- Low-risk zone
- High-risk zone



This presentation contains materials from CDC, MSF, and WHO

7

There are three risk areas to be aware of around the ETU: the area outside the ETU and two zones which make up the ETU -- the low-risk zone and the high-risk zone.

## Course Lectures and Scripts > Ebola Treatment Unit

Before we discuss the ETU, there are several high-risk areas in the community we must not forget. In fact, these areas are just as risky, if not more risky, than the ETU because PPE might not be available. These include:

- ▶ Patients' and deceased patients' houses
- ▶ Locations where corpses are prepared for funeral ceremonies
- ▶ Morgues
- ▶ Medical labs and operating theatres
- ▶ Traditional healer venues
- ▶ Vehicles used to transport patients suspected to have Ebola
- ▶ Hospitals and other healthcare settings with poor infection prevention and control infrastructure
- ▶ Healthcare worker households used for after-hours consultations

Patient triage (or screening) occurs outside the ETU. Triage is the critical point of separating persons suspected of having Ebola from persons without Ebola. Triage is performed either before arrival at the ETU (for example, by contact tracers or at another healthcare facility), or upon arrival at the ETU.

The ETU is designed to have clearly delineated low-risk and high-risk zones with a well-defined unidirectional flow. The ETU itself is surrounded by an outer fence and divided into a low-risk zone and a high-risk zone. Note the high-risk zone is fully contained within the low-risk zone and the high-risk zone is completely surrounded by a double fence (including a border between low- and high-risk zones) or a solid wall. A transparent fence is highly recommended as it demystifies what goes on in the ETU. Each of the two zones has specific facilities and persons allowed access. I will describe each zone in detail in the next several slides.

### Areas at Increased Risk Outside the ETU

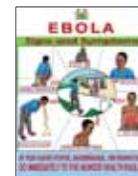
- ❑ Patients' and deceased patients' houses
- ❑ Locations where corpses are prepared for funeral ceremonies
- ❑ Morgues
- ❑ Medical labs and operating theatres
- ❑ Traditional healer venues
- ❑ Vehicles used to transport patients suspected to have Ebola
- ❑ Hospitals and other healthcare settings with poor infection prevention and control infrastructure
- ❑ Healthcare worker households used for after-hours consultations

This presentation contains materials from CDC, MSF, and WHO

8

### ETU Patient Triage (Screening)

- ❑ Triage is the critical point of separating persons suspected to have Ebola from persons without Ebola
- ❑ Triage is performed before or upon arrival at the ETU



From Ministry of Health and Sanitation, Sierra Leone

This presentation contains materials from CDC, MSF, and WHO

9

### ETU High-risk and Low-risk Zones Diagram



10

### ETU Low-risk Zone

- **People allowed—STAFF ONLY**
  - Medical staff, cleaning staff, water/sanitation and logistics staff, etc.
- **Clothing needed**
  - Scrub suits, boots (no gloves in general)
- **Main activities/areas**
  - Staff entry/exit between outside and ETU
  - Changing areas for donning scrubs and/or PPE
  - Staff laundry (scrubs) and drying area
  - Storage (PPE, disinfection and cleaning supplies)
  - Pharmacy
  - Chlorine solution preparation area
  - Staff briefing room/office
- **Contamination potential**
  - If protocols followed, ideally should be none
  - Potential for contamination if uncontrolled movement of contaminated people or material

This presentation contains materials from CDC, MSF, and WHO

11

The low-risk zone is a staff-only area. This includes medical staff, cleaning staff, water and sanitation, and logistics staff. Staff should be in scrubs and boots. In general, gloves are not required but should be used if touching potentially contaminated items like the fencing.

Staff use a dedicated entrance/exit between the outer ETU area and the low-risk zone. There is a changing area to change from street clothes into scrubs and boots and a separate area for donning high-risk PPE. There is also a staff laundry facility for washing and drying scrubs, as well as drying other reusable equipment after decontamination, such as boots, goggles, and heavy-duty rubber gloves. The low-risk zone also has areas for storage, a pharmacy, a chlorine solution preparation area, and a staff briefing room, office, or doctor's room.

If protocols are followed, contamination should be minimal, and ideally none. However, the potential for contamination increases if there is uncontrolled movement of contaminated people or material within the ETU.

### ETU High-risk Zone

- **People allowed—STAFF AND PATIENTS**
  - Only patients and designated staff
- **Clothing needed**
  - High-risk PPE for staff
  - Patients admitted in own clothes
- **Main activities/areas**
  - Care of patients with suspected or confirmed Ebola virus disease
  - Collection and processing of contaminated waste
  - Collection of patient specimens
    - Lab testing may be done inside the ETU or at an outside facility
- **Contamination potential**
  - **Everything contaminated**—Buildings, cots, personal belongings, paperwork, patients, and exposed PPE worn by staff

The high-risk zone is an area inside the low-risk zone (double fence)

This presentation contains materials from CDC, MSF, and WHO

12

Only patients and staff are allowed in the high-risk zone. Staff need to be in high-risk PPE. Patients are admitted to the high-risk zone in their own clothes.

The main function of the high-risk zone is to care for patients who either have or are suspected to have Ebola virus disease. The high-risk zone is also the area of the ETU for collecting, processing, and disposing of waste. Patient specimens are also collected in the high-risk zone. If the lab is located within the ETU, it is located in the high-risk zone. Otherwise, the lab might be located off-site and arrangements will need to be made for transporting specimens to the lab.

Everything in the high-risk zone—walls, floors, cots, personal belongings, paperwork, patients, and outer layer of PPE—should be considered contaminated. For this reason, and to add an extra layer of protection, the high-risk zone is an area fully contained inside the low-risk zone, either by a double fence or a solid wall.

## Course Lectures and Scripts > Ebola Treatment Unit

The high-risk zone itself is divided into two parts: a suspect patient area and a confirmed patient area. Separation of suspected and confirmed cases helps reduce transmission among patients if some of the patients in the suspect area are not true Ebola cases. Therefore, the flow of patients and staff always moves from the suspect area to the confirmed area, NEVER the reverse.

To emphasize the structure and flow of the ETU, we are going to walk through a mock Médecins Sans Frontières (MSF) ETU, first as a staff member, then as a patient. First, let's orient ourselves to this particular ETU.

The black line outlines the double fence surrounding the low-risk zone.

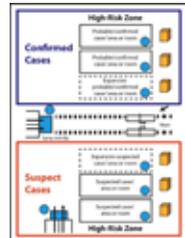
Now the black line demarcates the double fence surrounding the high-risk zone.

### ETU High-risk Zone Patient Wards

- Separation of suspected and confirmed cases to reduce transmission among patients

- Area(s)/room for suspected cases
- Area(s)/room for confirmed cases

Flow always moves from the suspect area to the confirmed area – NEVER the reverse



This presentation contains materials from CDC, MSF, and WHO

13

### MSF ETU



This presentation contains materials from CDC, MSF, and WHO

14

### MSF ETU



This presentation contains materials from CDC, MSF, and WHO

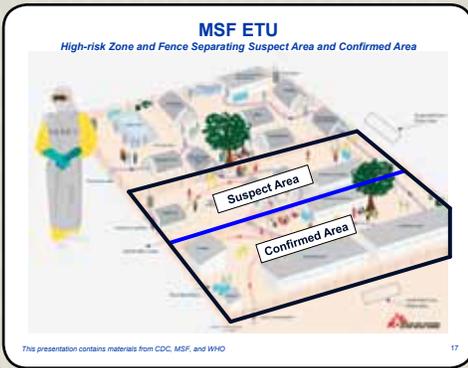
15

### MSF ETU

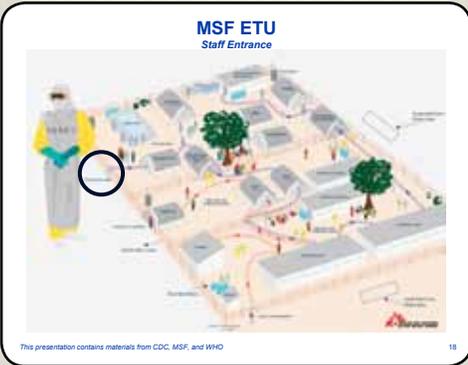


This presentation contains materials from CDC, MSF, and WHO

16



The blue line is on the double fence separating the suspect area from the confirmed area within the high-risk zone.



We will now follow a staff member named Henry who is coming to the ETU for his shift. Henry enters this MSF ETU through the dedicated staff entrance in the low-risk zone, indicated by the black circle. Henry enters the ETU wearing his street clothes.

**MSF Requirements—Entrance to Low-risk Zone**

- Low-risk Zone
  - Spray shoes with 0.5% chlorine solution
  - Perform hand hygiene
  - Change from street clothes into scrubs and boots

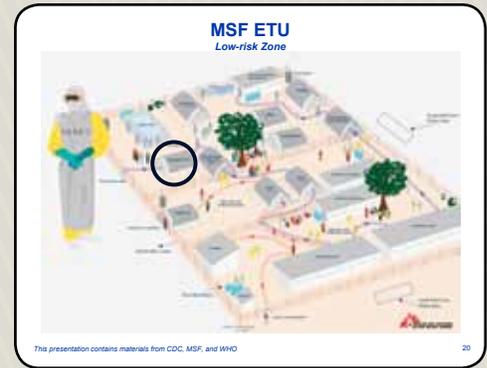


This presentation contains materials from CDC, MSF, and WHO 19

At the entrance to the low-risk zone, Henry's street shoes are sprayed with 0.5% chlorine solution to prevent him from tracking Ebola into the ETU. He also performs hand hygiene at the entrance, either with 0.05% chlorine solution or soap and water. He then enters the low-risk zone of the ETU and proceeds to the changing area.

## Course Lectures and Scripts > Ebola Treatment Unit

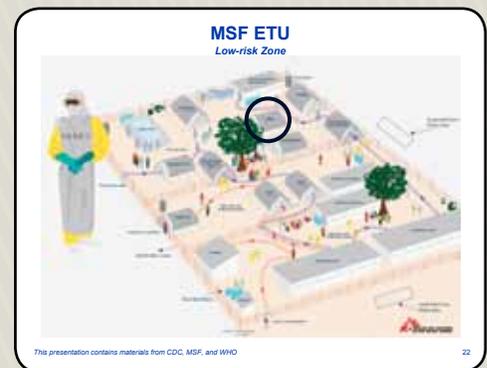
Here we see Henry proceeding to the changing area to change into his scrubs and boots.



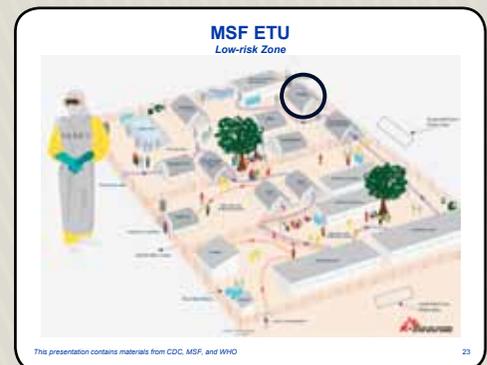
Next, he goes to the meeting tent where he meets up with his buddy and receives his shift briefing. Some of the other areas found in this low-risk zone include:



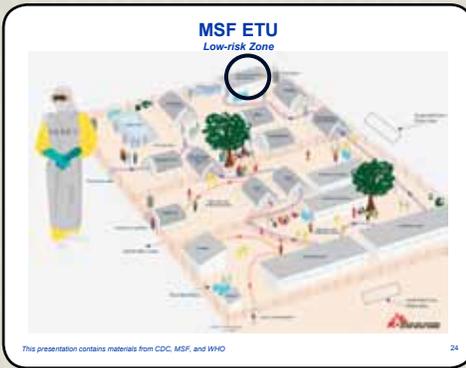
An office



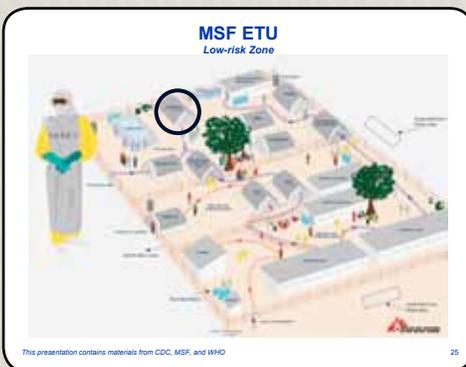
A storage area for medical supplies and PPE



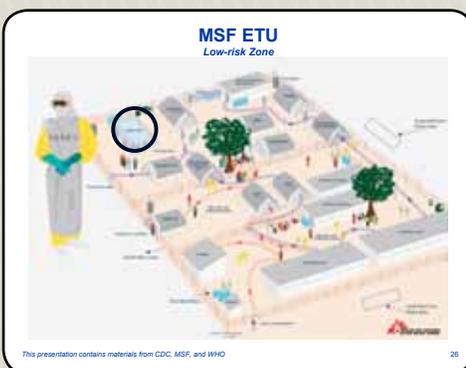
## Course Lectures and Scripts > Ebola Treatment Unit



A staff laundry, where scrubs are washed and dried. Reusable items which have been decontaminated may also be dried here. Chlorine solutions may be prepared in the laundry area or in the pharmacy.



A pharmacy



And a water tank

## Course Lectures and Scripts > Ebola Treatment Unit

After the briefing, Henry and his buddy then proceed to the high-risk zone donning area where they don their PPE.



As an MSF staff member, Henry dons a Tychem® suit, a fluid-resistant apron, two pairs of gloves, a N95 respirator, a hood specially made for MSF, and goggles. Your ETU might use other suit options. As you go through the ETU exercise for this course, you may notice differences in PPE. To emphasize again, the purpose of this course is to teach you infection prevention and control principles. Your ETU protocols are likely to vary some from both this slide and this course.

**MSF Requirements—High-risk Zone PPE**

- ❑ Suit (Tychem®)
- ❑ Apron
- ❑ Two pairs of gloves
- ❑ N95 respirator
- ❑ Hood
- ❑ Goggles

This presentation contains materials from CDC, MSF, and WHO

28

Henry and his buddy then note the time and log into the high-risk zone. It is important to sign in and out of the high-risk zone because it can be easy to lose track of time. For safety reasons, you are limited in the amount of time you are in high-risk PPE. Therefore, it is important to plan your activities before entering the high-risk zone. Also, it's important for the functioning of the ETU to know which staff members are in the high-risk zone at any given time.

**ETU Log of Healthcare Workers Entering High-risk Zone**

Date	Name	Service	Time In	Time Out
11-2-09	Dr. Hoang	Infection Diseases	08:15	11:00
11-2-09	Anna Blandin	Intensive Care	08:00	11:00
11-2-09	Alain Soudani	Infection Care	11:00	14:00
11-2-09	Stella	Cleaning	11:30	12:45
11-2-09	Stefanovic	Family member	11:15	

This presentation contains materials from CDC, MSF, and WHO

29

## Course Lectures and Scripts > Ebola Treatment Unit

### MSF ETU

High-risk Zone – Suspect Area



This presentation contains materials from CDC, MSF, and WHO

30

Henry and his buddy are now in the high-risk zone. Their first task is to take care of patients in the suspect area. Henry and his buddy do not forget to wash their gloved hands with 0.5% chlorine solution in between each patient, especially if they have touched anything. Also, notice Henry's hands. Holding your hands together and in front of you helps reduce contamination.

### MSF ETU

High-risk Zone – Confirmed Area



This presentation contains materials from CDC, MSF, and WHO

31

Henry and his buddy cross the fence separating the suspect and confirmed areas to care for patients with Ebola.

If Henry forgot his patient notes in the suspect area, what would he do? He can't go backwards from the confirmed area to the suspect area because he might contaminate a patient who does not have Ebola (remember that patients in the suspect area are waiting for lab tests and some will not have the virus). A staff member in the suspect area can bring his notes to him (and not return to the suspect area), or he could work from memory.

### MSF ETU

Staff Exit from High-risk Zone



This presentation contains materials from CDC, MSF, and WHO

32

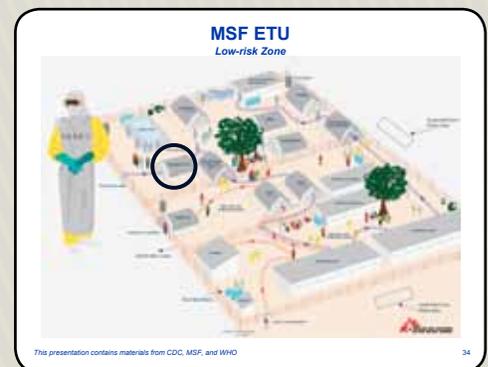
When finished, Henry and his buddy leave the high-risk zone through a staff-only exit. They doff their PPE with a doffing coach and exit back into the low-risk zone.

## Course Lectures and Scripts > Ebola Treatment Unit

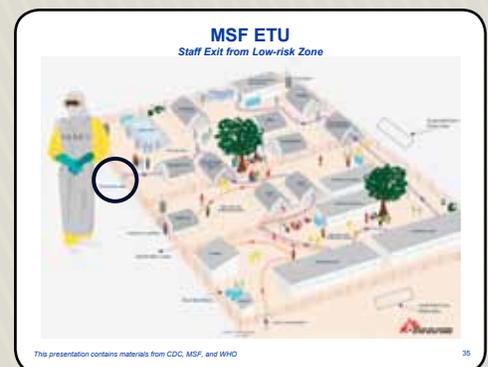
Henry and his buddy then go to the meeting tent to debrief about the shift. They will also drink plenty of water to help compensate for dehydration caused by wearing high-risk PPE.



Henry then changes back into his street clothes.

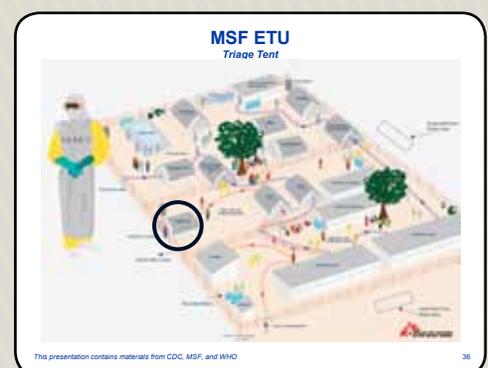


And leaves the ETU by the same way he entered.



Now let's look at patient flow through the ETU.

The black circle shows the patient triage area. If a patient is suspected of having Ebola, that patient enters the ETU directly into the suspect area of the high-risk zone.



## Course Lectures and Scripts > Ebola Treatment Unit

### MSF ETU

Non-case Exit from Suspect Area



This presentation contains materials from CDC, MSF, and WHO

37

If the patient tests negative by RT-PCR AND it's been three or more days since the onset of symptoms, the patient is NOT an Ebola case and needs to be discharged. The patient showers in 0.05% chlorine solution, and receives new clothes and shoes to replace the old clothes and shoes that have been incinerated. The patient then exits from the suspect area through a one-way dedicated patient exit, shown by the black circle.

### MSF ETU

Confirmed Area



This presentation contains materials from CDC, MSF, and WHO

38

If the patient's PCR test is positive for Ebola virus disease, the patient is moved into the confirmed area of the high-risk zone.

### MSF ETU

Exit for Cured Patients



This presentation contains materials from CDC, MSF, and WHO

39

A patient with Ebola who gets better AND tests negative by PCR is discharged through a one-way dedicated patient exit in the confirmed area, shown by the black circle. Before leaving, the patient showers and receives new clothes and shoes. The patient's old clothes and shoes are incinerated.

### MSF ETU

Morgue

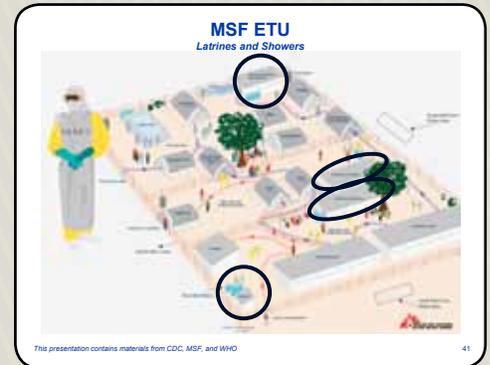


This presentation contains materials from CDC, MSF, and WHO

40

A patient with Ebola who dies is taken to the morgue. The morgue is always in the confirmed area of the high-risk zone and has a protected exit for collection of body bags by burial teams.

Notice the latrines and showers are separated for staff (in the low-risk zone), patients in the suspect and confirmed areas, and cured patients (in the high-risk zone).



As Henry and the patient demonstrated, fences or walls are needed to mark the borders of the different ETU zones. The high-risk zone should be physically separated from the low-risk zone using double fencing or existing walls. Ideally, there should be no solid walls between low and high risk in order to be able to monitor patients in the high-risk zone. Such separation prevents uncontrolled movement between zones.

### ETU Partitions/Physical Barriers

- ❑ Fences or walls mark borders of the ETU zones
- ❑ High-risk zone should be physically separated from low-risk zone using double fencing or existing walls
- ❑ Separation prevents uncontrolled movement between zones



In addition, the separation between zones needs to be well marked and understandable.

### Signage

- ❑ Separation between zones needs to be well marked and understandable



### ETU Entrances and Exits Designed to Isolate High-risk Zone (1 of 2)

#### □ Entering the ETU from outside

- **Suspected cases** enter directly into high-risk zone from triage area through one-way entrance
  - Caregivers accompanying patients are not admitted
  - Persons evaluated and not admitted leave from triage area
- **Staff** enter ETU through low-risk zone using separate staff-only entrance/exit
  - Disinfection on arrival

This presentation contains materials from CDC, MSF, and WHO

44

Entrances and exits need to be separated and controlled in order to isolate the high-risk zone.

Patients and staff enter the ETU from the outside using different routes/zones. Patients with suspected Ebola enter directly into the high-risk zone from the triage area through a one-way entrance. Any caregivers, family, or friends who accompany them are not admitted. Persons who are evaluated by ETU staff, but are determined not to have Ebola (and therefore, not admitted to the ETU), leave from the triage area.

In contrast, staff enter the ETU through the low-risk zone using a separate, staff-only entrance/exit. Staff members undergo disinfection on arrival by washing their hands either with 0.05% chlorine solution or with soap and water, and by spraying their shoes with 0.5% chlorine solution.

### ETU Entrances and Exits Designed to Isolate High-risk Zone (2 of 2)

#### □ Leaving the ETU

- **Discharged patients** leave through dedicated one-way exits
  - Non-cases through suspect area and cured patients through confirmed area
  - Disinfection is done as discharged patient leaves
- **Staff** exit ETU from low-risk zone using separate staff-only entrance/exit
  - Disinfection on departure

This presentation contains materials from CDC, MSF, and WHO

45

Discharged patients leave the ETU through dedicated one-way exits. Patients without Ebola exit through the suspect area after taking chlorine showers and changing into new clothes. Cured patients exit through the confirmed area after undergoing the same decontamination procedure.

Staff exit the ETU to the outside from the low-risk zone. This is a separate staff-only exit, generally the one through which they entered. As staff exit, they also undergo disinfection. They perform hand hygiene and their shoes are sprayed with 0.5% chlorine solution.

### Staff Movement Inside the ETU

#### □ Movement between low-risk zone and high-risk zone

- Only staff enter low-risk zone—no patients or other people
- One-way staff-only passage from low-risk zone to high-risk zone
  - Staff **don** PPE in low-risk zone before moving to high-risk zone
- Separate one-way staff-only passage from high-risk zone back to low-risk zone
  - Staff **doff** PPE before re-entering low-risk zone

#### □ Movement within the high-risk zone

- **Always** move from suspect area → confirmed area
- **Never** move from confirmed area → suspect area

This presentation contains materials from CDC, MSF, and WHO

46

Staff and patient movement inside the ETU is also important to isolate the high-risk zone. Movement always flows from lowest risk to highest risk. Staff members enter the ETU in the low-risk zone, which is a staff-only area. No patients or other people should be in the low-risk zone. There is a one-way staff-only passage from the low-risk zone to the high-risk zone. Staff members don PPE in the low-risk zone before moving into the high-risk zone. Then there is a separate one-way staff-only passage from the high-risk zone back to the low-risk zone. Here, staff members doff their PPE before re-entering the low-risk zone. Within the high-risk zone, movement is also from lower risk to higher risk. Staff always move from the suspect

## Course Lectures and Scripts > Ebola Treatment Unit

area to the confirmed area, never the other way.

Patients also move from lowest risk to highest risk, but their movements are confined to the high-risk zone since no patients are allowed in the low-risk zone. Once admitted to the suspect area, patients move to the confirmed area only if they have a positive lab test for Ebola virus.

Along with the ETU structure and function, ETU disinfection is an important component of the infection prevention and control practices that support the system of safety. There are two different concentrations of chlorine solutions used for different purposes throughout the ETU: 0.5% and 0.05%. The 0.5% chlorine solution is a strong caustic solution. Avoid direct contact with skin and eyes. This chlorine solution should be used to disinfect infectious body fluids, such as vomit, diarrhea, and blood, as well as corpses, toilets, gloved hands, floors, beds, and mattress covers. The 0.05% chlorine solution can be used to disinfect bare hands and other living skin, thermometers and medical equipment, staff laundry (such as scrubs, since 0.5% is very harsh on linens), and plates, cups, and eating utensils used by patients and kept in the high-risk zone.

All waste from the ETU's high-risk zone should be treated as if it is highly contaminated. Waste must be safely collected, handled, transported, and disposed of properly. Staff involved in the management of waste must wear high-risk PPE with additional protection for waste management. Waste can be divided into burnable waste, liquid waste, organic waste, sharps, and waste water.

### Patient Movement Inside the ETU

- All patients confined to high-risk zone
- Patients admitted to suspect area move to confirmed area **ONLY** if they have a positive lab test for Ebola virus

This presentation contains materials from CDC, MSF, and WHO

47

### ETU Disinfection

- Two different chlorine solutions are used for different purposes
- 0.5% chlorine solution

Note: 0.5% chlorine is a strong caustic solution. Avoid direct contact with skin and eyes

- Body fluids, excreta, vomit, etc.
  - Corpses
  - Toilets and bathrooms
  - Gloved hands
  - Floors
  - Beds and mattress covers
- 0.05% chlorine solution
  - Bare hands and other skin
  - Thermometers
  - Staff laundry
  - Plates, cups, eating utensils

This presentation contains materials from CDC, MSF, and WHO

48

### Waste Management

- All waste from the ETU high-risk zone should be treated as if highly contaminated
  - Waste must be safely collected, handled, transported, and disposed of properly
- Staff involved in the management of waste must wear high-risk PPE with additional protection for waste management
- Waste can be divided into burnable waste, liquid waste, organic waste, sharps, and waste water

This presentation contains materials from CDC, MSF, and WHO

49

### Summary

- The ETU main function is to keep high-risk patients and activities in one area
  - High-risk PPE for staff
  - Stringent environmental controls
- ETU staff and patient movements always proceed from lower-risk to higher-risk areas—**Never reverse this flow**
- ETU infection prevention and control practices should be consistent and unvarying regardless of sponsor (e.g., WHO, MSF)

This presentation contains materials from CDC, MSF, and WHO

90

In summary, the main function of the ETU is to keep high-risk patients and activities in one area. The high-risk zone requires special infection prevention and control practices, including high-risk PPE for staff and stringent environmental controls. ETU staff and patient movements always proceed from lower-risk to higher-risk areas—Never reverse this flow. ETU infection prevention and control practices should be consistent and unvarying regardless of the sponsoring organization.

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

Division of the Letters for Licensee and Prevention

# Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management

This lecture is on Ebola virus disease (EVD) and clinical care. It is the second in a three-part series. The lecture will cover Ebola diagnosis and clinical management.

This lecture will specifically focus on EVD in the West African setting. As you will see, there are key differences in screening, diagnosis, and treatment in West African ETUs than what you might encounter in settings in developed countries. For example, in the United States and in other developed countries, there are more aggressive interventions available such as intubation, dialysis, and frequent laboratory testing. You will need additional information in order to care for patients appropriately in countries where more advanced care is available.

The learning objectives for this lecture are to:

- ▶ Describe the diagnostic tests and appropriate samples used to make triage and clinical decisions
- ▶ Describe clinical management of EVD, including treatment of common symptoms
- ▶ Explain criteria for discharge of patients with confirmed and suspected Ebola
- ▶ Describe measures to improve post-discharge outcomes

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Ebola Virus Disease and Clinical Care: Part II: Diagnosis and Clinical Management

This presentation is current as of December 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Médecins Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- Describe the diagnostic tests and appropriate samples used to make triage and clinical decisions
- Describe clinical management of Ebola virus disease (EVD), including treatment of common symptoms
- Explain criteria for discharge of patients with confirmed and suspected Ebola
- Describe measures to improve post-discharge outcomes

This presentation contains materials from CDC, MSF, and WHO

2

Laboratory Diagnosis

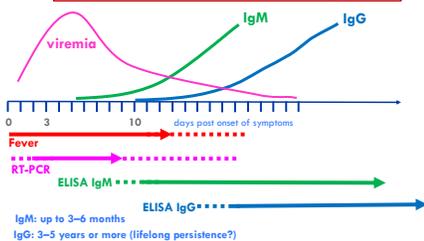
Let's begin by discussing laboratory diagnosis of EVD.

This presentation contains materials from CDC, MSF, and WHO

3

Typical Diagnostic Test Results among Patients Who Recover from Ebola Virus Disease

Critical information: Date of onset of fever/symptoms



This presentation contains materials from CDC, MSF, and WHO

4

This graph depicts the temporal relationships between symptoms, detectable Ebola virus in the blood, and the immune response. The graph illustrates schematically how virus levels and antibody levels change over time in patients who recover. Results for those who die do not look like this. For those patients, Ebola viremia peaks at a higher level and antibody never develops to reach an effective level.

Day zero on this graph is the date of symptom onset, not the date of infection. Viremia increases rapidly and reaches very high levels. This is not well illustrated on this graph because Ebola virus levels will be much higher at the time of the most severe symptoms than at the time when symptoms first occur. IgM antibody levels will not appear for at least seven days after symptom onset. IgG antibody peaks between two and five months after onset.

IgG antibody lasts for at least three to five years and in some people has been detected as long as 11 years post Ebola virus infection. It is believed that immunity after recovery might be lifelong as it is for some other viral illnesses.

How is EVD confirmed with laboratory testing? The current standard to confirm Ebola infection is RT-PCR for detection of Ebola viral RNA. The preferred specimen is blood in a purple-top tube, although a red-top tube can also be used.

Other tests listed on the slide are rarely, if ever, used to make decisions in the ETU. One test is virus isolation. As you can imagine, this type of test requires extreme care and a BSL4 lab.

Immuno-histochemical staining and histopathology can be used to localize Ebola viral antigen in tissue. This might be useful, if available, to test specimens from a patient who died without diagnosis.

An ELISA that detects viral antigen can show the virus is present in blood, serum, or tissue suspensions.

Serologic tests include IgM or IgG and might be used in a patient who survived and is now well but never had RT-PCR testing.

Blood testing is the standard for RT-PCR. This should preferably be venous blood, collected in an ethylenediamine tetraacetic acid (EDTA) Tube (purple-top tube) with anticoagulant. Venous blood in a dry tube (with a red top) without anticoagulant, can be used for RT-PCR or serology. Finger prick or drop of blood might be useful but this is not standardized. It should only be used if a venous blood sample is not available.

Saliva can be tested, but this is not standard practice in ETUs. Oral swabs which collect saliva and cells shed from the gingiva have been used for testing deceased patients who were not tested while alive. Although this has become the standard approach for sampling deceased patients, sensitivity is less than it is for blood, so a negative saliva test is not useful.

In summary, venous blood for RT-PCR is the most important Ebola virus diagnostic test for making decisions about clinical and infection prevention and control.

### How is EVD Confirmed with Laboratory Testing?

- RT-PCR: rapid, provides specific identification of genetic fragments of the virus. **PREFERRED SPECIMEN: BLOOD IN PURPLE-TOP PLASTIC TUBE**
- Current standard to confirm Ebola infection is RT-PCR for detection of Ebola viral RNA
- Other tests—rarely used by ETUs in clinical decisions
  - Virus isolation: requires a Biosafety Level-4 laboratory and can take several days
  - Immuno-histochemical staining and histopathology: localizes viral antigen in tissue, including postmortem
  - Viral antigen ELISA: detects antigen in blood, serum, or tissue suspensions
  - Serologic tests: IgM or IgG



This presentation contains materials from CDC, MSF, and WHO

5

### Patient with Ebola Samples Tested Using RT-PCR

- Blood
  - RT-PCR on venous blood
    - EDTA tube (purple-top, with anticoagulant)
    - Dry tube (red-top, without anticoagulant)
  - Finger prick or drop of blood, only if venous blood sample not available
- Saliva
  - Might encounter, not standard practice in ETUs
  - Saliva has been used for deceased patients who were not previously tested but utility uncertain
  - Sensitivity less than for blood, so a negative test is not useful
- Venous blood for RT-PCR is the most important diagnostic test for clinical and infection prevention and control decision-making

This presentation contains materials from CDC, MSF, and WHO

6

### Blood and Other Samples from Patients with Ebola are **Infectious**

- All blood and other samples from symptomatic patients with Ebola are highly infectious
- Specimens are decontaminated and double bagged for disposal
  - This applies for transport of samples collected in the community, healthcare facilities, and within the ETU

This presentation contains materials from CDC, MSF, and WHO

7

It is important to note blood and other samples from symptomatic patients with Ebola are extremely infectious. Therefore, it is critical to use extreme caution while handling specimens. Specimens must be decontaminated and double bagged for disposal. You will practice the decontamination process during one of the ETU practical exercises. Decontamination and double bagging applies for transport of samples collected in the community, health facilities, and within the ETU.

### Considerations for Test-negative Suspected Ebola Cases

- If symptoms started at least three days before a negative RT-PCR, the patient can be discharged
- RT-PCR tests are often negative in patients with symptoms for fewer than three days (72 hours)
  - Repeat the test at 72 or more hours after onset of symptoms
  - Keep in suspect area until a sample taken 72 hours or more after symptoms began is negative
  - Testing negative does not equal immunity
  - Each new presentation of symptoms must be assessed separately
  - Repeat diagnostic testing when indicated

This presentation contains materials from CDC, MSF, and WHO

8

Let's talk now about specific cases. What happens if you have a patient in the ETU who you thought might have Ebola virus disease but tests negative? We know patients can have a negative test up to three days after symptoms begin, when virus levels are low. If symptoms started at least three days before a negative RT-PCR, the patient can be discharged.

Remember, it is not always easy to elicit an accurate medical history and patients who are afraid may not always be accurate about the onset of symptoms. Therefore, healthcare workers should use the 72-hour cut-off point as a guide. If epidemiologic links or signs and symptoms are suggestive of Ebola for a person who has had one negative test, a second test should be done.

However, what do you do if symptoms have been present less than 72 hours? In this instance, keep the patient in the ETU suspect area, and repeat the test at 72 hours or more after onset of symptoms. Keep the patient in the suspect area until an RT-PCR test is negative. However, testing negative does not equal immunity. Each new presentation must be assessed separately, so don't hesitate to repeat diagnostic testing in a patient who was previously discharged after testing negative.

Now we will discuss clinical management used in ETUs in greater detail.

These two guidebooks are the most common clinical care guides currently in use. The left one is provided by the World Health Organization (WHO) and the right one is from Médecins Sans Frontières (MSF). Much of the material that follows is adapted from these guides.

In West African ETUs, clinical management is predominantly supportive. However, this does not mean it is ineffective. It is clear that aggressive replacement of volume loss from diarrhea, vomiting, and capillary leak/3rd spacing is necessary to improve chances of survival. To minimize risks to staff, some ETUs rely exclusively on oral hydration with oral hydration salt solution (ORS). ORS hydration should be used even if patients do NOT have diarrhea or vomiting to keep ahead of fluid loss. Where available, IV resuscitation with Ringer's lactate, which contains some potassium, is recommended. This is especially important for patients whose illness severity or mental status make ORS insufficient. Healthcare workers should replace potassium and magnesium loss, which are likely to be significant for patients with diarrhea. Replace empirically or, if available, base repletion on lab results. Electrolyte imbalances that can occur with aggressive IV hydration are a concern, but in most ETUs electrolytes cannot be measured.

There are no approved therapies specific for EVD.

### Clinical Management

This presentation contains materials from CDC, MSF, and WHO

9



This presentation contains materials from CDC, MSF, and WHO

10

### Clinical Management Suspected or Confirmed Cases of Ebola

- Clinical management is predominantly supportive
  - Aggressively replace volume loss from diarrhea, vomiting, and capillary leak/3<sup>rd</sup> spacing
  - Oral hydration with ORS (**even if patients do NOT have diarrhea or vomiting**)
  - IV resuscitation with Ringer's lactate (contains some potassium)
  - Replace potassium and magnesium loss, which are likely to be significant for patients with diarrhea
    - Replace empirically, or base repletion on lab results when available
    - Electrolyte imbalances with aggressive IV hydration a concern but usually cannot measure electrolytes
- There are no approved therapies specific for EVD

This presentation contains materials from CDC, MSF, and WHO

11

### Clinical Management

#### Managing the Treatable Manifestations and Complications of EVD

- **Fever and pain**
  - Paracetamol (acetaminophen)
  - Do NOT use NSAIDs (concern for thrombocytopenia, bleeding)
  - Opioids (caution in hypotensive patients; may reduce gut transit in diarrhea)
- **Nausea and vomiting**
  - Promethazine, metoclopramide, ondansetron
- **Diarrhea**
  - Aggressive oral rehydration
  - IV hydration when possible for those unable to take orally
  - Role of anti-motility agents uncertain
- **Dyspepsia**
  - Cimetidine or omeprazole
- **Agitation**
  - Diazepam or haloperidol
- **Malaria (empiric therapy for all, or treat rapid diagnostic test positives)**
- **Bacterial co-infections or gut translocation**
  - Empiric antibiotic therapy aimed at gut pathogens (e.g., cefepime)

This presentation contains materials from CDC, MSF, and WHO

12

The ETU focus is on managing the treatable manifestations and complications of EVD.

Patients can be provided with a variety of treatments aimed at relieving their symptoms. Fever and pain can be reduced by using paracetamol or acetaminophen. Do NOT use nonsteroidal anti-inflammatory drugs (NSAIDs) because of concerns about thrombocytopenia or bleeding. Opioids can be used, but with caution in hypotensive patients. Opioids might also help with diarrhea. Nausea and vomiting might respond to promethazine, metoclopramide, or ondansetron. Diarrhea should be managed as effectively as possible with aggressive oral rehydration and intravenous (IV) hydration when possible for those unable to take hydration orally. The role of anti-motility agents, such as loperamide, is uncertain in EVD treatment. Dyspepsia can be reduced with cimetidine but because of toxicity, use omeprazole, if available. Patients with Ebola can become agitated, and this makes treatment and management in the high-risk zone more difficult. In these situations, diazepam or haloperidol might help.

Many patients will have malaria. Most ETUs either provide empiric malaria therapy for all, or treat based on results from rapid diagnostic tests. Remember, if patients are not empirically treated for malaria, a reoccurrence of fever during hospitalization could represent a bout of malaria.

Patients unable to take oral medications may require IV or intramuscular artesunate. The severe GI tract manifestations might make bacterial co-infections caused by gut translocation more common, and some ETUs provide empiric antibiotic therapy such as cefepime aimed at gut pathogens.

### Clinical Management

#### Nutrition Support for Patients with Ebola

- **Enteral nutrition**
  - Encourage eating as soon as possible
- **Vitamin supplementation**
  - Retinol
  - B vitamin complex
  - Multivitamin

This presentation contains materials from CDC, MSF, and WHO

13

Patients might already be malnourished at baseline. Yet, there are considerable catabolic demands from a severe infection like Ebola virus. As much as possible, encourage patients to eat. Some ETUs supplement food with vitamins such as retinol, B vitamin complex, or just a simple multivitamin.

Pregnant or new mothers are a special situation. Breastfeeding mothers suspected of having Ebola virus disease or those confirmed to have the disease should not have close contact with unaffected infants if safe alternatives exist. If unaffected infants with affected mothers remain in the ETU, the infants (and other children) must be kept in a safe separate area requiring additional staff and logistics to monitor and care for them. These situations also require safe alternatives to breastfeeding. The issue with breast milk is the presence of macrophages, which are often a target of the virus. There are very little data on the risk of transmission from breast milk. However, given what is known about the transmission of Ebola virus, regardless of breastfeeding status, infants whose mothers are infected with EVD are already at high risk of acquiring the virus infection through close contact with the mother, and at high risk of death overall. Until more is known, a mother who survives Ebola should not breastfeed her baby if safe alternatives exist. However, in resource-limited settings where safe alternatives do not exist, breastfeeding may be the only option for providing the nutrition the baby needs.

In pregnant women, vaginal bleeding is a common symptom and often profuse. Mortality is extremely high among these women, who also have high rates of spontaneous abortions and miscarriage. Because of the likelihood of copious contaminated fluids, clear SOPs should be in place on what treatment and infection prevention and control should be used for pregnant women who are miscarrying in the ETU.

### **Clinical Management** ***Special Clinical Situations***

- **Breastfeeding mothers with suspected or confirmed Ebola**
  - Should not have close contact with unaffected infants
  - Require safe alternatives to breastfeeding
- **Pregnant women**
  - Vaginal bleeding is a common symptom and often profuse
  - Mortality is extremely high with high rates of spontaneous abortion, miscarriage

This presentation contains materials from CDC, MSF, and WHO

14

### Clinical Management Psychosocial Concerns for Patients

- Provide care with dignity
- Explain what you are doing and why to your patient and to the patient's family
- Recognize that patient anxiety and fear of death during EVD treatment is magnified by the infection prevention and control measures required
  - Isolation
  - Dehumanizing PPE
  - Reduced or absent communication with family and healthcare worker
  - Healthcare worker can only stay in the high-risk zone for a short period

This presentation contains materials from CDC, MSF, and WHO

15

There are also psychosocial concerns for patients receiving treatment in the ETU. Healthcare workers should do their best to provide care with dignity. Explain what you are doing and why to your patient and to the patient's family. Recognize that patient anxiety during Ebola treatment is magnified by the infection prevention and control measures required.

Anxiety may be caused by

- ▶ Fear of death
- ▶ Isolation
- ▶ Dehumanizing personal protective equipment (PPE)
- ▶ Reduced or absent communication with family and healthcare workers
- ▶ Healthcare workers can only stay in the high-risk zone for a short period

From the patient's point of view, care in the ETU is a completely alien and likely a terrifying experience. In addition to being desperately ill, they are seeing others in the ETU who are even more ill or dying.



This presentation contains materials from CDC, MSF, and WHO

16

In this picture, a young girl is tested for Ebola virus by a healthcare worker in high-risk PPE. You can imagine how scary this might be to anyone, especially a child.

### Patient Discharge

Now we will discuss discharge procedures and issues.

This slide describes the ETU discharge criteria for patients who are suspected to have Ebola. Only a negative RT-PCR test three or more days after symptom onset can be used to make discharge decisions.

If a patient who is suspected to have Ebola but tested negative has had contact with a person with Ebola while in the ETU, as most will, refer the patient to the contact tracing team on discharge. Based on clinical suspicion, do not hesitate to retest patients with suspected cases for Ebola virus even though they previously tested negative.

If the person who has tested negative for Ebola virus still requires ongoing medical care, refer the patient to a local non-ETU healthcare facility. Do not forget subsequent exposures can occur. Testing negative does not equal immunity.

The ETU discharge criteria for patients with Ebola are discussed on this slide. Discharge requires both clinical AND laboratory clearance.

In most ETUs, clinical criteria will include three days WITHOUT symptoms that could indicate ongoing shedding of virus, such as fever, vomiting, diarrhea, or bleeding, AND the ability to perform activities of daily living.

The lab criteria include one negative RT-PCR result for Ebola virus.

### Patient Discharge ETU Discharge Criteria for Patients with Suspected Ebola

- Only a negative test three or more days after symptom onset can be used to make discharge decisions
- If patient suspected of having Ebola who tested negative has had contact with a patient with Ebola while in the ETU, refer case to contact tracing team
- Retest for Ebola virus disease for suspected patients who had previously tested negative based on clinical suspicion
- If the person who has tested negative for Ebola virus disease requires ongoing medical care, refer to a local non-ETU healthcare facility

This presentation contains materials from CDC, MSF, and WHO

18

### Patient Discharge ETU Discharge Criteria for Patients with Confirmed Ebola

- Discharge requires clinical AND laboratory clearance
- **Clinical criteria**
  - Three days WITHOUT symptoms that could indicate ongoing shedding of virus (e.g., fever, vomiting, diarrhea, bleeding)
  - AND ability to perform activities of daily living (ADL)
- **Lab criteria**
  - One negative RT-PCR for Ebola virus

This presentation contains materials from CDC, MSF, and WHO

19

### Patient Discharge *Ebola Virus Shedding after Recovery*

- Viral shedding might persist up to three months in
  - Semen
- Viral shedding might persist for several weeks in
  - Breast milk
  - Vaginal secretions
  - Other body fluids, e.g., urine
- Counsel convalescent patients and provide condoms

This presentation contains materials from CDC, MSF, and WHO

20

The importance of viral shedding after recovery is uncertain.

Shedding of Ebola virus might persist for at least three months in semen, which is an immunologically protected place – antibodies don't penetrate well. Men are advised to use condoms for at least three months after recovery.

Viral shedding into breast milk might also continue after a patient recovers. Some experts have stated it is not likely Ebola virus shedding occurs in breast milk for longer than 1-2 weeks after recovery, although there are very little data to support this. It is generally recommended that lactating patients cease breastfeeding, and some healthcare workers use medications to stop their lactation during their inpatient stay for this reason. There is no current recommendation on when a woman can resume breastfeeding after recovery.

In addition, based again on very small numbers of patients, Ebola RNA has been detected by RT-PCR in vaginal secretions 2-3 weeks after the patient's recovery. Viral shedding in other body fluids such as urine may also persist for some time after recovery. The role of such findings in transmission is not well-established.

### Patient Discharge *Psychosocial Issues For Patients after Discharge*

- Difficulty restarting normal life
  - Loss of family members
  - Unemployment
  - Loss of personal belongings
  - Loss of community
- Stigmatization
  - Persons recovered from Ebola
  - Persons who were suspected of having Ebola but tested negative by RT-PCR

This presentation contains materials from CDC, MSF, and WHO

21

Recovered patients often face substantial psychosocial issues after discharge. Patients might have difficulty restarting normal life, due to:

- ▶ Loss of family members
- ▶ Unemployment
- ▶ Loss of personal belongings
- ▶ Loss of community structure in hard hit areas

Stigmatization by others in the community can occur among those who were ill. Even patients suspected of having Ebola but tested negative by RT-PCR - in other words, were shown not to have Ebola virus infection - have reported stigmatization as well.

When discharging a recovered patient, it is recommended the ETU provide:

- ▶ Disinfection supplies
- ▶ Replacement provisions such as clothing, food, and in some instances money
- ▶ Condoms for three months
- ▶ Vitamin supplements

Discharge planners should discuss with patients why using condoms or sexual abstinence for three months is important.

Patients should also be referred for appropriate follow-up care.

A key point to remember is medical care, nursing care, and psychosocial support increase chances of patient survival and reduce suffering. BUT please minimize your risks as healthcare workers by using PPE properly, and keeping interventions that could result in healthcare worker exposure to the absolute minimum required.

As WHO's motto states "We protect ourselves so that we can save lives."

### Patient Discharge Procedures for Recovered Patients with Ebola

- Provide
  - Disinfection supplies
  - Replacement provisions (e.g., clothing, food, possibly money)
  - Condoms
  - Supply of vitamin supplements
- Discuss why using condoms or abstinence for three months is important
- Refer for follow-up care

This presentation contains materials from CDC, MSF, and WHO

22

Medical care, nursing care, and psychosocial support increase chances of patient survival and reduce suffering

**BUT**

**Minimize Your Risks!**

This presentation contains materials from CDC, MSF, and WHO

23

### Summary

- ❑ RT-PCR testing of venous blood is used to make key admission and discharge decisions
- ❑ Accurate case identification is essential for patient isolation and treatment
- ❑ Clinical treatment is supportive, including aggressive rehydration necessary for most patients
- ❑ Nutrition and psychosocial support are important during hospitalization and after discharge
- ❑ Healthcare workers can provide clinical care that relieves some symptoms, but must minimize risk to self and other personnel

This presentation contains materials from CDC, MSF, and WHO

24

In summary:

- ▶ RT-PCR testing of venous blood for Ebola virus is used to make key admission and discharge decisions.
- ▶ Accurate case identification is essential for patient isolation and treatment.
- ▶ Clinical treatment is supportive, including aggressive rehydration necessary for most patients.
- ▶ Nutrition and psychosocial support are important during hospitalization and after discharge.
- ▶ Healthcare workers can provide clinical care that relieves some symptoms, but must minimize risk to self and other personnel.

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

# Disinfection and Waste Management in the ETU

This lecture is on disinfection and waste management in the ETU.

The learning objectives for this lecture are to:

- ▶ Identify how and when to use chlorine solution and the correct strengths for different uses
- ▶ Identify proper ways to dispose of various wastes
- ▶ Describe procedures for disinfection in the ETU
- ▶ Describe safe handling, moving, and burial of a corpse

To provide maximum safety in the ETU, it is important for all healthcare workers to understand the procedures for ETU disinfection, infection prevention and control, and sanitation described in this lecture.

ETU disinfection practices are influenced by two properties of the Ebola virus.

First, patients with Ebola shed large quantities of virus in blood and body fluids. Second, the Ebola virus has a lipid or fatty envelope so it is relatively fragile and easy to inactivate. Chlorine disinfection, heat, direct ultraviolet sunlight, and certain cleaning products all destroy the lipid envelope, thereby killing the virus.

Proper use of chlorine solutions can effectively kill the Ebola virus. Consequently, in this epidemic, chlorine is your friend.

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Disinfection and Waste Management in the ETU

This presentation is current as of December, 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Médecins Sans Frontières (MSF), and World Health Organization (WHO).

version 12.03.2014

### Learning Objectives

- ❑ Identify how and when to use chlorine solution and the correct strengths for different uses
- ❑ Identify proper ways to dispose of various wastes
- ❑ Describe procedures for disinfection in the ETU
- ❑ Describe safe handling, moving, and burial of a corpse

This presentation contains materials from CDC, MSF, and WHO

2

### Disinfection in the ETU Considerations

- ❑ Healthcare workers should understand sanitation procedures even if they may not perform all of them
- ❑ Patients shed large quantities of virus in blood and body fluids
- ❑ Ebola virus has a lipid envelope, making it relatively easy to inactivate
- ❑ Chlorine is your friend

This presentation contains materials from CDC, MSF, and WHO

3

### Chlorine Solutions Standard Disinfectant in the ETU

- How can the proper use of chlorine solutions help protect me?
  - Chlorine can inactivate the virus on personal protective equipment (PPE) or other surfaces, reducing the risk of healthcare worker infection
- How should those concentrations be made?
  - Clean water is used to dissolve powdered or tablet chlorine or to dilute liquid bleach in specified concentrations
  - Label solutions accordingly

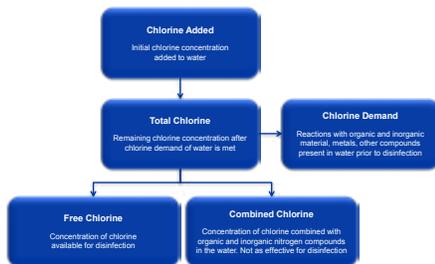
This presentation contains materials from CDC, MSF, and WHO

4

Because chlorine is a critical component to stop the spread of the Ebola virus, we will spend some time talking about the effectiveness and use of chlorine solutions within the ETU. How can the proper use of chlorine solutions help protect you? Chlorine can inactivate the virus on personal protective equipment (PPE) as well as viral contamination on other surfaces.

How should those concentrations of chlorine solutions be made? Clean water, defined here as clear, colorless non-turbid water, is used to dissolve powdered or tablet chlorine formulations or to dilute liquid bleach. Once made, chlorine solutions should be labeled accordingly to indicate their concentration levels.

### Free Chlorine Provides the Disinfection Action



This presentation contains materials from CDC, MSF, and WHO

5

The amount of free chlorine in the solution provides the disinfection action. This amount may differ from the amount of chlorine initially added to the water.

Clean, non-turbid water is important for free chlorine levels. Chlorine is an equal-opportunity disinfectant. In addition to reacting with Ebola virus and other pathogens, it also reacts with other compounds such as inorganic materials or metals that may be present in the water. Therefore, if the water is dirty or contains a lot of these dissolved materials, some of the chlorine will be used up in reacting with these substances. This results in what is called combined chlorine. Combined chlorine is not effective in disinfecting Ebola virus. Only the uncombined or free chlorine provides the disinfection action against the virus. Therefore, the cleaner the water, the more free chlorine will be available and this results in greater disinfecting power.

There are three basic forms of chlorine to make chlorine solutions for use in the ETU.

- ▶ Bleach, or sodium hypochlorite, is the formulation we are all familiar with. However, bleach may often be unavailable in West Africa. It is expensive to locally manufacture or import due to weight. It is usually sold as a solution between 2 and 8% and often the real concentration is lower than labeled.
- ▶ Calcium hypochlorite, also known as high-test hypochlorite or “HTH” is typically available in a powdered form and, in the United States, is commonly used to treat swimming pools. It is considered to be a relatively stable formulation of chlorine. However, experience has shown this product may be difficult to dissolve completely. This can lead to saturated concentrations of chlorine in the bottom of the vessel.
- ▶ Sodium dichloro-isocyanurate is more familiar to us as drinking water purification tablets. These come in various strengths. Sodium dichloro-isocyanurate (NaDCC) is also available in powdered form.

It is important to note all chlorine products will degrade over time, especially if not stored correctly. As a result, manufacturers’ labels may not accurately reflect the current strength of the product. Therefore, the product strength should be tested regularly.

There are two concentrations of chlorine solutions used in the ETU: 0.5% and 0.05%.

0.5% is used to disinfect most non-living items, including corpses, contaminated surfaces, infectious body fluids (such as vomit, diarrhea, and blood), and gloved hands.

0.05% is used to disinfect living tissue and other chlorine-sensitive materials. These include all living skin, including bare hands, face, and other exposed skin, staff linens (mainly scrubs), thermometers, and eating utensils used by patients and left in the high-risk zone for re-use.

### Commercially Available Chlorine Products Used to Make Chlorine Solutions in the ETU

- Bleach, sodium hypochlorite (NaClO)
  - Often unavailable in West Africa
  - Usually sold as a diluted solution between 2–8%
- Calcium hypochlorite  $\text{Ca}(\text{ClO})_2$  or “HTH”
  - Typically in powder form
  - Considered to be relatively stable
- Purification tablets, sodium dichloro-isocyanurate (NaDCC)
  - Tablets can come in varying strengths



NOTE: All chlorine products will degrade over time, and manufacturer's label may not accurately reflect strength of product—strength of products should be tested regularly.

This presentation contains materials from CDC, MSF, and WHO

6

### Chlorine Solutions Concentrations of Chlorine Solutions

- Concentrations of chlorine solutions in the ETU
  - 0.5% - most non-living items
    - Corpses, surfaces, vomit, diarrhea, blood, gloved hands
  - 0.05% - living tissue and sensitive materials
    - Bare hands, face, and other exposed skin, linens (scrubs), thermometers, plates/cups/eating utensils used by patients and remaining in high-risk zone



Photo credit: NPR.org (September 2014)

This presentation contains materials from CDC, MSF, and WHO

7

### Chlorine Solutions Limitations of Disinfection in the ETU

- Proper use of chlorine solutions can kill (inactivate) Ebola virus
- Limitations
  - Chlorine solutions will be much less effective on grossly contaminated surfaces
    - Organic material must be reduced to improve disinfection effectiveness
  - Strength of chlorine solutions can degrade over time, especially in hot climates
    - Use fresh chlorine products to make dilutions, i.e. <3 months old (bleach, HTH, tablets)
    - Properly store chlorine (no heat, light, humidity)
    - Test locally acquired products or use verified imported products
    - Prepare diluted chlorine solutions daily
    - Label all chlorine solutions with strength of solution (0.5%, 0.05%)

This presentation contains materials from CDC, MSF, and WHO

8

While proper use of chlorine solutions can effectively kill the Ebola virus, there are important limitations that influence the procedures for chlorine use.

Chlorine will be much less effective on grossly contaminated surfaces, such as those soiled with vomit or diarrhea. This is a similar process to organic matter in the water reacting with chlorine solution to reduce its disinfection power. Therefore, organic material must be reduced or even removed to improve disinfection effectiveness. Using more of the chlorine solution will not help if substantial biomass is present. For chlorine to properly disinfect, it needs direct contact with the virus.

The strength of chlorine solutions can also degrade over time, especially in hot climates. To assure maximum effectiveness, use chlorine products less than three months old to make solutions. Chlorine must be stored properly (no heat, light, humidity, in an air tight plastic container) to maximize shelf life.

Test locally acquired products or use verified imported products. There are a variety of test strips or chlorometer test kits that will measure chlorine solutions. Each day, discard old diluted chlorine solutions and prepare fresh solutions. Do not expose the solutions to direct sunlight. Solutions that are exposed to sunlight or become cloudy may need to be changed or replaced more frequently. Don't forget to label all chlorine solutions with the strength of solution to prevent errors in use.

Chlorine is a common and familiar chemical and is widely used in healthcare and domestic settings. However, safety is a consideration when preparing and using chlorine solutions. The higher concentration levels used in the ETU are caustic to skin and dangerous if they come in contact with the eyes.

By way of comparison, a well-maintained swimming pool usually has a chlorine level of 1-3 parts-per-million. The 0.05% chlorine solution has 500 parts-per-million of chlorine, which is more than 100 times that of a swimming pool. The 0.5% chlorine solution is 1,000 times more concentrated than the chlorine in a swimming pool.

Allergic or toxic reactions to chlorine-containing cleaning products, while uncommon, are more often seen when using the high concentration needed for disinfection in the ETU. Allergic contact dermatitis results in skin irritation. Chlorine is a strong airway irritant, particularly in high concentrations, and can cause inhalation reactions. This can be a problem for the healthcare workers preparing the chlorine solutions when they open the chlorine powder buckets or bleach bottles, releasing plumes of dust or fumes of chlorine. However, this type of airway irritation is different from an immune-mediated allergic reaction, which is quite rare. Workers preparing chlorine solutions must use appropriate respiratory and contact protection, such as goggles, respirators, and gloves. Do not mix different cleaning products such as ammonia, and chlorine or HTH and NaDCC powders.

With an understanding of the importance of chlorine solutions in the ETU, we will now discuss specific disinfection procedures for infection prevention and control inside the ETU.

### Chlorine Solutions Toxicity Information

- Widely used in healthcare and domestic settings
- Use with caution at higher concentrations (0.5%)
  - Caustic to skin
  - Dangerous for eyes
- Allergic or toxic reactions to chlorine-containing cleaning products uncommon
  - Allergic contact dermatitis - skin irritation and damage
  - Inhalation reactions - airway irritation, sometimes strong reaction particularly in high concentrations
  - Hypersensitivity - true allergic reaction rare
  - Use appropriate respiratory and contact protection (goggles, respirators, and gloves)

This presentation contains materials from CDC, MSF, and WHO

9

### Procedures for Cleaning and Disinfection

This presentation contains materials from CDC, MSF, and WHO

10

### Cleaning and Disinfection Disinfect Gloved Hands

- ❑ Policies on changing outer gloves between each patient vary between ETUs
- ❑ If not changing gloves between patients, disinfect gloved hands
  - Wash gloved hands in 0.5% chlorine solution
  - Gloves exposed to 0.5% chlorine solution can be damaged over time
    - Gloves should be regularly checked for damage
    - Staff should leave the high-risk zone if gloves are damaged (including broken or sticky gloves)

This presentation contains materials from CDC, MSF, and WHO

11

Clean gloves are essential to ETU infection prevention and control. However, the policies regarding changing outer gloves between each patient encounter vary between ETUs.

Those ETUs that do not require outer glove changing between patients do require disinfection of gloved hands between patients. This requires vigorous hand hygiene. The outer gloves need to be washed in 0.5% chlorine solution. However, over time, the concentration of chlorine can damage the gloves. Gloves should be regularly checked for tears or other damage or to assess whether the gloves start to feel sticky. Staff should immediately leave the high-risk zone and doff if their gloves are damaged.

### Cleaning and Disinfection ETU Surfaces

- ❑ Use 0.5% chlorine solution prepared at least daily
- ❑ Change solution and clean equipment regularly
- ❑ Start in “clean” areas and move toward “dirty” areas
- ❑ Clean and disinfect floors and horizontal work surfaces at least daily
- ❑ **DO NOT** dry sweep or wipe with a broom or dry cloth
- ❑ **DO NOT** spray disinfectant into the air (i.e., “fog”) in occupied or unoccupied clinical areas
  - Not effective
  - Possibly harmful

This presentation contains materials from CDC, MSF, and WHO

12

All ETU surface areas must remain clean.

- ▶ Use 0.5% chlorine solution and other cleaning solutions that have been prepared the same day.
- ▶ Solution remaining at the end of the day should be discarded. Also, chlorine solutions are inactivated by the presence of organic material. Therefore, the chlorine solution should be discarded if it appears cloudy or has visible organic material in it. Any re-usable cleaning equipment should be changed and disinfected regularly as well.
- ▶ Remember to always start in the cleanest area and move toward the dirtiest part.
- ▶ Clean and disinfect floors and horizontal work surfaces at least daily.
- ▶ Do not dry sweep or wipe with a broom or dry cloth. This could kick up particles and spread infectious materials.
- ▶ Similarly, do not spray disinfectant into the air, either in occupied or unoccupied rooms. Ebola virus is not spread by airborne transmission so spray disinfectant is not effective and it is possibly harmful.

Body fluid spills in the ETU, such as vomit, diarrhea, blood, and urine, are considered highly infectious. ALWAYS wear high-risk PPE when cleaning body spills and begin disinfection immediately after the spill occurs.

- ▶ First, spray one or more disposable absorbent pads with 0.5% chlorine solution and place the pads over the spill. Then use the pads to remove the solid organic material. However, do not wipe the surface with these pads. Double bag the pads and organic waste for disposal.
- ▶ Repeat this step as needed until the organic material is fully removed.
- ▶ Spray or pour 0.5% chlorine solution on the spill area. Be careful to avoid splashing. Let it stand for 15 minutes.
- ▶ Use disposable absorbent pads to soak up any remaining chlorine solution; then double bag the pads for disposal.

When cleaning body spills, use materials and equipment that are either disposable or can be fully disinfected.

Disinfection practices for linens and scrubs will vary. Follow the guidelines of your ETU regarding linen disposal. In linens and clothes from patients with Ebola are incinerated. Staff scrubs are generally washed in 0.05% chlorine solution followed by soap and water.

Next, we will talk about waste management.

### Cleaning and Disinfection Spills in the ETU

- ❑ ALWAYS wear high-risk PPE when cleaning body spills
- ❑ Begin disinfection of body spills (vomit, diarrhea, blood, urine) immediately
  1. Spray a disposable absorbent pad with 0.5% chlorine solution and use it to remove solid organic material → double bag pads and organic waste for disposal
  2. Repeat as needed until organic material is fully removed
  3. Spray or pour 0.5% chlorine solution on body spill area, avoid splashing → let stand 15 minutes
  4. Use disposable absorbent pads to soak up remaining chlorine solution → double bag pads for disposal
- ❑ Use materials and equipment that are disposable or can be fully disinfected

This presentation contains materials from CDC, MSF, and WHO

13

### Cleaning and Disinfection Washing Linens and Scrubs in the ETU

- ❑ Follow guidelines of your ETU regarding linen disposal
- ❑ In practice, linens and clothes from patients with Ebola are usually incinerated
- ❑ Staff linen (scrubs) are generally washed in 0.05% chlorine solution followed by soap and water

This presentation contains materials from CDC, MSF, and WHO

14

### Waste Management

This presentation contains materials from CDC, MSF, and WHO

15

### Waste Management in the ETU Containers and Bags

- Sharps containers
  - Leak-proof and puncture-resistant sharps container
    - Recommended but not always available
  - Dispose in sharps pit when full
- Leak-proof biohazard bags
  - Double bag waste (e.g., sealable plastic bag)
    - Spray each bag with 0.5% chlorine solution
  - Incinerate bags
- Trash cans for solid waste
  - Disinfect trash cans after emptying
- Buckets for liquid waste
  - Disinfect buckets after emptying into latrine



This presentation contains materials from CDC, MSF, and WHO

16

Multiple types of containers are used to contain and dispose of the different types of waste generated in the ETU.

Sharps containers ideally should be leak-proof and puncture-resistant, but these are not always available. Médecins Sans Frontières (MSF) uses World Health Organization-approved cardboard safety boxes so the containers can be incinerated. However, the heavy use of chlorine spray and the wet atmosphere inside the ETU make it likely the cardboard can get wet and break, so it should be placed inside a plastic bucket. Sharps containers should be disposed of in a sharps pit. Be sure to dispose of sharps containers before they are filled to the top so they do not become safety hazards. Sharps containers should be readily available and easily identifiable in the ETU. If commercial sharps containers are not available, improvised containers can be made with puncture-resistant materials such as drums or paint cans. Follow the protocol of your ETU for guidance about sharps container disposal.

Most other waste is double-bagged in leak-proof biohazard bags. If possible, the inner bag should be a sealable bag, (such as Ziploc® brand) if available. The MSF protocol is to spray the inside and outside of each bag with 0.5% chlorine solution. Bags of infectious waste are incinerated.

There are also trash cans inside the ETU for solid waste. These trash cans should stay inside the ETU and should be disinfected after emptying. The bins should be lined with plastic bags to avoid requiring additional handling of the waste. The waste should be double bagged as just described.

Buckets are provided for liquid waste. The buckets should be disinfected with 0.5% chlorine solution after liquid waste is emptied into the latrine or a dedicated pit. The chlorine solution used to disinfect the buckets should also be dumped the same way.

Staff must wear high-risk PPE to dispose of organic waste from patients with Ebola.

Body spills and the materials used to clean the spills should be double bagged and incinerated.

Wastewater and human waste are disposed of in an isolated latrine or toilet designated for waste contaminated with Ebola virus.

Reusable containers, such as bedpans and buckets, should be disinfected with 0.5% chlorine solution.

### Waste Management in the ETU Organic Waste from Patients with Ebola

- Must wear high-risk PPE
- Disposing of material from body spills
  - Body fluid spill (vomit, excrement, mucus, blood) and materials used to clean spill should be incinerated
- Disposing of wastewater/human waste
  - Use isolated latrine or toilet designated for waste contaminated with Ebola virus
- Disinfect reusable containers (e.g., bedpan, bucket) with 0.5% chlorine solution

This presentation contains materials from CDC, MSF, and WHO

17

Patient transport is not directly related to disinfection and waste management practices within the ETU. However, patient transport raises contamination and infection prevention and control issues. Proper patient transport procedures reduce contamination risks.

### Transporting a Patient into the ETU

This presentation contains materials from CDC, MSF, and WHO

18

### Transporting a Patient into the ETU

- ❑ Don high-risk PPE in preparation for moving the patient
- ❑ Assess the situation before moving the patient
- ❑ Assist the patient in descending from the vehicle, taking into account patients are often extremely weak
- ❑ If the patient cannot walk, then the patient will need to be moved by stretcher
  - Four staff members should move a patient (one person at each corner of the stretcher)
  - Avoid turning your back to the stretcher

This presentation contains materials from CDC, MSF, and WHO

19

When transporting a patient suspected to have Ebola to the ETU, certain steps and precautions must be taken.

- ▶ First, don high-risk PPE in preparation for moving the patient.
- ▶ Next, assess the situation before moving the patient. Is it safe for you to move the patient at this time? What additional equipment do you need? Where are you moving the patient to and is there room for the patient?
- ▶ Finally, assist the patient. For example, the patient may need help in descending from the vehicle. Patients are often extremely weak. If possible, patients should be encouraged to move to the edge of the vehicle so you can help them safely exit. This reduces exposure to less protected parts of your PPE.

If the patient cannot walk, then the patient will need to be moved by stretcher. Four staff members should move a patient by stretcher, with a person at each corner. Keep your apron to the stretcher. If you are one of the people at the front, this may mean walking to the side of the stretcher rather than in front of it. Although turning your back to the stretcher poses a risk because this is the least protected part of your PPE, this is preferable to trying to walk backwards which presents a significant fall risk.

### Assisting Patient on Arrival at ETU



Assisting patient on arrival at ETU  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

20

Here is a photo of a staff member in high-risk PPE helping a patient out of the back of a pick-up truck. Notice she is sitting on the tailgate first before stepping down to make it easier for the healthcare worker to assist her.

Here is another photo of two staff members assisting a patient out of the back of a vehicle.

### Transporting a Patient



Assisting patient on arrival at ETU  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

21

Because of the extremely high viral load in a corpse, managing human remains safely in the ETU requires special attention to disinfection and sanitation practices.

### Management of Human Remains in the ETU

This presentation contains materials from CDC, MSF, and WHO

22

The following protocol describes steps common to many ETUs for transporting a corpse from the ETU to the morgue. Remember it is important to handle the corpse as little as possible and to wash gloved hands between every step:

1. First, label an empty body bag with the patient's name and ID number and don high-risk PPE before entering the high-risk zone.
2. Assess the situation. Confirm that the patient is deceased. Also make sure there are no obstacles in your way so you can safely transport the corpse.
3. Put a screen around the bed of the deceased patient for privacy.
4. Spray the area around the corpse with 0.5% chlorine solution.
5. Cover the corpse with a sheet, if one is available, and this has not already been done.
6. Saturate the sheet and all exposed parts of the corpse with 0.5% chlorine solution.

### Transporting a Corpse (1 of 2)

To safely remove a corpse, the following steps should be followed:

1. Label an empty body bag with patient's name and ID number and don high-risk PPE before entering the high-risk zone
2. Assess the situation, confirm the patient is deceased and no obstacles are in your way for safe transport of the corpse
3. Put a screen around the bed of the deceased for privacy
4. Spray a cleared area on the floor next to the corpse with 0.5% chlorine solution
5. Cover the corpse with a sheet, if available
6. Saturate the sheet and all exposed parts of the corpse with 0.5% chlorine solution

This presentation contains materials from CDC, MSF, and WHO

23

### Transporting a Corpse (2 of 2)

7. Place the body bag on the floor or a stretcher with the flap opening away from the bed
8. Pour/spray 0.5% chlorine solution into the inside of the empty body bag
9. Place disposable absorbent pads inside the body bag and spray them with 0.5% chlorine solution
10. Place the corpse along with all soiled materials (clothing, linens) inside the body bag
11. Spray the corpse inside the body bag
12. Zip the body bag closed with both zippers at the head
13. Spray the outside of the body bag
14. Transport the body bag to the morgue in the high-risk zone

This presentation contains materials from CDC, MSF, and WHO

24

7. Place the body bag on the pre-sprayed floor or on a pre-sprayed stretcher with the flap opening away from the bed.
8. Pour or spray 0.5% chlorine solution into the inside of the empty body bag.
9. Place disposable absorbent pads inside the body bag and spray them with 0.5% chlorine solution. The absorbent pads are added to absorb body fluid released during decomposition.
10. Place the corpse along with all soiled materials, such as clothing and linens, inside the body bag away from the decedent's face as the body might be shown to the family before burial.
11. Spray the corpse inside the body bag.
12. Zip the body bag closed, both zippers closed at the head.
13. Spray the outside of the body bag with 0.5% chlorine solution taking care to spray the handles and the zipper.
14. Finally, transport the body bag to the morgue in the high-risk zone.

### Transporting a Corpse Potential Risk



Assisting patient on arrival at ETU  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

25

This is a photo of ETU staff transporting a corpse. Do you notice anything wrong with this picture? The lead staff member is walking with his back towards the stretcher, exposing the least-protected part of his PPE to a potentially highly contaminated body bag.

To make this a safer transport with three people, you should have two people in front, each holding the stretcher pulled to their sides, and one person in back moving forward.

Family members may want to see the deceased. Having the zipper at the head will allow staff easy access to the face to facilitate viewing of the corpse.

In summary:

- ▶ All patients, corpses, body fluids, and surfaces inside the high-risk zone are considered contaminated.
- ▶ Chlorine solutions are the best option for effective disinfection inside the ETU.
- ▶ There are two chlorine concentrations to remember:
  - 0.5% for non-living items, such as corpses, gloved hands, surfaces, vomit, feces, and blood.
  - 0.05% for living tissue such as skin, including hands. This concentration is also for scrubs and sensitive medical equipment like thermometers.
- ▶ Remember to disinfect body spills immediately. These include vomit, blood, feces, and urine.
- ▶ Transport patients into the ETU with careful attention to infection prevention and control measures.
- ▶ Deceased patients with Ebola remains must be handled carefully but respectfully.
- ▶ Finally, procedures and recommendations in your ETU should always be based on common sense and infection prevention and control principles.

### Proper Position of Remains in Body Bag



This presentation contains materials from CDC, MSF, and WHO

26

### Summary

- All patients, corpses, body fluids, and surfaces inside the high-risk zone are considered contaminated
- Chlorine solutions are the best option for effective disinfection
- Chlorine concentrations to remember
  - 0.5% (non-living items—corpses, gloved hands, surfaces, vomit, feces, blood)
  - 0.05% (living tissue—hands, face, and other skin, scrubs)
- Disinfect body spills (vomit, blood, feces, or urine) immediately
- Transport patients into the ETU with careful attention to infection prevention and control measures
- The remains of patients with Ebola must be handled carefully but respectfully
- Procedures and recommendations in your ETU should be based on infection prevention and control principles and common sense

This presentation contains materials from CDC, MSF, and WHO

27

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention  
1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

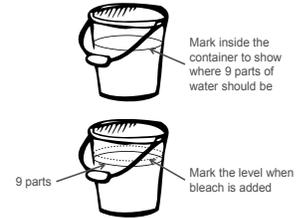
**Chlorine Solution Appendix/Supporting Documents**

This presentation contains materials from CDC, MSF, and WHO

29

**Preparing 0.5% Chlorine Solutions**

- A 1:10 solution has 9 parts water and 1 part bleach



This presentation contains materials from CDC, MSF, and WHO

32

**How to Make Chlorine Solutions for Environmental Disinfection**

- Using Liquid Bleach (~5% Chlorine)

$$\frac{\% \text{ chlorine in liquid bleach}}{\% \text{ chlorine desired}} - 1 = \text{Total parts of water for each part bleach}$$

Example: To make a 0.5% chlorine solution from 5.0% bleach:

$$\frac{5.0\%}{0.5\%} - 1 = 9 \text{ parts water for each part bleach}$$

- Using Powdered Chlorine (bleach powder, HTH)

$$\frac{\% \text{ chlorine desired}}{\% \text{ chlorine in powder}} \times 1000 = \text{Grams of powder for each liter of water}$$

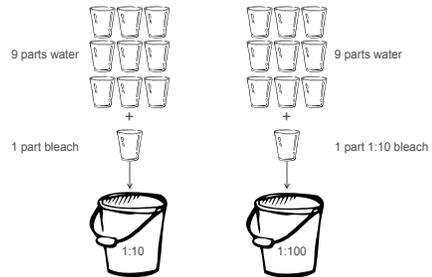
Example: To make a 0.5% chlorine solution from powder containing 35% active chlorine:

$$\frac{0.5\%}{35\%} \times 1000 = 14.3 \text{ grams of powder in each liter of water}$$

This presentation contains materials from CDC, MSF, and WHO

30

**Preparing 0.05% Chlorine Solutions**



This presentation contains materials from CDC, MSF, and WHO

33

**How to Make Chlorine Solutions for Environmental Disinfection**

- Using sodium dichloro-isocyanurate (NaDCC) tablets

Starting with:	0.5% chlorine solution	0.05% chlorine solution
Sodium dichloro-isocyanurate (NaDCC) at 1 gram active chlorine per tablet	5 tablets/litre	5 tablets/10 litres

This presentation contains materials from CDC, MSF, and WHO

31

**Recommended Chlorine Solutions and Uses in Typical ETUs**

Chlorine Solution	Recommended Uses as Disinfectant
0.5% (5,000 ppm or 1:10)	<ul style="list-style-type: none"> <li>• Surfaces or objects contaminated with blood or other body fluids (let stand on objects/surface for 15 minutes)</li> <li>• Toilets and bathroom (let stand on surface for 15 minutes)</li> <li>• Soiled linens (soak fully immersed in solution for 10-15 minutes)</li> <li>• Mattress covers (let stand on objects/surface for 15 minutes)</li> <li>• Corpses (wipe body bag and coffin with disinfectant)</li> <li>• Gloved hands, aprons, and goggles when removing PPE</li> <li>• Footbaths</li> <li>• Layer packaging when transporting blood samples (spray each layer before packing into next)</li> </ul> <p><small>Note: This is a strong, caustic solution. Avoid direct contact with skin and eyes.</small></p>
0.05% (500 ppm or 1:100)	<ul style="list-style-type: none"> <li>• Everyday cleaning of surfaces and floors</li> <li>• Hand-washing for bare hands and skin</li> <li>• Medical equipment, including thermometers</li> <li>• Patient bedding and clothing (soak for 30 minutes)</li> <li>• Plates, cups, and eating utensils</li> <li>• Contaminated waste for disposal</li> </ul>

This presentation contains materials from CDC, MSF, and WHO

34

# Staff Health and Support

This lecture is intended to inform healthcare workers serving in ETUs in Africa about staff health and support.

This lecture describes sensitive issues ETU staff often face. Also provided are steps you can take to maintain physical and mental health while performing under stressful and physically demanding conditions. The lecture is based on guidance from the Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO) and Médecins Sans Frontières (MSF), as well as from discussions with healthcare workers who have provided care in ETUs in Sierra Leone, Liberia, and Guinea.

The learning objectives of this lecture are to:

- ▶ Describe strategies to avoid dehydration, heat stress or heat stroke, malaria, and other health risks both inside and outside the ETU
- ▶ Identify actions to take if you suspect you have had an Ebola virus exposure
- ▶ Describe specific measures you can take before, during, and after deployment to maintain physical and emotional health
- ▶ Recognize when to access physical or emotional care and other support available for healthcare workers

There are some important actions you can take before you are deployed to ensure your health and safety.

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Staff Health and Support

This presentation is current as of December 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Médecins Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- ❑ Describe strategies to avoid dehydration, heat stress, heat stroke, malaria, and other health risks both inside and outside the ETU
- ❑ Identify actions to take if you suspect you have had an Ebola virus exposure
- ❑ Describe specific measures you can take before, during, and after deployment to maintain physical and emotional health
- ❑ Recognize when to access physical or emotional care and other support for healthcare workers (HCWs)

This presentation contains materials from CDC, MSF, and WHO

2

### Pre-Deployment

This presentation contains materials from CDC, MSF, and WHO

3

### Risks Undertaken by Healthcare Workers *Know Before You Go*

- Risk can be reduced with simple actions
- Procedures that protect healthcare worker safety are effective in greatly reducing risk of Ebola virus infection
  - Procedures need to be understood and followed by everyone
- Reduce all risks to your health—not just Ebola virus infection
  - Malaria and other vector-borne diseases
  - Heat illness
  - Gastrointestinal illness (e.g., typhoid, acute diarrheal illness)
  - Severe fatigue and sleep deprivation
  - Bloodborne pathogens
- Any illness will provoke concerns for EVD
  - Consequences for you and colleagues

This presentation contains materials from CDC, MSF, and WHO

4

To stay safe, adopt a know-before-you-go approach. Risk can be reduced with simple actions.

Procedures that protect healthcare worker safety are effective in greatly reducing risk of Ebola virus infection. However, these procedures need to be understood and followed by everyone.

While Ebola virus exposure is the primary concern of those going to work in an ETU, there are other risks that can be easily mitigated. You want to avoid other illnesses while there. In addition to the effects of the illness, those first few hours can seem like months if you are worried that the fever and nausea you have are symptoms of Ebola virus disease (EVD). So it's important to reduce other possible risks to your health. These include:

- ▶ Malaria and other vector-borne diseases
- ▶ Heat illness
- ▶ Gastrointestinal illness
- ▶ Severe fatigue and sleep deprivation
- ▶ Bloodborne pathogens

Take preventive measures to avoid these other illnesses. Any illness will provoke concerns about EVD, and you might end up in isolation while you wait for EVD test results. As a result, colleagues may have to change shifts to cover staffing needs. Recognize that health problems for one person may adversely impact the entire team. This is why it's important to avoid any illness - not just EVD.

Before leaving you should:

- ▶ Consult a travel medicine physician for travel-related medical issues.
- ▶ Consult a personal physician for management of existing medical issues.
- ▶ Complete a health screening. Many sponsoring agencies recommend or require a pre-deployment health screening.
- ▶ Check recommended vaccinations in the CDC Yellow Book, and get all of them, including typhoid fever, before you leave the United States. Ideally, vaccination should be performed at least a week before deployment to avoid possible side effects similar to Ebola symptoms.
- ▶ Prevent malaria by initiating malaria prophylaxis before you arrive. Prevent malaria and dengue by bringing and using bed nets treated with insecticide. Also consider using insect repellent on your body.

Because of the risks and physical demands of personal protective equipment (PPE) use, pregnant women should not deploy.

### Prepare Physically

- ❑ Consult travel medicine physician for travel related medical issues
- ❑ Consult personal physician for management of existing medical issues
- ❑ Complete a health screening
- ❑ Check recommended vaccinations and get them before arrival (including typhoid vaccine)
  - Check CDC's Yellow Book
- ❑ Prevent malaria and dengue
  - Initiate malaria prophylaxis
  - Bring and use insecticide-treated bed nets
  - Consider using insect repellent
- ❑ Pregnant women should not deploy

This presentation contains materials from CDC, MSF, and WHO

5

### Prepare Mentally

- ❑ Read all materials provided
- ❑ Think about and prepare for work in a resource-limited setting and exposure to disturbing scenarios (e.g., death, grief, fear)
- ❑ After training, mentally rehearse and re-rehearse actions you will need to take, especially donning and doffing personal protective equipment (PPE)
- ❑ Discuss with family and friends the practices and procedures you will undertake to remain safe
  - They need to be reassured and confident that you are taking actions for safety
- ❑ Think through fears and concerns, and satisfy yourself that you have strategies to reduce or allay them

This presentation contains materials from CDC, MSF, and WHO

6

Preparing yourself mentally is important. Read all materials provided through this training and by your deploying organization.

Think about and prepare for work in a resource-limited setting. This includes preparing yourself for exposure to disturbing scenarios involving death, grief, and fear.

After this and other trainings, mentally rehearse and re-rehearse actions you will need to take, especially donning and doffing PPE. This mental rehearsal might help later when you are coming out of the ETU exhausted and very hot.

Family and friends need to be reassured and confident you are taking actions to remain safe. Discuss with them the practices and procedures you will undertake. Some healthcare workers believe that not discussing concerns will keep their family and friends from worrying. Yet, returned healthcare workers are unanimous in saying that talking about these concerns helps everyone involved, including those who are deploying.

Think through your fears and concerns, and remember your strategies to reduce or allay them.

You will receive more training at the ETU to which you are deploying. This will include mentoring and coaching as you gradually transition to full patient care responsibilities.

### During Deployment

This presentation contains materials from CDC, MSF, and WHO

7

Working in the ETU is exhausting, both mentally and physically. Recognizing this will help you plan and focus on the essential work you will be performing during deployment.

There are two things you should always keep in mind while working in the ETU. First, you should take care of yourself, and second, you also need to watch out for each other.

Get enough rest. This is a priority to eliminate mistakes due to fatigue. Take your breaks and rest days. Many ETUs have a required one-day break per week. Aim for at least 7-8 hours of sleep every 24 hours.

Physically, be as active as you can: walk, stretch, and exercise as much as circumstances allow and be sure to hydrate.

Don't be afraid to be open with your co-workers. Discuss, share, and commiserate about your experiences. Open dialogue helps people who may be struggling to come forward with concerns about their health.

Also, identify the health and safety lead for your ETU or designate a lead if needed. This person will know infection protocols and staff isolation and medevac procedures in case of an incident.

### **Taking Care of Yourself and Watching Out for Other ETU Staff**

- **Get enough rest**
  - Eliminate mistakes due to fatigue
  - Many ETUs have a compulsory one-day break per week
  - Aim for at least 7–8 hours of sleep every 24 hours
- **Walk, stretch, exercise as circumstances allow and be sure to hydrate**
- **Discuss, share, commiserate with other staff—**
  - Open dialogue helps people struggling to come forward with health concerns
- **Designate or identify the health and safety lead for your ETU**

This presentation contains materials from CDC, MSF, and WHO

### Prevent Other Illnesses and Other Conditions Stay Healthy

- **Personal hygiene**
  - MSF policy of no physical contact of any kind, at any time, is prudent
  - Cough etiquette - cover cough with elbow
  - Frequent handwashing - soap/water or alcohol-based hand sanitizer but use soap/water if visibly soiled
- **Prevent gastrointestinal illness**
  - Carefully prepare and store food, obtain food from trusted sources
  - Rinse fruits and vegetables in chlorinated water
  - Drink only safe water and ice (chlorinated, filtered, or boiled)
- **Keep rodents out of living space**
  - Cover food and water containers
  - Leave no crumbs or other bits of food on floor
  - Block small entrances that rodents can enter

This presentation contains materials from CDC, MSF, and WHO

9

There are some specific actions you can take to keep yourself healthy.

Some ETUs, including those organized by MSF, have a policy of no physical contact of any kind, at any time, with other staff or people in the community. Touching can increase chances for respiratory pathogens to spread. These can be mistaken for early stage EVD.

Practice cough etiquette and cover your cough with your arm (at the elbow).

Frequent handwashing is a must. Use soap and water or alcohol-based hand sanitizer. However, if your hands are visibly soiled, soap and water is more effective.

To prevent gastrointestinal illness, you should:

- ▶ Be careful about food storage and preparation. Obtain food only from trusted sources.
- ▶ Rinse fruits and vegetables in chlorinated water.
- ▶ Only drink safe water and ice that has been chlorinated, filtered, or boiled.

Keep rodents out of your living space. Make sure to:

- ▶ Cover food and water containers.
- ▶ Leave no crumbs or other bits of food on the floor.
- ▶ Block small entrances where rodents can enter.

### Malaria Prevention

- **Malaria is extremely common in West Africa**
  - 10-50% of general population is parasitemic
  - Malaria can quickly cause severe illness or death even with appropriate treatment
- **Take recommended malaria prophylaxis faithfully—it is highly effective**
- **Use insecticide-treated nets**
- **Consider using insect repellent (will also help prevent other vector-borne diseases, such as dengue)**

This presentation contains materials from CDC, MSF, and WHO

10

The importance of preventing malaria cannot be overstated. Remember that many people in the general population are parasitemic, so transmission is very common. Malaria is itself a serious disease that can be deadly even when treated.

Fortunately, there are steps you can take to prevent malaria.

First, take recommended malaria prophylaxis faithfully. It is highly effective.

Second, use insecticide-treated nets when you sleep at night.

And finally, consider using insect repellent at all times. This will also help prevent other vector-borne diseases, such as dengue and chikungunya virus that are carried by the same mosquito that carries malaria.

It is very hot and humid in West Africa. Expect temperatures to range from 80-95°F with high humidity. This will result in a heat index of 100°F or more.

Conditions inside high-risk PPE will be significantly hotter. Expect 100% humidity with almost no ability to evaporate sweat to self-cool. Because of this, ETUs typically restrict time in PPE to a maximum of two hours, and often less than one hour. Always exit the ETU high-risk zone before you need to and be aware the doffing process often takes 15-20 minutes. If you feel faint or unable to concentrate fully, exit the high-risk zone and doff PPE at once.

Heat illness is always a risk in the hot West African climate. Heat illness is preventable, but it takes good team management, a buddy system, and experienced staff working together to recognize the signs. Certain medications, caffeine and alcohol intake, or previous heat illness can put you at greater risk for heat strain. Remember local staff are also susceptible to heat illness even though they may be acclimated to the climate, so keep an eye on them too.

In early stages, heat illness signs and symptoms can be subtle. It is important to treat them before they become severe and life-threatening.

Therefore, while in the ETU:

- ▶ Know the signs and symptoms of heat illness. Monitor not only yourself but your buddy
- ▶ Gradually build up to working in the heat while wearing PPE
- ▶ Rotate staff between jobs that require PPE and jobs that do not

### Environmental Conditions

- Expect temperature range 80–95°F (26–35°C) with high humidity
- Conditions inside high-risk PPE will be significantly hotter
  - 100% humidity
  - Almost no ability to evaporate sweat to self-cool
  - ETUs typically restrict time in PPE to less than 2 hours, and sometimes less than 1 hour—exit before you need to
  - If you feel faint or unable to concentrate fully—exit and doff PPE at once

This presentation contains materials from CDC, MSF, and WHO

11

### Heat Illness

- Heat illness is preventable
- Good team management, buddy system, and experienced staff can prevent heat illness
- Local staff are also susceptible to heat illness—watch and support them
- Early symptoms are mild but can become severe/life-threatening
- In the ETU
  - Know heat illness symptoms, and monitor yourself and your buddy
  - Gradually build up to working in the heat while wearing PPE
  - Rotate staff between jobs that require PPE and those that do not

This presentation contains materials from CDC, MSF, and WHO

12

**Heat Illness Spectrum**  
*Heat Illness Can Be Severe*

	Heat cramps (mildest)	Heat exhaustion	Heat stroke (most severe)
Core temperature		>38° C or 100.6° F	>40.5° C or 104.9° F
Skin temperature	Normal	Normal or cool and clammy	Hot and dry (50% of cases)
Sweat rate	Increased	Increased or decreased	Decreased
Urine output	Normal	Oliguria	Anuria
Gastrointestinal	Thirst	Nausea +/- vomiting	Nausea and vomiting
Cardiovascular	Tachycardia	Hypotension	+/- Circulatory collapse
Central nervous system	None	Uncoordinated, irritable, or confused	Delirium/ seizures/ coma
Other	Thirst		Renal failure, Liver failure, DIC

This presentation contains materials from CDC, MSF, and WHO

13

Heat illness can range from heat cramps in its mildest form, to heat exhaustion, to heat stroke, the most severe form. The three types are outlined here and can be differentiated by temperature, sweat, urine output, GI, cardiovascular, and central nervous system symptoms. Remember core temperature inside PPE can reach heat exhaustion levels of 100.6°F within an hour. Heat exhaustion is a real threat each time you go into the high-risk zone.

ETUs often have a chart like this posted in the low-risk zone where staff begin the process of putting on PPE. It is worth looking over each time you pass it.

**What to Do When a Buddy is Ill from the Heat**

- ❑ Exit high-risk zone immediately
  - Follow appropriate doffing procedures, never cut corners
- ❑ Notify supervisor
- ❑ Move your buddy to a cooler, shaded area
- ❑ Provide cool drinking water, if able to drink
- ❑ Fan and mist your buddy with water
- ❑ Apply ice, if available (ice bags or ice towels)
- ❑ IF YOUR BUDDY IS NOT ALERT or seems confused, this may be heat stroke
  - Apply ice as soon as possible
  - Take vital signs and treat as indicated

<http://www.aafp.org/atp/20050601/12133.html>

This presentation contains materials from CDC, MSF, and WHO

14

What should you do when your buddy has heat illness?

First, help your buddy exit the high-risk zone immediately. Follow all appropriate doffing procedures. Never cut corners when leaving the high-risk zone.

After leaving the high-risk zone notify a supervisor. Move your buddy to a cooler, shaded area. Provide cool drinking water if your buddy is able to drink. Fan and mist your buddy with water and, if available, apply ice using ice bags or ice towels.

If your buddy is not alert or seems confused, this may be an indication of heat stroke. You should apply ice as soon as possible. Take vital signs and treat your buddy as indicated.

Of course, the primary concern of most healthcare workers in the ETU is Ebola virus exposure. Although this is topmost in everyone's mind, the actual risk of exposure is low if appropriate precautions are rigorously followed. Expatriate healthcare worker infection in ETUs has been extremely rare.

All ETUs should have a clear chain of command and instructions on what to do if an employee is exposed. Check for this in the ETU to which you deploy. If it is not present, you should request to have procedures explained thoroughly to you.

If exposure is suspected do not panic. Immediately stop working and follow post-exposure protocol. Safely exit from the high-risk zone. It is crucial you safely doff PPE. Report any concerns immediately to the clinician-in-charge, who will assess the risk.

Management of suspected exposure is evolving, but typically would include isolation with possible evacuation. Experimental, unproven treatments have been used in some exposed persons, with uncertain effect. Procedures for their use and their availability are evolving. However, it is reasonable to ask periodically about this.

MSF has guidelines for action to take after a suspected exposure. These are based on common sense, but are unproven.

For a needlestick or similar injury you should:

- ▶ Immerse the exposed site in 70% alcohol for 30 seconds or 0.5% chlorine solution for three minutes.
- ▶ Leave the high-risk zone and doff PPE correctly. Do not cut corners.
- ▶ Wash the affected area with soap and clean water.
- ▶ Then rinse with clean running water for 30 seconds.

For direct contact with a body, body fluids, or other contaminated material from a patient with Ebola the following steps should be taken:

- ▶ For eyes, flush with copious non-chlorinated clean water, Ringer's lactate, or saline.
- ▶ For mouth or nose exposure, rinse with 0.05% chlorine solution, but do not swallow.
- ▶ If you think broken skin was exposed, rinse with 0.5% chlorine solution, and then wash with soap and clean water.

### Suspected Ebola Virus Exposure

- ❑ Exposure is unlikely if appropriate precautions are rigorously followed
- ❑ All ETUs should have a clear chain of command and instructions on what to do if an employee is exposed
- ❑ If exposure is suspected
  - DO NOT PANIC
  - Immediately stop working
  - Follow post-exposure protocol
  - Safely exit from high-risk zone and safely doff PPE (crucial)
  - Report ANY concerns immediately to clinician-in-charge, who will assess risk
- ❑ Management of suspected exposure is evolving, but typically would include isolation with possible evacuation, if feasible
- ❑ Experimental, unproven treatments have been used in some exposed persons, with uncertain effect

This presentation contains materials from CDC, MSF, and WHO

15

### Actions to be Taken on the Spot Summary of MSF Guidelines

- ❑ Needlestick or similar injury
  - Immerse exposed site in 70% alcohol for 30 seconds or 0.5% chlorine for three minutes
  - Leave high-risk zone, doffing PPE correctly
  - Wash affected area with soap and clean water
  - Rinse with clean running water for 30 seconds
- ❑ Contact with body, body fluids, or other contaminated material of a patient with Ebola
  - Eyes: flush with copious non-chlorinated clean water, Ringer's lactate, or saline
  - Mouth or nose: rinse with 0.05% chlorine solution, but do not swallow
  - Broken skin: rinse with 0.5% chlorine solution, then wash with soap and clean water

This presentation contains materials from CDC, MSF, and WHO

16

### Accidental Exposure Other Considerations

- ❑ Exposed persons should be monitored for 21 days
- ❑ HIV prophylaxis, if indicated
- ❑ Hepatitis B vaccination, if indicated
  - You should already be fully vaccinated
- ❑ Possible evacuation
  - Discuss policy with your deploying organization before you leave
  - CDC guidelines: exposed persons should not travel on commercial conveyances (planes, boats, buses, etc.)
- ❑ Conduct a post-event analysis of what went wrong so corrective action can be taken

This presentation contains materials from CDC, MSF, and WHO

17

After accidental exposure the following precautions should be taken:

- ▶ You should be monitored for 21 days with fever checks twice daily.
- ▶ HIV prophylaxis should be taken, if indicated.
- ▶ Although you should be fully immunized, a hepatitis B vaccination should be administered, if indicated. Therefore, additional HBV prophylaxis is not needed.

Exposed persons can also be considered for possible evacuation, especially if exposure is well documented and very likely. However, organizations vary in their policies, so discuss this with your deploying organization. CDC guidelines indicate exposed persons should not travel on commercial planes, boats, or buses.

A post-event analysis of what caused the exposure should be conducted so corrective action can be taken.

### After a Suspected Ebola Virus Exposure

- ❑ Monitor your temperature in accordance with the protocol for your ETU
- ❑ For your own well-being and the safety of your team members, discuss any symptoms you experience with the staff member designated by your ETU
- ❑ Know how to contact the medical director (or other person responsible for healthcare workers' health issues) of the organization that deployed you to the ETU
  - Follow all protocols for monitoring and notification
  - Know the plan in case of an Ebola virus exposure or symptoms

This presentation contains materials from CDC, MSF, and WHO

18

After a suspected exposure, you should take steps to protect yourself and your co-workers.

Monitor your temperature in accordance with the protocol for your ETU. Current practices require daily monitoring of temperature for at least 21 days after last potential exposure.

For your own well-being and the safety of your team members, immediately discuss any symptoms you experience with the staff member designated by your ETU.

Know how to contact your safety officer or the person in your organization who is responsible for healthcare workers' health issues. Follow all protocols for monitoring and notification as required by your organization. In short, know the plan for your ETU and your deploying organization in case of an Ebola virus exposure or symptoms.

Maintaining mental health and resilience are also important for your well-being.

Be aware of normal emotional and physical reactions to an extremely stressful situation. You may experience a wide range of symptoms from anger to fatigue.

Resting, sleeping, eating, and being active are just as important for your mental health as your physical health.

Ask for additional rest if you need it.

To de-stress, do something you enjoy.

Talk with your colleagues. Watch out for them, too. They are likely experiencing many of the same emotions that you are.

Be aware it is not uncommon for healthcare workers to have physical symptoms which will cause anxiety, including GI problems, respiratory illness, and fatigue. If you experience these symptoms, make sure to rest and also talk it over with your colleagues. They can provide important support.

After you return from deployment, there are a few things to consider. Many returning healthcare workers have reported working in the ETU is a profoundly affecting experience. It is not really over once you get on the plane to return home.

### Maintaining Mental Health and Resilience

- Be aware of normal emotional and physical reactions to an extremely stressful situation (anger, fatigue, etc.)
- Rest, sleep, eat, be active
- Ask for additional rest if needed
- Do something you enjoy
- Talk with colleagues, and watch out for them, too
- Be aware that healthcare workers often have symptoms that cause anxiety (e.g., GI illness, respiratory illness, fatigue)
  - Rest if you feel unwell
  - Talk it over with colleagues

This presentation contains materials from CDC, MSF, and WHO

19

### After Deployment

This presentation contains materials from CDC, MSF, and WHO

20

### Re-entry into Your Former Life

Assuming you have **no known exposure** and are **asymptomatic**

- ❑ CDC recommendations: No need to isolate or quarantine yourself
- ❑ Monitor yourself
  - Take your temperature twice a day for 21 days, starting before you depart for home
  - Watch for other symptoms, like severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhaging
  - For fever ( $>38^{\circ}\text{C}$  or  $100.4^{\circ}\text{F}$ ) symptoms, seek medical care, and contact the organization that deployed you to the ETU
  - Notify the healthcare facility where you are seeking care before you arrive that you recently returned from working in an ETU
  - CDC recommendations available at [www.cdc.gov/ebola](http://www.cdc.gov/ebola)
- ❑ Expect to have emotional reaction
- ❑ Attend scheduled post-deployment meetings/debriefs
  - Counselor visit mandatory in some programs—don't fight this, most find it helpful
- ❑ Family or friends might be apprehensive; provide reassurance
- ❑ Accept that your work has been courageous and important

This presentation contains materials from CDC, MSF, and WHO

21

When you return, if you have no known exposure and are asymptomatic, current CDC recommendations indicate there is no need to isolate or quarantine yourself. However, you should self-monitor by taking your temperature twice a day for 21 days, starting from the time of last possible exposure. Some protocols may require observed monitoring of the daily temperature. Also watch for other symptoms, like severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhaging.

State requirements for returned healthcare workers vary. You should check with your state and organization before returning home.

Should you develop a fever of more than  $100.4^{\circ}\text{F}$  or show any of the symptoms listed, seek medical care. However, notify the healthcare facility before arriving to let them know you recently worked in an ETU and contact your sponsoring organization. You should also notify your state or local health department. You should have the necessary phone numbers with you at all times while monitoring your fever. Recommendations for monitoring are available at the CDC website listed on this slide. Remember as we gain more experience, these recommendations could change, so refer to the website as often as practical.

Mentally, do expect to have an emotional reaction. Plan to attend scheduled post-deployment meetings and debriefs. For some programs, a counselor visit is mandatory. Don't fight this. Most healthcare workers find it helpful. Remember that family or friends might be apprehensive, so reassure them as much as you can.

Finally, remember your work has been courageous and important, even if the overall situation in the affected country remains dire.

In summary:

- ▶ Pre-deployment preparation includes training, health assessments, vaccination, malaria prophylaxis, and attention to mental preparedness and health.
- ▶ Heat illness and dehydration are serious risks while wearing PPE in tropical conditions. Adhere to time restrictions for working in the ETU while wearing PPE.
- ▶ Adhere to recommendations for rest.
- ▶ Remember Ebola virus exposure is unlikely if appropriate precautions are rigorously followed, but know what to do if it happens.
- ▶ Pay attention to mental and physical health during and after deployment.

### Summary

- Pre-deployment preparation includes training, health assessments, vaccination, malaria prophylaxis, and attention to mental preparedness and health
- Heat illness and dehydration are serious risks while wearing PPE in tropical conditions. Adhere to time restrictions for working in the ETU while wearing PPE.
- Adhere to recommendations for rest
- Ebola virus exposure is unlikely if appropriate precautions are rigorously followed, but know what to do if it happens
- Pay attention to mental and physical health during and after deployment

This presentation contains materials from CDC, MSF, and WHO

22

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



# Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccine

This lecture is part three of the *Ebola Virus Disease and Clinical Care* lectures.

This brief lecture will review current standards of care and provide basic information on experimental treatments and vaccines. Some of these have already been used to treat or prevent Ebola virus disease (EVD), while others are in the pipeline. At this time, none of these are approved by the U.S. Food and Drug Administration (FDA), and none have had more than very early and limited testing in humans. Developments in the field are moving rapidly. If you have questions about the use of such treatments or vaccines for exposed or ill healthcare workers, your sponsoring organization can provide information regarding their policies and procedures.

**NOTE:** Information in this presentation will change regularly. Current and updated information can be found at: [www.clinicaltrials.gov](http://www.clinicaltrials.gov)

The learning objectives for this lecture are to:

- ▶ Recognize supportive care is a cornerstone of clinical management for patients with Ebola
- ▶ Understand the types of supportive care used in caring for patients with Ebola
- ▶ Understand the role of current investigational therapies and vaccines for the treatment of, or prophylaxis against, Ebola virus disease

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETU) in Africa

## Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccines

This presentation is current as of December, 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Malaria Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

### Learning Objectives

- Recognize supportive care is a cornerstone of clinical management for patients with Ebola
- Understand the types of supportive care used in caring for patients with Ebola
- Understand the role of current investigational therapies and vaccines for the treatment of, or prophylaxis against, Ebola virus disease (EVD)

This presentation contains materials from CDC, MSF, and WHO

### Clinical Management of EVD Supportive, but Aggressive

- Hypovolemia +/- sepsis physiology
  - Aggressive IV fluid resuscitation
  - Ringer's lactate is preferred solution
  - Médecins Sans Frontières (MSF) advocates oral rehydration salts solution (ORS)
- Electrolyte abnormalities (from GI losses)
  - Oral rehydration salts
  - Ringer's lactate preferred
  - Normal saline with  $K^+$ ,  $Mg^{++}$ , glucose,  $HCO_3^-$
- Symptomatic management of fever, nausea, vomiting, diarrhea, seizures, myalgia, abdominal pain
- Consider empirical therapy
  - Antibiotics for possible bacterial infections
  - Antimalarials



This presentation contains materials from CDC, MSF, and WHO

3

As has been presented earlier in this course, a cornerstone of Ebola management is supportive care. However, this care should be aggressive.

Patients will often have hypovolemia due to substantial gastrointestinal fluid losses, and later may develop capillary leak, and exhibit a sepsis-like physiology. They might respond well to aggressive IV fluid resuscitation. However, caution should be exercised so that aggressive fluid resuscitation does not result in pulmonary edema. Because intravenous catheter placement and maintenance entails risk to the healthcare worker, some ETUs, at times when high patient census or low staffing levels make use of IV fluids riskier, prefer to use oral rehydration solution (ORS). If your ETU uses IV fluid resuscitation, the intravenous catheter should be placed as soon as need for intravenous hydration has been identified. Catching up with fluid is difficult. IV catheter placement may require additional clinical staff to assist the patient and minimize risks. Fluid requirements by mouth are an excellent alternative. But patients can often be too weak or nauseated to take in enough fluid.

It should be assumed electrolytes are being lost even in the absence of lab testing. Therefore, electrolyte abnormalities from vomiting and diarrheal losses should be replaced. Options include:

- ▶ Oral rehydration solution
- ▶ Intravenous fluid, with Ringer's lactate. This is a preferred IV solution because of the presence of potassium and lactate
- ▶ Normal saline can be supplemented with Potassium ( $K^+$ ), Magnesium ( $Mg^{++}$ ), glucose, or Bicarbonate ( $HCO_3^-$ )

Healthcare workers should provide symptomatic management of fever, nausea, vomiting, diarrhea, seizures, myalgia, or abdominal pain.

Most ETUs provide empirical therapy for other infections that can complicate EVD, including broad spectrum antibiotics for possible bacterial infections and antimalarials.

There are currently no approved Ebola-specific prophylaxis or treatments that have proven to be effective.

Some non-human primate data have been used to identify potentially effective Ebola treatments, but data are limited, and human clinical trial data are extremely limited. However, Phase I trials are ongoing.

On this slide you can see listed a few of the investigational therapies or vaccines you might hear about. We go into more detail on several of these in subsequent slides. Therapeutic interventions that have been tried during the current Ebola epidemic include:

- ▶ Convalescent plasma and whole blood
- ▶ ZMapp, a monoclonal antibody cocktail by Mapp Bio
- ▶ TKM-Ebola, a small interfering RNA therapeutic by Tekmira
- ▶ Brincidofovir - a nucleotide analog (Chimerix)
- ▶ Favipiravir - an RNA-dependent RNA polymerase inhibitor (Toyama)

Several candidate Ebola vaccines are in the early stages of development and show some promise.

At this time, availability of these study products is very limited and they are only used under an investigational protocol.

### Investigational Therapies

#### □ No approved Ebola virus-specific prophylaxis or treatment

- Some non-human primate (NHP) data
- Limited human clinical trial data (Phase I trials ongoing)
  - Therapeutic medications
    - Convalescent plasma and whole blood
    - ZMapp—monoclonal antibody cocktail (Mapp Bio)
    - TKM-Ebola—small interfering RNA therapeutic (Tekmira)
    - Brincidofovir - nucleotide analog (Chimerix)
    - Favipiravir - RNA-dependent RNA polymerase inhibitor (Toyama)
  - Vaccines
- Limited availability of these study products

This presentation contains materials from CDC, MSF, and WHO

4

### Investigational Therapies

#### □ Convalescent blood products

- Variable *in vivo* data in NHP<sup>1</sup>
- Seven of eight patients who received convalescent plasma survived in one outbreak in 1995<sup>2</sup>
  - Unable to assess efficacy (not formally studied)
- Risks
  - Transmission of bloodborne pathogens
  - Transfusion-related Acute Lung Injury (TRALI)
  - Possible Ab-dependent enhancement of Ebola pathogenesis
- Clinical trials of convalescent plasma treatment currently being conducted in Africa

<sup>1</sup>Jarhing, P et al. JID 2007 5400  
<sup>2</sup>Mapapa, K et al. JID 1999 518

This presentation contains materials from CDC, MSF, and WHO

5

Convalescent blood products have been used to treat severe viral diseases, including EVD. Ebola survivors may have high titers of antibodies against the virus that might provide some protection for persons currently infected. The World Health Organization (WHO) indicated this approach was reasonable to try in the absence of any other specific therapy, and such blood products could be collected and made available in affected countries. However, *in vivo* data on effectiveness of convalescent plasma in non-human primates (NHP) have been inconsistent. In humans, seven of eight patients who received convalescent plasma survived in one outbreak in 1995. However, because the blood products were administered to patients later in the clinical course who seemed to be improving, the effectiveness could not be adequately assessed.

However, there are potential risks to using this therapy, including:

- ▶ Transmission of bloodborne pathogens,
- ▶ Transfusion-related acute lung injury (TRALI), and
- ▶ Possible antibody-dependent enhancement (ADE) of Ebola virus pathogenesis.

In short, it is unclear if convalescent whole blood or plasma provides any specific benefit for treatment of EVD.

Clinical trials of convalescent plasma treatment for EVD are currently being conducted in Africa.

### Investigational Therapies

#### □ ZMapp

- Cocktail of three chimeric human-mouse monoclonal antibodies produced in tobacco plants<sup>1-3</sup>
- ZMapp completely protected non-human primates when treatment was initiated up to five days post exposure<sup>1</sup>
- Patients have been treated on compassionate grounds
- No drug currently available
- Phase I clinical trials (assessing safety) planned for 2015, followed by efficacy study

<sup>1</sup>Olinger, GG et al. PNAS 2012

<sup>2</sup>Dye, JM et al. PNAS 2012

<sup>3</sup>Qiu, X et al. Sci Transl Med 2013

This presentation contains materials from CDC, MSF, and WHO

6

ZMapp is a mix of three human-mouse monoclonal antibodies produced in tobacco plant cells. The antibodies bind to Ebola virus proteins and render the virus less able to infect cells in mammals. In NHPs, ZMapp completely protected rhesus macaques when treatment was initiated up to five days post exposure. Patients have been treated on compassionate grounds but a formal efficacy study has not been completed.

ZMapp is administered by IV. Production capacity is very limited, and there is no current supply. Phase I clinical trials to assess safety are planned for 2015 and will be followed by an efficacy study.

TKM-Ebola is another investigational therapy. It is made by Tekmira and was initially designed for post-exposure prophylaxis. The drug consists of lipid nanoparticle small interfering RNAs that target two essential viral genes to prevent virus replication. In NHP studies, there was 67 to 100% efficacy when treatment was initiated 30 minutes post challenge. TKM-Ebola is administered by IV, and when given to uninfected humans, side effects observed included transient hypotension, headache, dizziness, chest tightness, and raised heart rate. A limited supply of TKM-Ebola has been available for use under emergency investigational new drug (IND) for known patients. It has also been used for post-exposure prophylaxis (PEP). Clinical efficacy trials of a new formulation of TKM-Ebola for treatment are under consideration.

Brincidofovir (BCV) is an oral broad spectrum antiviral with activity against double-stranded DNA viruses. It is a nucleotide analog lipid conjugate targeting viral replication. It was originally selected for pharmaceutical development on the basis of its activity against cytomegalovirus and adenovirus. More than 1,000 persons have received BCV for non-EVD causes without severe adverse reactions; however, elevated liver function tests have been noted. It is currently in Phase III clinical trials for cytomegalovirus and adenovirus. Chimerix announced BCV's *in vitro* activity against EVD was equivalent to that seen against RNA viruses in September 2014. BCV received FDA Experimental IND approval in October 2014. A clinical trial of BCV for EVD is planned in Liberia.

Favipiravir (Avigan) is an oral antiviral that targets RNA dependent RNA polymerase and viral replication. Favipiravir has been shown in the mouse model and NHPs to have activity against EVD *in vivo*. Favipiravir is currently in Phase III clinical trials for influenza. More than 1,400 persons have received Favipiravir for non-EVD causes. The dosages used for treatment of patients with Ebola have been well above the doses recommended for treatment of influenza and severe adverse reactions have not been observed. However, nausea and vomiting with this medication have been noted and may reduce its utility. Clinical trials of Favipiravir for treatment of EVD have begun in Guinea.

### Investigational Therapies

#### TKM-Ebola (TKM-100802)<sup>1,2</sup>

- Lipid nanoparticle formulation of a small interfering RNA
- Targets two essential genes to prevent virus replication
- NHP studies: 67-100% efficacy when treatment initiated 30 minutes post challenge
- In a Phase I study in humans, side effects included transient hypotension, headache, dizziness, chest tightness, and raised heart rate but data are very limited
- Current supply limited; clinical efficacy trial under consideration

<sup>1</sup> Geisbert, TW et al. *JID* 2006  
<sup>2</sup> Geisbert, TW et al. *Lancet* 2010

This presentation contains materials from CDC, MSF, and WHO

7

### Investigational Therapies

#### Brincidofovir (BCV)<sup>1,2</sup>

- Oral broad-spectrum antiviral with activity against double-stranded DNA viruses
- Nucleotide analog lipid conjugate targets viral replication
- Pharmaceutical development on the basis of its activity against cytomegalovirus and adenovirus
- More than 1,000 persons have received BCV for these non-EVD causes
- Currently in Phase III clinical trials for cytomegalovirus and adenovirus
- BCV *in vitro* activity against EVD — Sept 2014, but no conclusive animal data available
- BCV received FDA Experimental Investigational New Drug approval — Oct 2014
- Clinical trials begin at an MSF facility in Liberia — January 2015

<sup>1</sup> Florouci, DF et al. *Expert Rev Anti Infect Ther* 2014

<sup>2</sup> Chimerix, Inc. Brincidofovir: frequently asked questions. Durham, NC: Chimerix, Inc.; 2014. Available at <http://www.chimerix.com/discovery-clinical-trials/brincidofovir/brincidofovir-for-ebola/>

This presentation contains materials from CDC, MSF, and WHO

8

### Investigational Therapies

#### Favipiravir

- Oral antiviral; has been used in several patients on compassionate grounds
- Targets RNA-dependent RNA polymerase/viral replication
- *In vivo* activity against EVD in mouse model and NHP<sup>1,2</sup>
- Currently in Phase III clinical trials for influenza<sup>3</sup>
- >1,400 persons received Favipiravir for non-EVD causes<sup>3</sup>
- Clinical trials begun at a MSF facility in Guéckedou, Guinea — Dec 2014, with preliminary results due in early 2015

<sup>1</sup> Ostereich, L, et al. *Antiviral Res* 2014; <sup>2</sup> Smither, SJ et al. *Antiviral Res* 2014; <sup>3</sup> Furuta Y, Gowen BB et al. *Antiviral Res* 2013.

This presentation contains materials from CDC, MSF, and WHO

9

### Experimental Fast-tracked Ebola Virus Vaccines

- No approved Ebola virus vaccines
  - Investigational Phase I studies underway
  - Some non-human primate data suggest benefit for these vaccines
- Chimpanzee Adenovirus 3-vectored bivalent vaccine<sup>1,2</sup>
  - Developed by NIH in collaboration with Okairo
  - Contains an Ebola virus gene from two strains, adenovirus vector is non-replicating
- Vesicular Stomatitis Virus (VSV) vectored monovalent vaccine<sup>3</sup>
  - Developed by Public Health Agency of Canada
  - VSV glycoprotein is deleted – replaced with Ebola glycoprotein (GP)
  - Used experimentally post exposure to boost immune response<sup>4</sup>
    - NHP did not develop Ebola virus infection
- Additional vaccine development is underway, including vaccines based on recombinant adenovirus, recombinant vaccinia, or rabies vaccines, with studies in NHP planned for late 2015

<sup>1</sup> Kobinger, GP et al. Virology 2006

<sup>2</sup> Wang, D et al 2009

<sup>3</sup> Gleibert, TV et al. JID 2011

<sup>4</sup> Gunther et al. JID 2011

This presentation contains materials from CDC, MSF, and WHO

10

There are no Ebola virus vaccines that have been approved or proven to be effective, but studies are now underway.

Some limited NHP data suggest some protective benefit from vaccination. Several candidate vaccines have been fast-tracked for study.

One vaccine is a Chimpanzee Adenovirus 3-vectored bivalent vaccine. It was developed by the Vaccine Research Center of the National Institutes of Health (NIH) in collaboration with Okairo, a Swiss-Italian biotech company. The vaccine contains two Ebola virus genes and is a non-replicating vaccine.

Another is a Vesicular Stomatitis Virus (VSV), a vectored monovalent vaccine, developed by the Public Health Agency of Canada. This is a replicating vectored vaccine. In this vaccine, the VSV glycoprotein is deleted and replaced with the Ebola glycoprotein (GP). This vaccine has been used experimentally post exposure to boost immune response. NHP receiving the vaccine were protected from infection. A small number of persons have received VSV vaccine after experiencing a high-risk exposure (e.g., needlestick) while working in an ETU. However, effectiveness of VSV vaccine is unknown when used for post-exposure prophylaxis.

Additional Ebola vaccine development is underway, including vaccines based on recombinant adenovirus, recombinant vaccinia, or rabies vaccines. Studies in NHP are planned for late 2015.

### Summary

- Treatment for patients with Ebola is supportive with a particular focus on fluid replacement, electrolyte replacement, symptom relief, and use of empiric antibiotics and antimalarials
- Currently, there are no specific treatments or vaccines available for EVD

This presentation contains materials from CDC, MSF, and WHO

11

In summary, treatment for patients with Ebola virus disease is supportive with a particular focus on fluid replacement, electrolyte replacement, symptom relief, and use of empiric antibiotics and antimalarials. Currently, there are no specific treatments or vaccines available for EVD.

Experimental treatments and vaccines to prevent Ebola are rapidly evolving. Current information can be found at [www.clinicaltrials.gov](http://www.clinicaltrials.gov).

### Resources

- The most up-to-date information on experimental treatments and vaccines can be found at:
  - [www.clinicaltrials.gov](http://www.clinicaltrials.gov)

This presentation contains materials from CDC, MSF, and WHO

12

<http://www.cdc.gov/vhf/ebola>

**For more information please contact Centers for Disease Control and Prevention**  
1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-4653) / TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



# Interactions with the Community: Health Promotion and Contact Tracing

This lecture is on health promotion and contact tracing.

Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa

## Interactions With the Community: Health Promotion and Contact Tracing

This presentation is current as of December, 2014. This presentation contains materials from Centers for Disease Control and Prevention (CDC), Médécins Sans Frontières (MSF), and World Health Organization (WHO).



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

version 12.03.2014

The learning objectives for this lecture are to:

- ▶ Explain the role of health promotion in Ebola outbreak management
- ▶ Understand the importance of appropriate health promotion messages targeted at the community about the Ebola Treatment Unit (ETU)
- ▶ Describe the importance of contact tracing
- ▶ Recognize interactions that constitute a case contact
- ▶ Explain the role of healthcare workers in health promotion and contact tracing

### Learning Objectives

- Explain the role of health promotion in Ebola outbreak management
- Understand the importance of appropriate health promotion messages targeted at the community about the ETU
- Describe the importance of contact tracing
- Recognize interactions that constitute a case contact
- Explain the role of healthcare workers in health promotion and contact tracing

This presentation contains materials from CDC, MSF, and WHO

2

We'll start with health promotion.

### Health Promotion

This presentation contains materials from CDC, MSF, and WHO

3

### Health Promotion in an Ebola Outbreak

- Health promotion is a two-way dialogue between the ETU team and the community to facilitate outbreak control that incorporates:

- Health education
- Anthropology
- Public health
- Communication
- Psychology



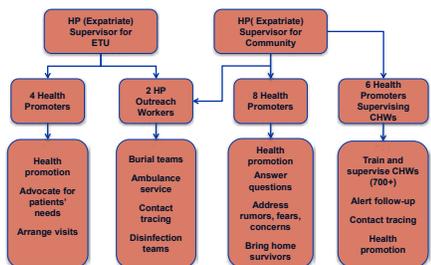
Community health workers, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

4

Health promotion is a two-way dialogue between the ETU team and the community, patients, family, and visitors to facilitate outbreak control. It incorporates a variety of skill sets, including expertise in health education, anthropology, public health, communication, and psychology. As you will see, effective health promotion involves more than one specialty.

### Health Promotion (HP) Team Organization MSF Example from Kailahun, Sierra Leone



This presentation contains materials from CDC, MSF, and WHO

5

Health promotion includes different types of skill sets and strategies for spreading health messages. This is an example of the organizational chart used by Médecins Sans Frontières (MSF) for a health promotion team. It demonstrates the wide range of specialties needed. The chart shows the two branches of health promotion: one within the ETU and the other in the surrounding community.

Within the ETU you have health promoters who advocate for patients' needs and arrange visits with family and friends. In addition, you have those who support outreach workers such as burial teams, ambulance services, contact tracers, and disinfection teams. Overlapping with the ETU are those who work with the community. Health promoters assist with answering questions, addressing rumors, and bringing home survivors to reunite them with their communities, help them reintegrate into society, and address stigmatization.

The job of community health workers is daunting. In this example, you see six supervisory community health workers overseeing more than 700 staff to ensure appropriate follow-up to alerts and contact tracing.

## Course Lectures and Scripts > Interactions with the Community

For effective health promotion you need to understand the local population and culture. Elements such as language, religion, and family contribute to the social structure of the community. Understanding risk exposure in the context of cultural norms will help with understanding the population at risk. Understanding cultural practice around health seeking behavior, funeral and burial practices, and eating and living habits, will aid in developing an appropriate health promotion response.

It is important to remain sensitive to resistance, fear, denial, distrust, and anger; all of these may alter the community's perception of your efforts.

Target populations for health promotion messaging include not only patients in the ETU, but also their families, visitors, and the ETU staff.

Within the community, it is important to promote messages to a range of audiences, including local healers, other healthcare workers, and community leaders. It is important to maintain cultural awareness of who will be most effective in delivering the message. There may be groups outside mainstream society who are important members of the community. The more you can share correct information with a wide population, the better. Remember, in the end, the target population is everyone!

It is important to have clear communication messages to promote health objectives during an outbreak. Effective messages should be simple and easy to explain to staff, patients, and the community.

Communicate clear, simple messages that aim to:

- ▶ Strengthen understanding of Ebola
- ▶ Promote knowledge of the purposes of the ETU and how it works
- ▶ Support outreach activities and contact tracing
- ▶ Dispel myths and fears about Ebola and the ETU within the community
- ▶ Fight stigmatization

### Effective Health Promotion Need to Understand the Population and Culture

- **Social structure**
  - Population, languages, religion, sources of income, movements and transport, social structures, communication channels, marketplaces and dates, family organization
- **Context of risk exposures**
  - Health-seeking behaviors
  - Funeral and burial practices
  - Eating and living habits
- **Perceptions**
  - Resistance, fear, denial, distrust, anger

This presentation contains materials from CDC, MSF, and WHO

6

### Who is the Target Population for Health Promotion Messages?

- **Ebola Treatment Unit**
  - Patient
  - Family and other visitors
  - Staff
- **Community**
  - Healthcare workers
  - Local healers and birthing attendants
  - Chiefs, elders, stakeholders (NGOs)
  - Religious leaders (pastors, imams) and teachers
- **Everybody!!!!**

This presentation contains materials from CDC, MSF, and WHO

7

### Health Promotion Objectives During an Ebola Outbreak

- **Communicate clear, simple messages among staff, patients, and communities**
  - Strengthen understanding of Ebola
  - Promote knowledge of purposes of the ETU
  - Support outreach activities and contact tracing
  - Dispel myths and fears about Ebola and the ETU within the community
  - Fight stigmatization

This presentation contains materials from CDC, MSF, and WHO

8

### What are the Health Promotion Messages?

#### Health Education

- What is Ebola?
- How is it transmitted?
- How is it prevented?

#### Ebola Treatment Unit

- Why should people go to the ETU?
- What treatment is available?
- How does the ETU function?
- How does the ETU keep the community safe?

#### Survivors and Negative Cases

- What are the differences?

It is important to keep messages CLEAR and SIMPLE.



Survivor being congratulated by health promotion worker, Sierra Leone  
Photo provided by Médecins Sans Frontières

This presentation contains materials from CDC, MSF, and WHO

9

What are the health promotion messages related to Ebola?

Healthcare workers should be prepared to answer questions such as “what is Ebola?”, “how is it transmitted?”, and “how is it prevented?”

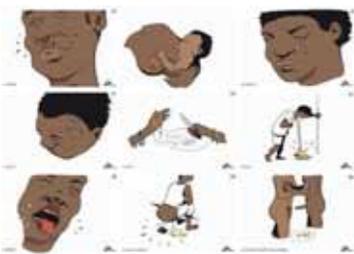
In addition, it is important to be able to explain who should go to the ETU and why. Clear messaging needs to explain what treatment is available, how the ETU works, why it can provide the best medical care, and how it helps keep the community safe.

It is also important to describe the differences between those who are survivors versus those who never had Ebola virus disease (EVD) and were discharged from the ETU because their test results were negative. It is especially important to reach patients who tested negative. They need to understand they are not cured of Ebola just because they have been discharged.

Remember to always keep your messages clear and simple.

The photo in the slide shows an MSF health promotion worker in Sierra Leone celebrating the discharge of an Ebola survivor.

### Photos to Stress Modes of Transmission



This presentation contains materials from CDC, MSF, and WHO

10

This is an example of simple communication. Because many members of the community may be illiterate, they may respond better to pictures. This is a poster from MSF showing how Ebola can spread. As the saying goes, a picture is worth a thousand words.

## Course Lectures and Scripts > Interactions with the Community

Health promotion occurs everywhere!

As a team member in the ETU, an important part of your role is to be sure patients and other staff receive clear and simple messages. The goal is to have such messages become part of the culture within the ETU.

Also, a variety of methods can be used to promote health in the community. These might include having success stories featured in local publications about patients who have recovered from Ebola and using the media to provide accurate information about the disease. Health organization partners are also excellent resources for getting your message out.

ETU-related outreach activities provide another resource for health promotion. Burial teams, disinfection teams, ambulance crews, and those doing contact tracing all provide avenues for message distribution. Use community businesses, including restaurants and hotels, to share information with the community. Health promotion can be done anywhere.

It's important to use every method available to share health promotion messages with the community. To reach large populations, use traditional modes of mass communication such as radio, pamphlets, and television. However, also consider culturally popular methods like storytellers, dance, jingles, and theatre productions.

In addition, one of the best methods for health promotion is face-to-face communication. This pays huge dividends in getting the message out directly to people. Use health promotion staff, community health workers, and survivors to interact with everyone with whom they come in contact.

Both mass communication and face-to-face interactions are essential to success.

### Where Does Health Promotion Take Place?

- Ebola Treatment Unit
- Community
  - Social mobilization
  - Other health structures
  - Mass media
  - Bringing home survivors
- Outreach activities
  - Burial teams
  - Disinfection teams
  - Ambulance service
  - Contact tracing
  - Surveillance teams
- Everywhere! (hotels, restaurants, etc.)



Four survivors being escorted home by health promotion team, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

11

### How to Share Health Promotion Messages

- Mass Communication
  - Radio
  - Paper pamphlets
  - Television
  - Story tellers
  - Dance
  - Jingles
  - Theatre productions
- Face-to-face Communication
  - Health promotion staff
  - Community health workers
  - Survivors
- Mass communication and face-to-face interaction are both essential



Community health worker introducing Ebola survivor back into the community with a government certificate of cure, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

12

## Course Lectures and Scripts > Interactions with the Community

### Benefits of Effective Health Promotion

- **Stops rumors and confusion**
  - Communicate facts clearly
  - New rumors arise every day from a variety of sources
- **Establishes trust**
  - Security for the program
  - Encourage ill people to come to the ETU
- **Reduces fear**
  - Ebola is a new disease in the area
  - Many deaths very quickly



Cured patient with health promotion worker, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

13

Effective and accurate health promotion can have many benefits.

Rumors start every day, mainly out of fear and ignorance. By communicating facts clearly and simply, we can help counter these rumors.

Establishing trust in the community is important for the security of an effective response to the outbreak. By building trust you can better encourage people who are ill to come to the ETU for testing or treatment. Remember Ebola is a new disease in West Africa. It has taken a huge toll with many deaths happening very quickly.

This photo shows an example of someone who can assist with health promotion messaging. Ebola survivors can help to reduce fear by sharing positive stories of the ETU and of recovery.

### Rumors New Ones Arise Everyday!

- Chopping limbs, draining blood, stealing organs
- Staff bring Ebola to the community
- Chlorine causes cancer
- If everyone bathes in warm salt water between 2 and 3am, Ebola will go away
- Prayer alone will make Ebola go away
- Ebola is finished
- Ebola does not exist
- Ebola is HIV
- MSF throws people into the burn pits
- Ebola is a way for the government to kill different tribes
- MSF kills patients with Ebola
- Ebola comes from water
- MSF is going to spray entire villages
- Patients will be forced to go to the ETU
- There is no food or water at the ETU

This presentation contains materials from CDC, MSF, and WHO

14

Rumors can take on a life of their own in a crisis, which can undermine effective health promotion and response efforts. Some of the homegrown Ebola rumors are included on this slide. Everything from stealing organs, draining blood, patients being thrown into burn pits, and no food or water at the ETU have been heard by healthcare workers.

It is important to understand how the culture of the community may promote or propagate these types of rumors. For example, in West Africa it is expected that family members will take care of loved ones who are hospitalized and a caregiver will stay with them. However, family members are not allowed in the ETU because this would put them at risk. It is likely difficult for them to accept their loved one will be well cared for and that there is no need for them to provide supplies and food. Remaining culturally sensitive, being transparent, and having clear and simple messages will help to keep rumors to a minimum.

## Course Lectures and Scripts > Interactions with the Community

As you can see in this photo there will be varying levels of acceptance within the community. It can be challenging to effectively share health promotion messages depending on the receptivity of the audience.

### Educating the Community



A health promotion talk in a village, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

15

Lessons from the field can help shape health promotion messages moving forward. For example, experience tells us we should avoid highly charged terms such as “isolation unit” or “camp.” The communities in West Africa are familiar with refugee camps after years of war and strife. It is important to avoid terms that have negative connotations because of the community’s recent history. Using these terms can be detrimental to improving health promotion. Keep the messages clear and simple. Also, avoid the scary negative messages and use balanced ones such as “Ebola is very deadly, BUT many people survive.”

### Lessons Learned: General

- ❑ Avoid terms like “isolation unit” or “camp”
- ❑ Keep messages clear and simple
  - Do not focus on messages that are irrelevant or of minor importance
  - It is very easy for people to get caught up in details and miss the main point
- ❑ Balance negative messages with positive messages
  - “Ebola is very deadly, BUT many people survive”

This presentation contains materials from CDC, MSF, and WHO

16

## Course Lectures and Scripts > Interactions with the Community

### Lessons Learned: Inside the ETU

- ❑ Use see-through fences (strive for visibility)
- ❑ Provide area for visitors near the high-risk zone
- ❑ Provide opportunities for religious services
- ❑ Provide mental health services
- ❑ Take care of families of patients who die
  - Make morgue visible
  - Provide area for grieving
  - Give 24 hours to view body, to provide time for items to be placed inside body bag, and to say prayers

This presentation contains materials from CDC, MSF, and WHO

17

This slide lists helpful lessons already learned by healthcare workers with experience working in ETUs. For example:

- ▶ Use see-through fences to increase visibility both inside and out
- ▶ Provide an area for visitors to safely interact with loved ones while maintaining a safe distance
- ▶ Offer religious services when possible
- ▶ Provide patients with mental health services

For families of deceased patients, it is important to:

- ▶ Make the morgue visible
- ▶ Provide an area for those grieving
- ▶ Give family 24 hours to view the body before burial. This allows them an opportunity to say prayers and provide items to be buried with loved ones



Patient with Ebola holding picture of his wife and child. All three survived.  
Photo provided by MSF, Sierra Leone

This presentation contains materials from CDC, MSF, and WHO

18

Notice the openness of this ETU and the use of see-through fencing in the background. This patient was fortunate to have survived along with his wife and child. While he awaited discharge he maintained contact with his family and was even provided a photo to build his spirits until they were reunited.

We have concluded health promotion and will now cover contact tracing.

Contact tracing is a process used to identify every person who may have had contact with someone who has Ebola. Identify every single contact of every single Ebola case. This is done through interviews with each patient who arrives at the ETU as well as the family. Additional information is gathered from healthcare workers and others who may have information about the patient's recent history and potential contacts.

Let's define contact. A contact is anyone who had exposure to a person with Ebola (dead or alive) during the past 21 days.

There are different types of contact. Direct contact happens when someone is exposed by a needlestick, by a splash to the mucous membranes, or by having touched any infected body fluids or a corpse without wearing appropriate personal protective equipment (PPE). Direct contact also includes living with and caring for a person showing symptoms of Ebola. Close contact is when someone is within three feet of a person with EVD for a prolonged time without wearing PPE, such as being in the same household or workplace.

Risk level is defined and based on the type of contact that occurred. CDC provides risk-level guidance at the website listed on the slide.

According to the guidelines, and regardless of the risk level, all contacts are followed daily until 21 days after their last known exposure to the case.

### Contact Tracing

This presentation contains materials from CDC, MSF, and WHO

19

### What is Contact Tracing?

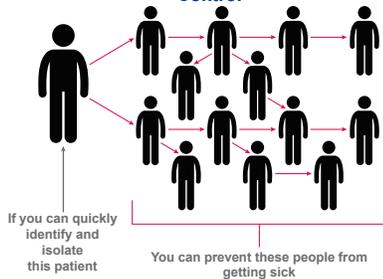
- Identify all contacts of every Ebola case
  - Interviews with patient, family, healthcare workers, and others
- Contact: Anyone who had exposure to a person with Ebola (dead or alive) over the past 21 days
  - Direct contact = needlestick, splash to mucous membranes, or touching any infected body fluids or a corpse without correctly wearing personal protective equipment (PPE), or living with and caring for a person showing symptoms of Ebola
  - Close contact = being within three feet of a person with Ebola for a prolonged time without wearing PPE (e.g., same household or worksite)
  - Risk level:
    - \*high risk
    - \*some risk
    - \*low risk
- Follow all high, some, and low risk contacts daily until 21 days after last contact

<http://www.cdc.gov/vhf/ebola/exposure/risk-factors-when-evaluating-person-for-exposure.html>

This presentation contains materials from CDC, MSF, and WHO

20

### Contact Tracing is Key to Ebola Outbreak Control



This presentation contains materials from CDC, MSF, and WHO

21

Rapid identification of contacts is the key to controlling an Ebola outbreak.

Here, you can see how quickly a single case can become a multitude of cases with just one or two exposures. Quick identification of cases allows the ability to isolate them from a larger group of contacts who may expose even more people.

### Contact Tracing and the Healthcare Worker

- **Contact tracing is:**
  - Conducted by public health workers as part of the epidemiologic component of the response
  - Not done by healthcare workers who are caring for patients
- **Healthcare workers need to understand contact tracing to:**
  - Facilitate the process
  - Report observed deficiencies in contact tracing to epidemiologists

This presentation contains materials from CDC, MSF, and WHO

22

Contact tracing is not done by healthcare workers who are directly caring for patients. Instead, it is conducted by public health workers as part of the epidemiologic component of the response. However, all healthcare workers, as part of the healthcare team, need to understand and facilitate contact tracing.

If you observe a deficiency in contact tracing, you should notify the epidemiologists working with your ETU. For example, an increase in ill patients presenting to the ETU despite efforts to quarantine and isolate should be reported. This will allow increased efforts to respond appropriately to prevent more people from becoming ill.

### Contact Tracing: The Visit

- **Visit all contacts daily for 21 days after last interaction with confirmed case (alive or dead) to see if the contact remains well**
  - Contact tracing can pose a risk of infection
  - Contact or the contact's household members may be ill
  - Always maintain interpersonal distance of >1 meter (3 feet) to reduce risk of infection
  - Do not enter homes
  - PPE generally not used during contact tracing
- **If contact has fever or is unwell, call for safe transportation to the ETU**

This presentation contains materials from CDC, MSF, and WHO

23

All contacts need daily visits for 21 days after the last interaction with a confirmed case. This work can expose the contact tracer to specific risks including close contact with the patient's household members who also may be ill.

Generally, contact tracers do not wear PPE when visiting communities. This helps build trust and reduce fear associated with people showing up in high-risk PPE. This also allows for better communication and interaction. However, to protect themselves, contact tracers should maintain an interpersonal distance of at least one meter or three feet. They should not enter homes. If the contact is too sick to walk to the door, an alert should be activated and the person should be transported to an ETU.

## Course Lectures and Scripts > Interactions with the Community

Once a contact is identified, the person should be transported to the ETU if ill, or monitored for 21 days if he or she remains well.

If the contact is absent, this should be reported to the epidemiologists and priority should be given to finding this person the next day. Efforts should be made to continue to account for missing contacts, even if the 21 days after known contact have passed. This is important to determine whether the person has contracted EVD and exposed others.

When a contact flees or disappears, it may be out of fear of being forced to go to the ETU or because of stigmatization. Because of this fear, proceed with caution in these cases.

This is a photo of a contact tracer and supervisor in Sierra Leone filling out a contact tracing form with curious onlookers from the community. It is important to keep all of these processes visible and open for the community members to see what is happening.

This slide depicts some of the challenges that may be faced with contact tracing and transport. Rough terrain, rain, mud, road blocks and other obstacles may hinder this task. Contact tracers are attempting to pick up a possible case after a contact became symptomatic.

### Contact Tracing: Outcomes

- If contact has fever or is ill: safely transport to the ETU
- If contact remains well for 21 days: monitoring ends
- If contact is absent: report to epidemiologists—finding and visiting this contact is a priority for the next day
- If contact is not traceable for several days
  - Search diligently for contact
  - Continue tracing contact until found; important to try to account for the contact even after 21 days have passed
    - Many times, a contact flees due to fear. In these cases, the team should proceed with caution

This presentation contains materials from CDC, MSF, and WHO

24

### Contact Tracing in the Field



Contact tracing team, Kallahun district, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

25



Community outreach team going to a village, Kallahun district, Sierra Leone  
Photo provided by MSF

This presentation contains materials from CDC, MSF, and WHO

26

**All direct and close contacts  
will be monitored for 21 days**

This presentation contains materials from CDC, MSF, and WHO

27

It's important to state once again all contacts will be monitored for 21 days from the time of contact with the confirmed case.

### **When Patients with Ebola are Not Hospitalized**

- **Ideally, to control the epidemic, all patients with Ebola are hospitalized in ETUs**
  - Isolation → prevents spread
  - Treatment → improves chances of survival
- **However, some patients with Ebola are not admitted**
  - Some patients refuse admission—admission is not compulsory
  - Some ETUs are full and have to turn away patients
- **What can be done?**
  - If a patient refuses admission, do your best to change his or her mind
  - If the ETU is full, know the plan and recommendations for patients returning home
  - Other strategies for caring for patients with Ebola are under active discussion

This presentation contains materials from CDC, MSF, and WHO

28

What happens when patients are not cared for in ETUs?

We know isolation in the ETU prevents spread of the virus. Also treatment, especially early treatment, in the ETU improves chances of survival.

However, not all patients are admitted. Some may refuse admission, which is not mandatory. Some ETUs are simply full and have to turn patients away.

If a patient refuses admission, do your best to change their mind. However, realize admission is not compulsory. Remember to be as respectful and culturally sensitive as possible. Some contacts who eventually become ill flee their villages in fear of forceful admission and they subsequently spread the disease to a new location.

In the event the ETU is full, know your ETU's plan and what the recommendations are for patients returning or staying home. It is also important to know the other healthcare resources in your community to better utilize a network of options.

Other strategies for caring for patients with Ebola outside the ETU continue to be evaluated and discussed.

## Course Lectures and Scripts > Interactions with the Community

In the event a patient refuses admission to the ETU and decides to receive treatment at home, it is recommended the patient be looked after by only one designated caregiver to protect the family and community.

Educate the patient and caregiver about routes of transmission. Also provide information about how to protect the caregiver and others in the home from virus exposure. Provide the caregiver with protective equipment and disinfection materials and training on how to use them.

Notify the contact tracing infrastructure for your ETU. Lab testing is sometimes done after a risk assessment in patients who remain at home.

Health promotion and contact tracing are essential elements of outbreak control. They are conducted by health promoters, community health workers, epidemiologists, and other public health workers.

Healthcare workers' roles in health promotion and contact tracing include:

- ▶ Supporting clear communication about Ebola, ETUs, and safety measures
- ▶ Facilitating contact tracing where possible
- ▶ Reporting observed deficiencies in contact tracing to epidemiologists

### Home-based Support and Risk Reduction for Patients Who Refuse ETU Admission *Example from MSF*

- If patient remains at home, he or she should be looked after by **ONE** designated caregiver
- Educate patient and caregiver
  - About routes of transmission
  - How to protect caregiver and other people in the home
  - About basic supportive treatment (e.g., painkillers, fever control, oral antibiotics, antimalarials, ORS)
- Give caregiver protective equipment and disinfection materials along with appropriate training
- Notify the ETU contact tracing infrastructure

This presentation contains materials from CDC, MSF, and WHO

29

### Summary

- Health promotion and contact tracing are essential elements of outbreak control
  - They are conducted by health promoters, community health workers, epidemiologists, and other public health workers
- Healthcare workers' roles in health promotion and contact tracing
  - Support clear communication about Ebola, ETUs, safety measures
  - Facilitate contact tracing where possible
  - Report observed deficiencies in contact tracing to epidemiologists

This presentation contains materials from CDC, MSF, and WHO

30

<http://www.cdc.gov/vhf/ebola>

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333  
Telephone: 1-800-CDC-INFO (232-462-6342) TTY: 1-888-232-6348  
E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) Web: [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention



U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention



# Tabletop Exercises

## **Designing a Safe Ebola Treatment Unit**

- ▶ Trainer Guide
- ▶ List of Items for ETU Design
- ▶ Student Worksheet

## **Triage of Persons Presenting to an ETU**

- ▶ Trainer Guide
- ▶ Case Study Scenarios
- ▶ Student Worksheet
- ▶ WHO Screening Algorithm for Healthcare Facilities in Guinea



## Designing a Safe Ebola Treatment Unit

### Trainer Guide

To reinforce the concepts taught in the Ebola Treatment Unit (ETU) lecture, students will participate in an exercise to design an ETU structure and apply healthcare worker safety practices. In this tabletop exercise, students work in groups to design the physical layout of an ETU. The exercise reinforces the safety principles behind a well-designed ETU.

Trainers should review the exercise instructions and become familiar with the goals, key points, and flow of the exercise.

**Duration: 1 hour**

**Prerequisites: Ebola Treatment Unit lecture**

#### Materials:

- ▶ A whiteboard, poster board, or flip chart for each group
- ▶ Sharpies, two for each group
- ▶ Medium size sticky notes, three note pads for each group
- ▶ [List of items for ETU design for each group](#)
- ▶ [Student Worksheet for Designing a Safe Ebola Treatment Unit](#) (optional)

***Note:** The student guide is optional. The information is available through other tabletop exercise resources. Printable versions of the [Trainer Guide](#), [list of items](#), and [student worksheets](#) can be found at.*

#### Trainer Preparation and Setup:

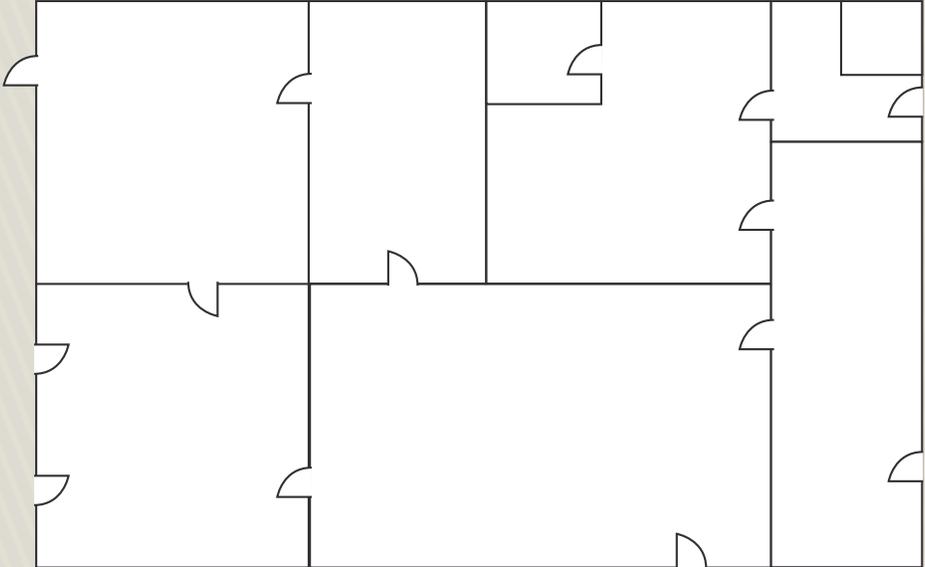
- ▶ Divide students into groups (up to 12 students per group)
- ▶ Provide a whiteboard, poster board, or flip chart for each group
- ▶ Draw an outline of an empty building or a large rectangle on a whiteboard, poster board, or flip chart for each group of students. Reference the picture provided.
- ▶ Provide two sharpies, three sticky pads, and the list of items for ETU design for each group

#### Session Goal:

Ensure students understand how infection prevention and control principles are used in the design and structure of an ETU to support the safety of healthcare workers and patients.

#### Key Points:

- ▶ Healthcare worker safety is a priority.
- ▶ ETU infection prevention and control procedures should be consistent and unvarying to ensure the safety of healthcare workers, patients, and others.
- ▶ ETU staff and patient movements always proceed from lower-risk to higher-risk areas—from clean to dirty.
- ▶ The ETU is part of the system of safety designed to prevent transmission of Ebola. Personal protective equipment (PPE) and your buddy are two other critical components.
- ▶ Understanding the design of an ETU helps healthcare workers assess their environment and recognize unsafe practices.

Duration: 1 hour Prerequisites: Ebola Treatment Unit lecture	
Phase/Time	Instructional Sequence
<p><b>Introduction</b></p> <p>10 minutes</p>	<p>At the start of the exercise, discuss the following points with the students:</p> <ul style="list-style-type: none"> <li>▶ Explain the goal and key points.</li> <li>▶ Note that the exercise reinforces knowledge and concepts learned in the <i>ETU</i> lecture.</li> <li>▶ Explain by designing an ETU, students will be able to see how the physical layout and mechanics of an ETU structure directly relate to the safety of healthcare workers, patients, and others.</li> </ul>
<p><b>Practice</b></p> <p>30 minutes</p>	<p>First, instruct the group to draw the following directly onto their pre-drawn facility:</p> <ul style="list-style-type: none"> <li>▶ Walls/fences, doors, and flow of people</li> <li>▶ Entry and exit points for staff, patients, and visitors</li> </ul>  <p>Second, have the students write the list of items for ETU design on the sticky notes and place the notes where they belong within their ETU drawing. Students should make multiple sticky notes for items that may be found in multiple locations.</p>
<p><b>Debrief</b></p> <p>20 minutes</p>	<p>When each group has completed the design of their ETU, they will have five minutes to present their work. After all groups have finished presenting, conduct a five-minute debriefing discussion.</p>

## Designing a Safe Ebola Treatment Unit

### LIST OF ITEMS FOR ETU DESIGN

Before placing items within the ETU, the following should be drawn on the whiteboard, poster board or flip chart:

- ▶ Walls/fences, doors, and flow of people
- ▶ Entry and exit points for staff, patients, and visitors

Once the above items are drawn on the board, write each of these item names on a sticky note and place them in the correct location on your ETU drawing:

- ▶ Burn pit
- ▶ Changing area
- ▶ Chlorine solution prep station
- ▶ Chlorine tubs (0.5% chlorine solution)
- ▶ Footbaths (0.5% chlorine solution)
- ▶ Handwashing stations (0.05% chlorine solution)
- ▶ Handwashing stations (0.5% chlorine solution)
- ▶ High-risk zone—confirmed area
- ▶ High-risk zone—suspect area
- ▶ High-risk zone PPE doffing station
- ▶ High-risk zone PPE donning station
- ▶ Kitchen
- ▶ Lab
- ▶ Latrines (suspect, confirmed, and staff)
- ▶ Laundry
- ▶ Low-risk zone
- ▶ Low-risk zone PPE donning and doffing station
- ▶ Morgue
- ▶ Office
- ▶ Pharmacy
- ▶ PPE and medical equipment storage
- ▶ Staff briefing and debriefing area
- ▶ Triage station
- ▶ Visitor area
- ▶ Water tank

**NOTE:** Some items will have multiple locations.

## Designing a Safe Ebola Treatment Unit

### STUDENT WORKSHEET

---

#### Goal:

Ensure that you understand how infection prevention and control principles are used in the design and structure of the Ebola Treatment Unit (ETU) to support the safety of healthcare workers and patients.

#### Key Points:

- ▶ Healthcare worker safety is a priority.
- ▶ ETU infection prevention and control procedures should be consistent and unvarying to ensure the safety of healthcare workers, patients, and others.
- ▶ ETU staff and patient movements always proceed from lower-risk to higher-risk zones—from clean to dirty.
- ▶ The ETU is part of the system of safety designed to prevent transmission of Ebola. PPE and your buddy are two other critical components.
- ▶ Understanding the design of an ETU helps healthcare workers assess their environment and recognize unsafe practices.

#### Directions:

Using the List of Items for ETU Design, you have 30 minutes to design an ETU from an existing structure. After the design is completed, the person you designate for your group will present your ETU.

## Triage of Persons Presenting to an ETU

### Trainer Guide

To reinforce the concepts taught in the *Ebola Virus Disease and Clinical Care* lectures, students will participate in a role play exercise to triage patients presenting to an Ebola Treatment Unit (ETU). In this tabletop exercise, students will triage patients from six case studies to determine what action is needed. The exercise reinforces the need to understand exposure and symptom criteria to identify patients with suspected Ebola virus disease.

Trainers should review the exercise instructions and become familiar with the goals, key points, scenarios, and flow of the exercise.

**Duration:** 1 hour

**Prerequisites:** Ebola Virus Disease and Clinical Care Parts I and II

#### Materials:

- ▶ [Triage case study scenarios for trainer](#)
- ▶ Copies of [World Health Organization \(WHO\) triage algorithm](#) used in Guinea for all students
- ▶ Copies of [student worksheet](#) (optional)

**Note:** *The student worksheet is optional. The worksheet provides space to take case notes. Printable versions of the [Trainer Guide](#), [WHO algorithm](#), and [student worksheets](#) can be found at.*

#### Trainer Preparation and Setup:

- ▶ Review the triage case study scenarios to use during the role play exercise.
- ▶ Divide students into small groups (up to 6 students per group).
- ▶ Distribute the WHO triage algorithm used in Guinea for each student.

#### Session Goal:

Use triage protocol on exposure and symptoms to appropriately determine which patients should be admitted to the ETU.

#### Key Points:

- ▶ Triage decisions may be quite different from the clinical decisions healthcare workers are used to making.
- ▶ Correct triage decisions are critically important. Admitting a true patient with Ebola to the ETU halts further transmission, while not admitting can propagate infection. Admitting a patient without Ebola places the patient at risk of acquiring Ebola infection.
- ▶ Applying a uniform case definition is critical for case identification tracking and control of the epidemic. Case definitions can differ by location.

## Tabletops > Triage of Persons Presenting to an ETU > Trainer Guide

Duration: 1 hour		Prerequisites: Ebola Virus Disease and Clinical Care Parts I and II	
Phase/Time	Instructional Sequence		
<b>Introduction</b>  5 minutes	At the start of the exercise, discuss the following points with the students: <ul style="list-style-type: none"> <li>▶ Explain the goal and key points.</li> <li>▶ Remind students that the exercise reinforces knowledge and concepts from the <i>Ebola Virus Disease and Clinical Care</i> lectures.</li> <li>▶ Note that students will be participating in a patient triage role playing exercise to simulate interviews that have occurred in real ETUs.</li> </ul>		
<b>Exercise</b>  45 minutes  (7 minutes per case)	The group can choose to ask questions as a team for each triage case study. Alternatively, a different student can take the lead for each case study and ask the questions, seeking a triage determination from the entire group. <p>Provide the following background information:</p> <p><i>“We are in a small village in Guinea that has been hit hard by Ebola. I (the trainer) am a patient presenting to the triage area at an ETU. You (the students) are healthcare workers responsible for triaging patients. I will give you some basic personal information about why I have arrived at the ETU. You will need to ask questions to make a triage decision. You may pretend to take the temperature of the patient.”</i></p> <p>Explain that the algorithm is available to guide triage decisions. As a group, students will decide if the patient needs to be admitted to the ETU, transferred to a non-ETU healthcare facility, or discharged to the community. Students should be able to explain why they made their decision. If provided, students can also use the optional student worksheet to take notes about patients.</p>		
<b>Debrief</b>  5 minutes	Lead students in a short discussion about what they learned from this exercise and how this will help them in the ETU.		

## Triage of Persons Presenting to an ETU

### Case Study Scenarios

#### CASE 1

**Patient:** 40-year-old man whose family insisted he come

**Script:** *“I don’t even know why I’m here, but my family brought me here.”*

**Students must elicit the following information from the patient:**

#### Contact Status:

- ▶ *“No one in my village is sick.”*
- ▶ *“No recent deaths in my village”*
- ▶ *“I did visit a friend for two days in another village before he died last week. I didn’t go to the funeral. When I was there I stayed in his house.”*

#### Symptoms:

- ▶ **Stomach pain, nausea, no vomiting:** *“I do have stomach pain and I feel like I want to throw up, but can’t.”*
- ▶ **Sore throat:** *“Yes, my throat hurts.”*
- ▶ **Temperature:** 38.5°C
- ▶ **Tired:** *“I do get tired sometimes, but who doesn’t? I probably just have malaria.”*

**Trainer:** *“What is your assessment of the patient and what is your triage decision?”*

#### Probing questions:

- ▶ *“Does the patient meet the clinical criteria for a suspected case?”*
- ▶ *“Does the patient have epidemiologic risk factors?”*
- ▶ *“Why did you make that decision?”*

#### Answer:

- ▶ Patient reports **CONTACT** with a suspected case.
- ▶ Patient has **three or more SYMPTOMS** including fever, nausea, abdominal pain, and sore throat.
- ▶ Therefore, patient **IS a suspected case**.

#### Triage decision

- ▶ Admit to the ETU for evaluation.

#### Key points:

- ▶ The patient did not think he needed to come to the ETU.
- ▶ The evaluator may have to ask many specific questions to find out if a patient has had contact with a confirmed or suspected case.

## CASE 2

**Patient:** 18-year-old woman

**Script:** *"I feel sick."*

**Students must elicit the following information from the patient:**

### Contact Status:

- ▶ *"No one in my family is ill and no one has died in my family."*
- ▶ *"No one I know is sick."*
- ▶ *"I have not been to any funerals recently."*

### Symptoms:

- ▶ Diarrhea and stomach pain: *"I have had diarrhea and stomach pain for a few weeks."*
- ▶ No fever or chills: *"No, I haven't had a fever or chills."*
- ▶ No unexplained bleeding: *"I am on my period, but normal flow, in fact it is almost over and very little bleeding."*
- ▶ Temperature: 36.5°C

**Trainer:** *"What is your assessment of the patient and what is your triage decision?"*

*Probing questions:*

- ▶ *"Does the patient meet the clinical criteria for a suspected case?"*
- ▶ *"Does the patient have epidemiologic risk factors?"*
- ▶ *"Why did you make that decision?"*

### *Answer:*

- ▶ Patient reports **NO CONTACT** with a suspected or confirmed case.
- ▶ Patient has diarrhea, but **no other symptoms**.
- ▶ Therefore, patient **IS NOT a suspected case**.

### Triage decision

- ▶ Discharge to community or refer to another hospital or healthcare clinic.

### Key points:

- ▶ As healthcare workers, you may be tempted to try to diagnose, examine, or test patients for other things. However, this triage is based on screening questions only and decisions must be made quickly so isolation can occur if necessary. You are only determining whether to admit to the ETU for further diagnostic testing.

### CASE 3

**Patient:** Infant with a fever, accompanied by her mother.

**Script:** *“My baby girl is really hot and I’m very worried because there have been deaths in my village.”*

**Students must elicit the following information from the patient:**

**Contact Status:**

- ▶ *“No one at home is sick and because of the illness in the village we have stayed home.”*

**Symptoms:**

- ▶ Breastfeeding: *“She is six months old and is breastfeeding.”*
- ▶ No diarrhea or vomiting: *“No, she has not had any diarrhea or vomiting.”*
- ▶ Nursing: *“She is nursing well.”*
- ▶ Temperature: 38.5°C

**Trainer:** *“What is your assessment of the patient and what is your triage decision?”*

*Probing questions:*

*“Does the patient meet the clinical criteria for a suspected case?”*

*“Does the patient have epidemiologic risk factors?”*

*“Why did you make that decision?”*

**Answer:**

- ▶ Patient has had **NO CONTACT** with a suspected or confirmed case.
- ▶ Patient has fever but has **no other symptoms** of Ebola.
- ▶ Therefore, patient is **NOT** a suspected case.

**Triage decision**

- ▶ Refer to another hospital or healthcare facility.

**Key points:**

- ▶ What about the mother’s health? It may be wise to ask her questions about her symptoms. She may be too worried about her baby to think about herself. She could be a contact.

## CASE 4

**Patient:** 34-year-old man perspiring heavily

**Script:** *“I don’t feel well. It’s been hard on my family because I sell charcoal for a living and haven’t been able to work.”*

**Students must elicit the following information from the patient:**

### Contact Status:

- ▶ *“Many have died in my village, but I haven’t been to any of the funerals because I haven’t felt well enough to go.”*
- ▶ *“The villagers died of Ebola, but I have not had contact with them.”*

### Symptoms:

- ▶ Diarrhea: *“I have had diarrhea, but no bloody stools.”*
- ▶ Fever and chills: *“I feel like I have had a fever and I keep getting hot and cold.”*
- ▶ Temperature: 38.7°C
- ▶ Tired: *“I am so tired all the time; it’s hard to leave my bed.”*
- ▶ Vomiting: *“Yes, my stomach has been very bad for about two weeks. It is very tiring to vomit so much.”*

**Trainer:** *“What is your assessment of the patient and what is your triage decision?”*

*Probing questions:*

- ▶ *“Does the patient meet the clinical criteria for a suspected case?”*
- ▶ *“Does the patient have epidemiologic risk factors?”*
- ▶ *“Why did you make that decision?”*

### *Answer:*

- ▶ Patient reports **NO CONTACT** with a suspected or confirmed case, BUT
- ▶ Patient has **FEVER and three other SYMPTOMS** (nausea/vomiting, diarrhea, and intense fatigue),
- ▶ Therefore, patient **IS a suspected case**.

### Triage decision

- ▶ Admit to the ETU for evaluation.

### Key points:

- ▶ What about the fact he is a salesman? What about his family at home? The evaluator may want to probe further for contacts.

## CASE 5

**Patient:** 18-year-old man struggles to get into triage and requires assistance. He looks tired and is sweating. He is holding his head with his hand.

**Script:** *“I have a terrible headache that won’t go away.”*

**Students must elicit the following information from the patient:**

### Case Status:

- ▶ *“My grandmother died two weeks ago here at this ETU. She was so weak I had to carry her in.”*

### Symptoms:

- ▶ Fever and chills: *“I have been feeling hot and maybe some sense of chilliness, but I don’t know if I have a fever.”*
- ▶ Headache: *“I have had this headache for three days.”*
- ▶ Temperature: 38.5°C
- ▶ Tired: *“I feel weak and tired.”*

**Trainer:** *“What is your assessment of the patient and what is your triage decision?”*

### Probing questions:

- ▶ *“Does the patient meet the clinical criteria for a suspected case?”*
- ▶ *“Does the patient have epidemiologic risk factors?”*
- ▶ *“Why did you make that decision?”*

### Answer:

- ▶ Patient reports **CONTACT** with a confirmed case.
- ▶ Patient has **three or more SYMPTOMS** including fever (history of subjective fever or chills counts), weakness, and headache.
- ▶ Therefore, patient **IS a suspected case**.

### Triage decision

- ▶ Admit to the ETU

Additional challenge: Ask student to explain the decision to admit him to the ETU.

**Patient response:** *“No, no I can’t stay. I have to go home to take care of my father, who is ill.”*

**Trainer:** *“What would you do?”*

### Key Points:

- ▶ You can’t force anyone to be admitted to the ETU.
- ▶ If someone refuses admission, explain to the patient that he should be looked after by only one designated caregiver. Provide information about routes of transmission and provide information about how to protect the caregiver and others in the home from Ebola virus exposure. If possible, provide protective equipment and disinfection materials and training on how to use them. Notify those assigned to conduct contact tracing for your ETU.

## CASE 6

**Patient:** 24-year-old woman, 8 months pregnant, history of caesarean delivery with previous pregnancy

**Script:** *“I feel like I am in labor now. I am scared because I have been bleeding for two days. I went to the healthcare center, but they sent me here.”*

**Students must elicit the following information from the patient:**

### Contact Status:

- ▶ *“My husband and sister died of Ebola a week ago.”*
- ▶ *“We all lived together, so no one to help with the baby; I have nowhere to go.”*

### Symptoms:

- ▶ Vaginal bleeding: *“The bleeding is vaginal.”*
- ▶ Temperature: 38.1°C

**Trainer:** *“What is your assessment of the patient and what is your triage decision?”*

*Probing questions:*

- ▶ *“Does the patient meet the clinical criteria for a suspected case?”*
- ▶ *“Does the patient have epidemiologic risk factors?”*
- ▶ *“Why did you make that decision?”*

### **Answer:**

- ▶ Patient reports **CONTACT** with confirmed cases.
- ▶ Patient has **SYMPTOMS** of vaginal bleeding, likely representing a miscarriage.
- ▶ Therefore, patient **IS a suspected case** (and almost certain to be confirmed).

### Triage decision

- ▶ Admit to the ETU for evaluation

### Key Points:

- ▶ Situations like this present difficult choices; sometimes there appear to be no good solutions or options. While it is likely this woman is infected with Ebola virus, there is always a chance she is suffering complications from the pregnancy and is not infected. If the latter is true, and she contracts EVD in the ETU, she and her baby are much more likely to die as the mortality rate among pregnant women is almost 100%.

**Further questions:**

Trainer asks: “*What is the prognosis for the woman and the fetus?*”

- ▶ This is a dire situation for the woman and the fetus. Ebola in pregnancy is uniformly fatal for the fetus and almost always fatal for the mother.

Trainer asks: “*What are the options for managing this delivery?*”

- ▶ Surgery is not an option. A healthcare worker could assist with normal delivery but it will be an extremely high-risk delivery.

## Triage of Persons Presenting to an ETU

### Student Worksheet

To reinforce the concepts taught in the *Ebola Virus Disease and Clinical Care* lectures, you will participate in a role play exercise to triage patients presenting at an ETU. In this tabletop exercise, you will triage six patients to determine what action is warranted. The exercise reinforces the need to understand exposure and symptom criteria to identify suspected Ebola cases.

**Goal:** Use triage protocol on exposure and symptoms to appropriately determine which patients should be admitted to an ETU.

### Key Points:

- ▶ Triage decisions may be quite different from the clinical decisions healthcare workers are used to making.
- ▶ Correct triage decisions are critically important. Admitting a true patient with Ebola to the ETU halts further transmission, while not admitting can propagate infection. Admitting a patient without Ebola places the patient at risk of acquiring Ebola.
- ▶ Applying a uniform case definition is critical for case identification tracking and control of the outbreak. Case definitions can differ by location.

### Scenario

You are a healthcare worker working in an ETU located in a small town in Guinea, a hard-hit area, and you are responsible for triaging patients. You have a patient that just arrived at the ETU and it's up to you to find out why. You will ask questions to get the information you need to decide on your triage options:

1. Admit to ETU.
2. Transfer to a non-ETU healthcare facility.
3. Discharge to the community.

Refer to the WHO algorithm for healthcare facilities in Guinea to assist with your decisions.

Triage of Persons Presenting to an ETU

**Student Worksheet**

CASE 1

**Presenting Patient**

**40-year-old man whose family insisted he come**

Questions and Answers

Does the patient have a suspected case?

What is your triage decision?

CASE 2

**Presenting Patient**

**18-year-old woman**

Questions and Answers

Does the patient have a suspected case?

What is your triage decision?

**CASE 3**

**Presenting Patient**

**Infant with a fever accompanied by her mother**

Questions and Answers

Does the patient have a suspected case?

What is your triage decision?

CASE 4

**Presenting Patient**

**34-year-old man perspiring heavily**

Questions and Answers

Does the patient have a suspected case?

What is your triage decision?

**CASE 5**

**Presenting Patient**

**18-year-old man tired and sweating**

Questions and Answers

Does the patient have a suspected case?

What is your triage decision?

**CASE 6**

**Presenting Patient**

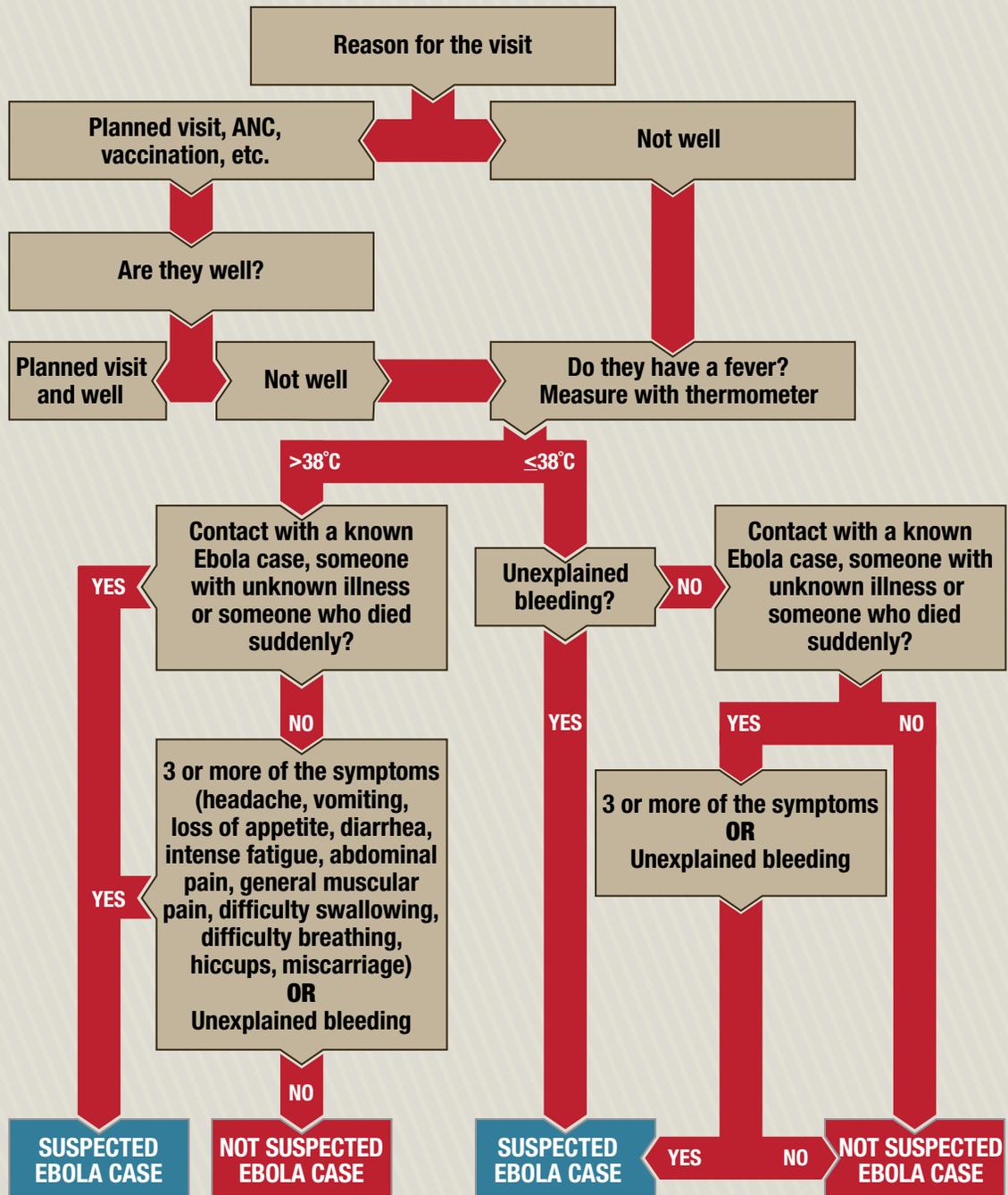
**24-year-old woman, 8 months pregnant, history of caesarean delivery with previous pregnancy**

Questions and Answers

Does the patient have a suspected case?

What is your triage decision?

## WHO Screening (Triage) Algorithm for Healthcare Facilities in Guinea (example)





# Appendices

- ▶ Appendix A - Ebola Outbreak Frontline Video
- ▶ Appendix B - Course Abbreviations
- ▶ Appendix C - Course Alternative Agendas
- ▶ Appendix D - ETU Map
- ▶ Appendix E - High-risk and Low-risk Zone Diagram
- ▶ Appendix F - Donning (putting on) Gloves and Doffing (taking off) Gloves
- ▶ Appendix G - WHO Screening Algorithm for Healthcare Facilities in Guinea
- ▶ Appendix H - Heat Illness Spectrum
- ▶ Appendix I - E-lecture Instructor Information
- ▶ Appendix J - Knowledge Assessment Questions
- ▶ Appendix K - Up-to-date Information on the Ebola Epidemic
- ▶ Appendix L - Health Protocols, Guidelines, and Recommendations
- ▶ Appendix M - Other Ebola Resource
- ▶ Appendix N - Journal Articles
- ▶ Appendix O - Course Resources

## Appendix A > Ebola Outbreak Public Broadcasting Service (PBS) Frontline® Video

### EBOLA OUTBREAK PUBLIC BROADCASTING SERVICE (PBS) FRONTLINE® VIDEO

---

<http://www.pbs.org/wgbh/pages/frontline/ebola-outbreak/>

Public Broadcasting Service Frontline® prepared a 30-minute video from Sierra Leone “reporting from inside the deadliest Ebola outbreak in history.” The video provides excellent information on the crisis and follows healthcare workers and patients within an ETU. The video can be shown during classroom lectures or shown during the ETU practical exercise breakouts.

## Appendix B > Course Abbreviations

### COURSE ABBREVIATIONS

---

ADL	Activities of Daily Living
ALT	Alanine Aminotransferase
AST	Aspartate Aminotransferase
BCV	Brincidofovir
CDC	Centers for Disease Control and Prevention
DRC	Democratic Republic of Congo
EDTA	Ethylenediaminetetraacetic Acid Tubes
ELISA	Enzyme-linked immunosorbent assay
ETU	Ebola Treatment Unit
EVD	Ebola Virus Disease
GI	Gastrointestinal
GP	Glycoprotein
HCW	Healthcare Worker
HF	Hemorrhagic Fever
HTH	Powdered Chlorine (HTH) High Test Hypochlorite
IV	Intravenous Therapy
M	Meter
MoH	Ministry of Health
MSF	Médecins Sans Frontières
N95	NIOSH-Approved Particulate Filtering Face piece/Respirators
NGO	Non-governmental Organization
NHP	Non-human Primate
NSAIDs	Nonsteroidal Anti-Inflammatory Drugs
ORS	Oral Rehydration Solution
PHEIC	Public Health Emergency of International Concern
PPE	Personal Protective Equipment
PT	Patient
RT-PCR	Reverse Transcription Polymerase Chain Reaction
TRALI	Transfusion-related Acute Lung Injury
UN	United Nations
VHF	Viral Hemorrhagic Fever
VSV	Vesicular Stomatitis Virus
WBC	White Blood Cells
WHO	World Health Organization

## Appendix C > Course Alternative Agendas

### COURSE ALTERNATIVE AGENDAS

<b>Day 1 Agenda</b>				
<b>Time</b>	<b>Duration</b>	<b>Description</b>		
8:00 AM	30 min	Overview of Course		
8:30 AM	45 min	Overview of the 2014 Epidemic and Response		
9:15 AM	45 min	Ebola Virus Disease and Clinical Care Part I: History, Transmission, and Clinical Presentation		
10:00 AM	30 min	Break/med checks		
10:30 AM	30 min	Infection Prevention and Control for Healthcare Workers		
11:00 AM	60 min	Lunch		
12:00 PM	15 min	Travel to ETU		
12:15 PM	45 min	Donning and Doffing		
1:00 PM	3.75 hrs	Group A	Group B	Group C
		ETU	Field Experience Discussion	Triage Tabletop
		Triage Tabletop	ETU	Field Experience Discussion
		Field Experience Discussion	Triage Tabletop	ETU
4:45 PM	15 min	Med Check		
5:15 PM	15 min	Travel to lodging		

## Appendix C > Course Alternative Agendas

### Day 2 Agenda

Time	Duration	Description		
8:00 AM	15 min	Daily Overview and Reflection		
8:15 AM	60 min	Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management		
9:15 AM	30 min	Disinfection and Waste Management in the ETU		
9:45 AM	30 min	Break/med checks		
10:15 AM	60 min	Ebola Treatment Unit		
11:15 AM	45 min	Staff Health and Support		
12:00 PM	45 min	Lunch		
12:45 PM	15 min	Travel to ETU		
1:00 PM	3.75 hrs	Group A	Group B	Group C
		ETU	ETU Design Tabletop	Field Experience Discussion
		Field Experience Discussion	ETU	ETU Design Tabletop
		ETU Design Tabletop	Field Experience Discussion	ETU
4:45 PM	15 min	Med Check		
5:00 PM	15 min	Travel to lodging		

## Appendix C > Course Alternative Agendas

### Day 3 Agenda

Time	Duration	Description		
8:00 AM	15 min	Daily Overview and Reflection		
8:15 AM	60 min	Interactions With the Community: Health Promotion and Contact Tracing		
9:15 AM	45 min	Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccines		
10:00 AM	15 min	Break/FEMA med checks		
10:15 AM	30 min	Ebola Outbreak Frontline Video*		
10:45 AM	45 min	Resiliency Lecture		
11:30 AM	30 min	Course Closing		
12:00 PM	45 min	Lunch		
12:45 PM	15 min	Travel to ETU		
1:00 PM	3.75 hrs	Group A	Group B	Group C
		ETU	Review first day questions	Extra Practice Don/Doff
		Extra Practice Don/Doff	ETU	Review first day questions
		Review first day questions	Extra Practice Don/Doff	ETU
4:45 PM	15 min	Med Check		
5:00 PM	15 min	Travel to lodging		

\*See Ebola Outbreak Frontline Video, [Appendix A](#) for more information

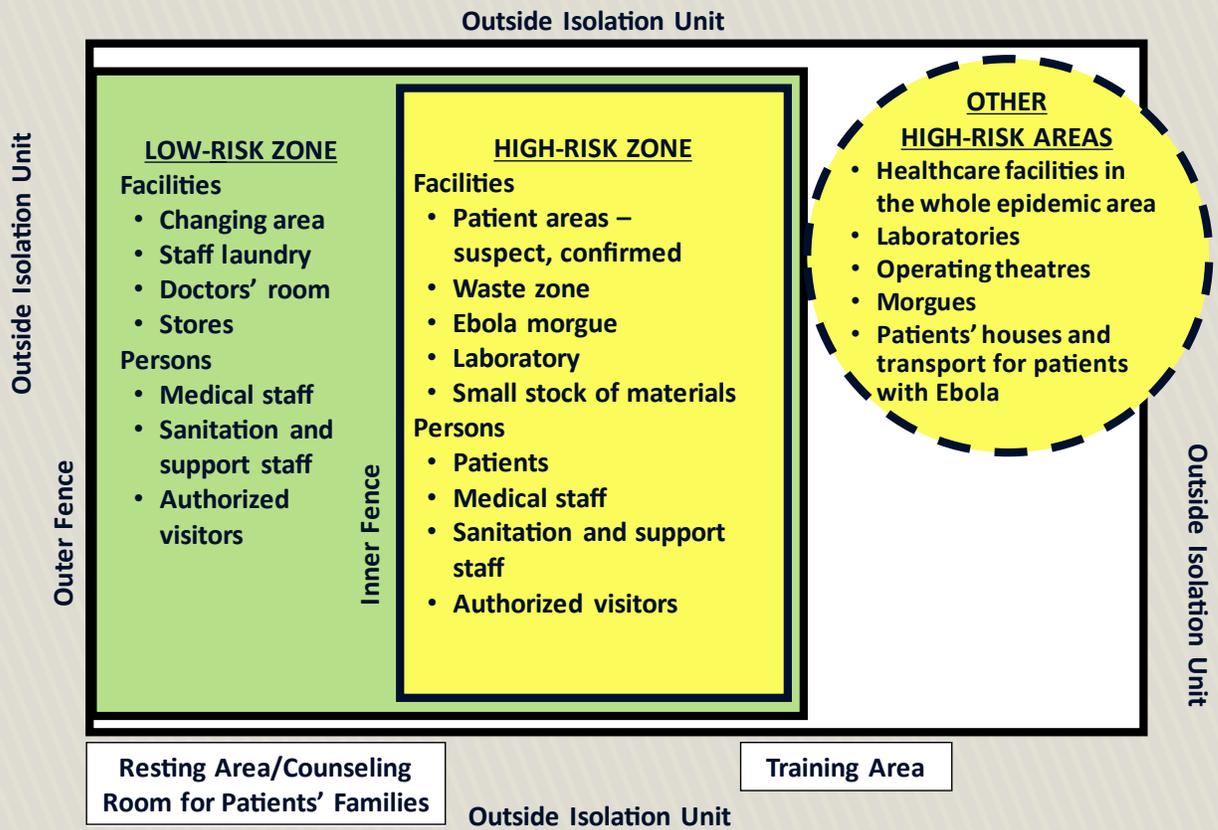
## Appendix C > Course Alternative Agendas

Group	ETU Entrance	ETU Time	ETU Practicum	Exercise 2	Exercise 3
A	Group 1	1:00	1:00 - 2:45	2:45 - 3:45	3:45 - 4:45
	Group 2	1:15	1:00 - 2:45	2:45 - 3:45	3:45 - 4:45
	Group 3	1:30	1:00 - 2:45	2:45 - 3:45	3:45 - 4:45
	Group 4	1:45	1:00 - 2:45	2:45 - 3:45	3:45 - 4:45
B	Group 5	2:00	2:00 - 3:45	3:45 - 4:45	1:00 - 2:00
	Group 6	2:15	2:00 - 3:45	3:45 - 4:45	1:00 - 2:00
	Group 7	2:30	2:00 - 3:45	3:45 - 4:45	1:00 - 2:00
	Group 8	2:45	2:00 - 3:45	3:45 - 4:45	1:00 - 2:00
C	Group 9	3:00	3:00 - 4:45	1:00 - 2:00	2:00 - 3:00
	Group 10	3:15	3:00 - 4:45	1:00 - 2:00	2:00 - 3:00
	Group 11	3:30	3:00 - 4:45	1:00 - 2:00	2:00 - 3:00
	Group 12	3:45	3:00 - 4:45	1:00 - 2:00	2:00 - 3:00



## Appendix E > High-risk and Low-risk Zone Diagram

### HIGH-RISK AND LOW-RISK ZONE DIAGRAM



## Appendix F > Donning (putting on) Gloves and Doffing (taking off) Gloves

### DONNING (PUTTING ON) GLOVES AND DOFFING (TAKING OFF) GLOVES



1. Take out a glove from its original box



2. Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff)



3. Don the first glove



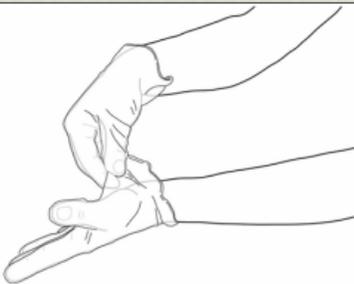
4. Take the second glove with the bare hand and touch only a restricted surface of glove corresponding to the wrist



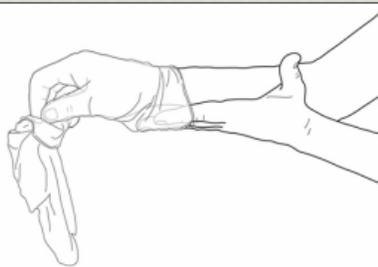
5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand



6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use



1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out



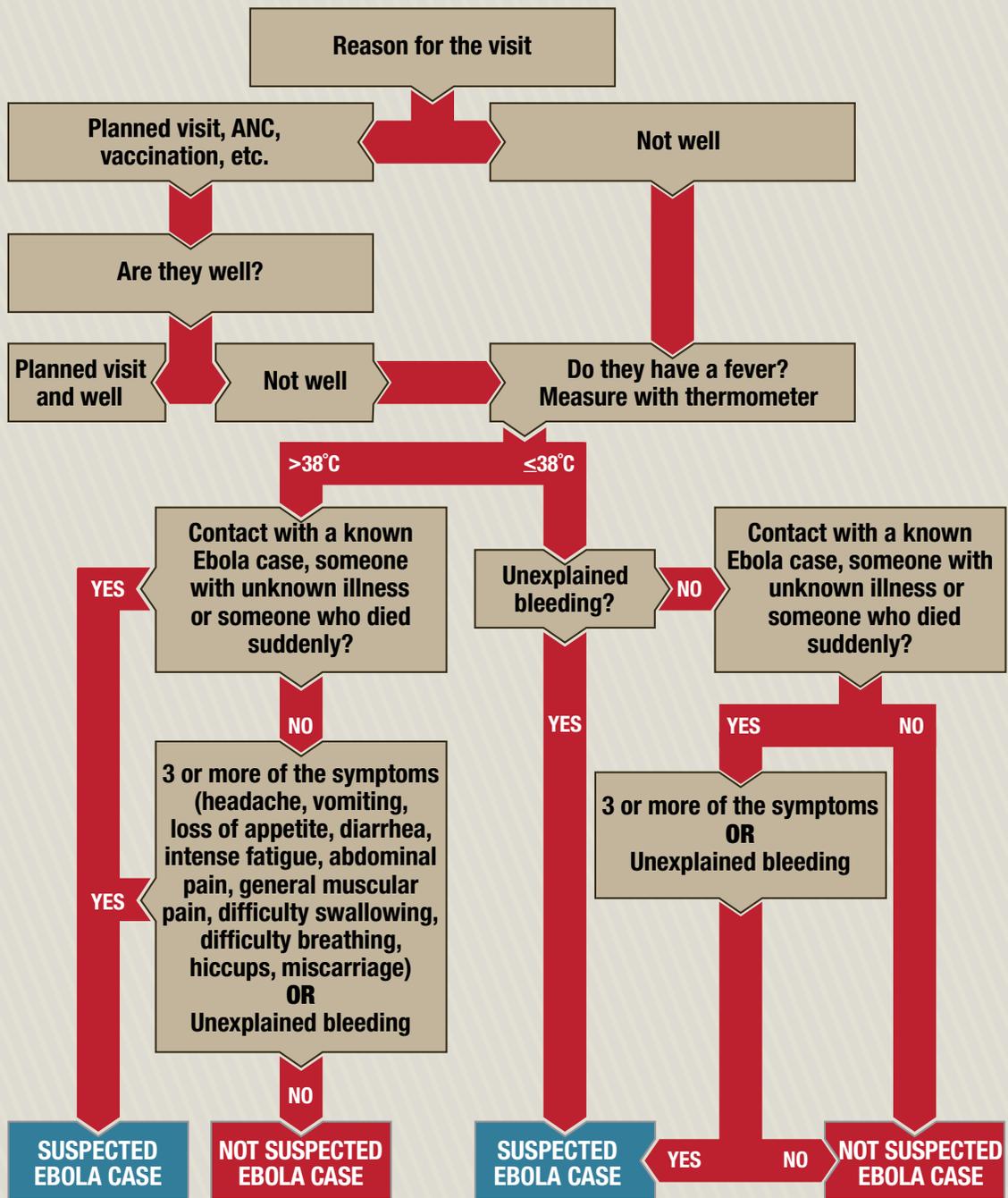
2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove



3. Discard the removed gloves

4. Then, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water

## WHO Screening (Triage) Algorithm for Healthcare Facilities in Guinea (example)



## Appendix H > Heat Illness Spectrum

### HEAT ILLNESS SPECTRUM

	Heat Cramps (Mildest)	Heat Exhaustion	Heat Stroke (Most Severe)
Core Temperature		>38°C or <100.6°F	>40.5°C or <104.9°F
Skin Temperature	Normal	Normal or Cool and Clammy	Hot and Dry (50% of cases)
Sweat Rate	Increased	Increased or Decreased	Decreased
Urine Output	Normal	Oliguria	Anuria
GI	Thirsty	Nausea +/- Vomiting	Nausea +/- Vomiting
CVS	Tachycardia	Hypotension	+/- Circulatory Collapse
CNS	None	Uncoordinated, Irritable, or Confused	Delirium, Seizure, Coma
Other	Thirst		Renal Failure, Liver Failure, DIC

## Appendix I > E-lecture Instructor Information

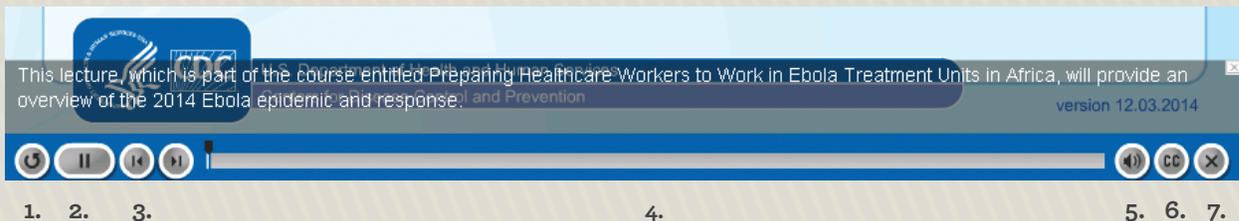
The e-lectures present the content of nine PowerPoint presentations covering various topics on Ebola virus disease and infection prevention and control principles in the Ebola Treatment Unit (ETU). Instructors should play the e-lectures for students in the classroom in the order determined by the course agenda. The e-lectures are shockwave flash (SWF) files that will play from a laptop or desktop computer. For optimal playback, save each of the e-lectures to your computer desktop.

### Moving through an E-lecture

The e-lectures are designed to advance automatically. There is a 2 to 3 second pause between slides; for slides with graphs or photos, there is a slightly longer pause to allow the student time to review the image. If the pause is too long between slides, you can advance the slide(s) manually by pressing the forward button (item #3 in diagram below).

You can adjust the volume or mute the narration (item #5 in the diagram below). You can also turn on the closed captioning and allow your students to read the narration (item #6 in the diagram below). The closed captioning mirrors the narration. At times the narration will sound slightly robotic because it is computer-generated.

The diagram below shows the navigation options (1 - 7) that appear at the bottom of the e-lecture screen.



- 1. Rewind** - When pressed, the course will restart from the beginning.
- 2. Play/Pause** - This button toggles between Play and Pause. As shown, it is in the Pause position; when pressed, the course will begin to play.
- 3. Forward** - When pressed, this button will advance one slide.
- 4. Progress Bar** - This bar is a visual indicator of progress through the e-lecture. As slides advance, the white bar will expand from left to right. As shown above, it is at the start of the e-lecture.
- 5. Audio** - When pressed, a bar appears that will allow you to adjust the volume of the narration. You can mute the narration with one quick click and a bar will appear across the button to indicate the narration is muted.
- 6. CC** - When pressed, the closed captioning appears at the bottom of the screen.
- 7. Exit** - When pressed, the e-lecture stops playing.

## Appendix I > E-lecture Instructor Information

### E-lecture Run Times

The approximate run time for each e-lecture is below. These times may vary depending on time spent interacting with your students on the knowledge assessment questions incorporated in the e-lectures.

	Title	Approximate Run Time
1.	Overview of 2014 Ebola Outbreak and Response *	30 minutes
2.	Ebola Virus Disease and Clinical Care Part I: History, Transmission, and Clinical Presentation	32 minutes
3.	Infection Prevention and Control for Healthcare Workers	33 minutes
4.	Staff Health and Support	29 minutes
5.	Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management	27 minutes
6.	Disinfection and Waste Management in the ETU	31 minutes
7.	Ebola Treatment Unit	34 minutes
8.	Interactions With the Community: Health Promotion and Contact Tracing	30 minutes
9.	Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccines	19 minutes

**\*NOTE:** Information at the end of this presentation will change regularly. Consider preparing a presentation with current information on the Ebola epidemic by referencing the following websites:

- ▶ **CDC website:** <http://www.cdc.gov/vhf/ebola>
- ▶ **CDC website:** <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>
- ▶ **CDC website:** <http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html>
- ▶ **WHO website:** <http://apps.who.int/ebola/>
- ▶ **MSF website:** <http://www.msf.org/diseases/ebola>

### E-lecture Questions

At the end of each e-lecture, there are knowledge assessment questions that provide an opportunity for interaction among the instructor and students. We suggest you open a discussion about each question while reviewing the possible answers. You may want to ask the class why each possible answer is either right or wrong. This should generate productive class discussion. Answer commentary for the knowledge assessment questions is provided in [Appendix D](#).

When you arrive at the knowledge assessment questions, the slides will display pause until an answer or answers are selected. After deciding on the answer(s), click the Enter key. Feedback explaining the answer will display.

To advance to the next question, click the Enter key.

### Knowledge Assessment Questions

#### OVERVIEW OF THE 2014 EBOLA EPIDEMIC AND RESPONSE

##### Describe major events in the current Ebola epidemic in West Africa

1. Put in chronological order these major events in the current Ebola epidemic in West Africa.
  - a. The World Health Organization (WHO) declared the current Ebola epidemic a Public Health Emergency of International Concern (PHEIC)
  - b. An Ebola-infected traveler from Liberia arrived in Lagos, Nigeria
  - c. Guinea reports an Ebola outbreak and Liberia reports sporadic cases
  - d. The number of Ebola cases sharply increases by this month as shown in the WHO epi curve

**Answer:** c, d, b, a

**Answer commentary:** In March 2014, Guinea reports an Ebola outbreak and Liberia reports sporadic cases. This event marks the first reporting of the Ebola epidemic in West Africa.

By June 2014, the number of Ebola cases sharply increases, according to the WHO epi curve. Sierra Leone reports an outbreak in the beginning of May, and Liberia reports a second outbreak in mid-May.

On July 20, 2014, an Ebola-infected traveler from Liberia arrived in Lagos, Nigeria. Many people in Nigeria were exposed, resulting in 19 confirmed cases of Ebola virus disease (EVD). Twelve cases recovered and seven died.

On August 8, 2014, WHO declared the current Ebola epidemic a Public Health Emergency of International Concern. This declaration indicated a need for a coordinated international response and was the precursor to the WHO Ebola Response Roadmap, published on August 28, 2014, which called for a scaled-up response to the epidemic.

##### Describe strategies used to control previous outbreaks

2. There are five key strategies used to control Ebola outbreaks. Name three of them.

**Possible answers:**

- ▶ Find suspected cases soon after symptom onset
- ▶ Get suspected cases into an Ebola Treatment Unit (ETU)
- ▶ Test with real-time virus diagnostics (field lab or regional lab)
- ▶ Find contacts and follow for 21 days
- ▶ Deliver risk reduction messages to the community and health centers

**Answer commentary:**

Each Ebola outbreak and epidemic is unique, so Ebola response and control measures may differ from outbreak to outbreak. However, these five key strategies have a long history of stopping outbreaks.

## Appendix J > Knowledge Assessment Questions

### Identify aspects of this epidemic that contribute to it being more difficult to control than previous outbreaks

3. Identify aspects of this epidemic that contribute to it being more difficult to control than previous outbreaks.

**Possible answers:**

- ▶ Geographic boundaries
- ▶ Lack of acceptance that Ebola is real
- ▶ Active community resistance
- ▶ Overburdened healthcare system
- ▶ Burial customs
- ▶ Healthcare worker infections

**Answer commentary:** There are many aspects of this epidemic that contribute to it being more difficult to control than previous outbreaks. Several lessons from the Ebola response have been learned. It has been shown outbreaks can move faster than the established methods used to control them. Therefore, new ways of implementing infection and control practices need to be established.

Geographic issues create multiple challenges. High population mobility across porous borders by multiple means, such as buses, boats, and cars, makes it hard to investigate new case leads, since people can migrate easily to another country. Contact tracing is also difficult in these circumstances.

Active community resistance and lack of acceptance that Ebola is real are challenges. This negatively impacts the ability to complete 100% contact tracing, as well as case identification.

Burial customs are a challenge. Funeral rituals consist of washing a corpse and touching a body without barrier protection. Acceptance of safe burial practices such as using full PPE is difficult among African cultures.

Lastly, an overburdened healthcare system has been a significant challenge in controlling this epidemic. There are insufficient numbers of healthcare workers to handle the epidemic, and in some instances, these workers are not being paid. Healthcare workers and others caring for those with Ebola are not always getting the training they need in infection prevention and control principles.

## Appendix J > Knowledge Assessment Questions

### Explain the role of the Ebola Treatment Unit healthcare worker in the current control strategy

4. As a healthcare worker in an ETU, what should be your primary goal?
  - a. Provide care to as many patients as possible
  - b. Stay healthy
  - c. Provide the most advanced treatments and vaccines
  - d. Stay abreast of the reach of the outbreak

**Answer:** b

**Answer commentary:** Ebola cases in healthcare workers in the affected West African countries are a major challenge to the current control strategy. More than 678 healthcare workers are known to have developed Ebola virus disease, of which about 55% have died from the disease. Training healthcare workers in infection prevention and control principles can help healthcare workers stay healthy so that they can provide care safely.

### EBOLA VIRUS AND CLINICAL CARE PART I: HISTORY, TRANSMISSION AND CLINICAL PRESENTATION

#### Describe the routes of Ebola virus transmission

1. Which of the following are known routes of Ebola virus disease transmission? Select all that apply.
  - a. Direct contact with blood or body fluids from an infected person through the eyes or other mucous membranes
  - b. Percutaneous injuries from objects contaminated with infectious materials
  - c. Person-to-person transmission of Ebola via inhalation (aerosols)
  - d. Direct contact with blood or body fluids from an infected person through breaks in the skin

**Answer:** a, b, and d

**Answer commentary:** Person-to-person transmission of Ebola via inhalation (aerosols) is not a known route of EVD. While it is possible in an experimental setting to create an infectious aerosol, aerosols are not typically generated in healthcare settings except under certain circumstances, such as during intubation or bronchoscopy. Viruses typically don't change transmission mechanism.

Transmission occurs via direct or indirect contact with body fluids from Ebola-infected persons or animals. Potentially infectious body fluids include blood, respiratory secretions, urine, feces, vomit, saliva, sweat, breast milk, semen, and vaginal secretions.

## Appendix J > Knowledge Assessment Questions

### Explain when and how patients are infectious

2. Fill in the blanks. Patients with Ebola are not infectious until the \_\_\_\_\_. Direct contact with \_\_\_\_\_ from an infected person is the major route of transmission.

**Answer:** *Patients with Ebola are not infectious until the onset of symptoms. Direct contact with body fluids from an infected person is the major route of transmission.*

**Answer commentary:** Patients with Ebola are not infectious until the onset of symptoms. Ebola has an incubation range of 2 to 21 days with 8 to 10 days being the most common incubation period. Evidence from this epidemic and previous outbreaks indicates direct contact with body fluids from an infected person is the major route of transmission. Potentially infectious body fluids include blood, respiratory secretions, urine, feces, vomit, saliva, sweat, breast milk, semen, and vaginal secretions. Levels of virus in blood and body fluids are very high, especially when patients are sickest and near death.

### Describe the clinical features of patients with Ebola

3. Name three initial clinical presentations of Ebola virus disease and three clinical features of EVD in severe disease.

**Possible answers:**

- ▶ Typical initial clinical presentation of EVD: Fever, chills, myalgia, malaise, weakness, nausea, headache, vomiting, diarrhea, abdominal pain, and spontaneous abortion/miscarriage
- ▶ Clinical features of EVD in severe disease: sepsis presentation, hemorrhagic symptoms, neuropsychiatric abnormalities, acute malnutrition, shock, and multiple organ failure

**Answer commentary:**

#### Typical initial clinical presentation of EVD

Fever is a very common early symptom, often accompanied by nausea, fatigue, or headache. Onset is often, but not always, abrupt. GI symptoms such as vomiting and diarrhea often follow the initial symptoms.

#### Clinical features of EVD in severe disease

In severe disease, a full-blown sepsis presentation is typical. Neuropsychiatric abnormalities such as agitation and confusion are also common in severe disease. In a setting where many persons have poor nutritional status at baseline, acute malnutrition is an issue in severe disease when patients cannot eat due to GI symptoms or weakness. Illness progresses to shock and multiple organ failure, and death in 50% or more of those infected.

## Appendix J > Knowledge Assessment Questions

### Describe screening criteria for EVD used in West Africa

4. According to WHO screening criteria for EVD, a person is considered a suspected case if they have a sudden onset of high fever and at least (blank) listed symptoms.

**Answer:** According to the WHO screening criteria for EVD, a person is considered a suspected case if they have a sudden onset of high fever and at least three listed symptoms.

**Answer commentary:** The symptoms and signs such as headaches, vomiting, diarrhea, lethargy, stomach pain, breathing difficulties, or even hiccups, along with others, are nonspecific. Because the symptoms are nonspecific and not unique to EVD, the screening criteria for a suspected case require at least three symptoms to be present.

### Explain how to identify patients with suspected cases of EVD who present to the ETU

5. A screening algorithm is used to identify patients with suspected cases of EVD who present to the ETU. According to the WHO algorithm, what is the first step that needs to be taken among persons not feeling well who present at a healthcare facility or ETU?

**Answer:** Determine if they have a fever.

**Answer commentary:** Presence of fever among persons not feeling well is the first step. Fever and known contact are immediate grounds for classifying a person as a suspected case. Persons with fever but no known contact become suspected cases if they have three or more additional symptoms. Any unexplained bleeding, regardless of fever, is a suspected case. Finally, even if there is no fever, patients can be classified as suspected if there was direct contact and other symptoms are present.

## EBOLA VIRUS AND CLINICAL CARE PART II: DIAGNOSIS AND CLINICAL MANAGEMENT

### Describe the diagnostic tests and appropriate samples used to make triage and clinical decisions

1. What is the current standard test used to diagnose and make clinical decisions in the ETU and what is the preferred specimen?

**Answer:** RT-PCR is the current standard test to make clinical decisions in the ETU and the preferred specimen is blood.

**Answer commentary:** Other tests besides the RT-PCR are rarely used to make decisions in the ETU. Blood testing is the standard for RT-PCR. This should preferably be venous blood collected in an EDTA Tube (purple-top tube) with anticoagulant. Venous blood in a dry tube (with a red top) without anticoagulant can be used for PCR or serology.

## Appendix J > Knowledge Assessment Questions

### Describe clinical management of EVD, including treatment of common symptoms

2. Treatments for the manifestations and complications of Ebola virus disease include which of the following? Select all that apply.
  - a. Promethazine/metoclopramide for nausea and vomiting
  - b. Aggressive oral rehydration for diarrhea
  - c. Diazepam for agitation
  - d. NSAIDs for fever and pain

**Answer:** a, b, and c

**Answer commentary:** The ETU focus is on treating the treatable manifestations and complications of EVD. Patients can be provided with a variety of treatments aimed at relieving their symptoms. Patients should not be given NSAIDs to treat fever and pain because of concerns about thrombocytopenia or bleeding.

Diarrhea should be managed as effectively as possible with aggressive oral rehydration and IV hydration when possible for those unable to take hydration orally. Patients with Ebola can become agitated, and this makes treatment and even management in the high-risk zone more difficult. In these situations, diazepam might help. Fever and pain can be reduced by using paracetamol or acetaminophen.

### Explain criteria for discharge of patients with confirmed and suspected Ebola

3. How often and when is the RT-PCR test used to discharge patients with suspected and confirmed Ebola?

**Answer:**

**A suspected case:** may be discharged if RT-PCR test is negative three or more days after symptom onset. If RT-PCR is negative less than three days after symptom onset, retest three or more days after onset.

**A confirmed case:** requires a negative RT-PCR test.

**Answer commentary:** It is important to note that only a negative RT-PCR test three or more days after symptom onset can be used to make discharge decisions for a suspected case. Confirmed cases require both clinical and laboratory clearance. In addition to a negative RT-PCR test, confirmed patients must go three days without symptoms that could indicate ongoing shedding of virus, such as fever, vomiting, diarrhea, or bleeding, and be able to perform daily living activities before discharge decisions can be made.

## Appendix J > Knowledge Assessment Questions

### Describe measures to improve post-discharge outcomes

4. List at least three actions ETU staff should do for a recovered patient when discharging him/her?

**Possible answers:**

- ▶ Provide disinfection supplies
- ▶ Provide replacement provisions (e.g., clothing, food, possibly money)
- ▶ Provide condoms
- ▶ Provide supply of vitamin supplements
- ▶ Explain why using condoms or abstinence for three months is important
- ▶ Submit referrals to follow-up care

**Answer commentary:** When discharging a recovered patient, it is recommended the ETU staff provide disinfection supplies, replacement provisions such as clothing, food, and in some instances, money, condoms for three months, and vitamin supplements. Discharge planners should discuss with patients why using condoms or abstaining from sex for three months is important (i.e., viral shedding). Some patients may need to be referred for follow-up care because of other health issue, or lingering effects of EVD.

### EBOLA VIRUS AND CLINICAL CARE PART III: EXPERIMENTAL TREATMENTS AND VACCINES

#### Recognize supportive care is a cornerstone of clinical management for patients with Ebola

1. \_\_\_\_\_ is a cornerstone of clinical management for patients with Ebola.

**Answer:** *Supportive care is a cornerstone of clinical management for patients with Ebola.*

**Answer commentary:** Supportive care is a cornerstone of clinical management of Ebola, with a particular focus on fluid resuscitation, electrolyte repletion, symptom relief, and use of empiric antibiotics and antimalarials.

## Appendix J > Knowledge Assessment Questions

### Understand types of supportive care used in caring for patients with Ebola

2. Match the symptom of Ebola or other type of infection with the corresponding treatment.

**Symptom/Infection**

**Treatment**

- |                                      |   |
|--------------------------------------|---|
| a. Hypovolemia +/- sepsis physiology | 1. Antibiotics for possible gut translocation, antimalarials  |
| b. Electrolyte abnormalities         | 2. Aggressive IV fluid resuscitation, Ringer's lactate solution, and oral rehydration salts solution (ORS)                                      |
| c. Other infections                  | 3. Oral rehydration salts solution (ORS), Ringer's lactate solution, K <sup>+</sup> , Mg <sup>++</sup> , glucose, HCO <sub>3</sub> <sup>-</sup> |

**Answer:**

**Symptom/Infection**

**Treatment**

- |                                      |   |
|--------------------------------------|---|
| a. Hypovolemia +/- sepsis physiology | 2. Aggressive IV fluid resuscitation, Ringer's lactate solution, and oral rehydration salts solution (ORS)                                      |
| b. Electrolyte abnormalities         | 3. Oral rehydration salts solution (ORS), Ringer's lactate solution, K <sup>+</sup> , Mg <sup>++</sup> , glucose, HCO <sub>3</sub> <sup>-</sup> |
| c. Other infections                  | 1. Antibiotics for possible gut translocation, antimalarials  |

**Answer commentary:**

**Hypovolemia +/- sepsis physiology:** Patients will often have hypovolemia due to capillary leak, and exhibit a sepsis-like physiology. They might respond well to aggressive IV fluid resuscitation. However, intravenous line placement and maintenance entails risk to the healthcare worker who must place and take care of it. In some ETUs, oral rehydration salts solution (ORS) is preferred for this reason.

**Electrolyte abnormalities:** It should be assumed electrolytes are being lost even in the absence of lab testing. Therefore, electrolyte abnormalities from GI losses should be replaced. Oral rehydration salts solution is one option used to treat electrolyte abnormalities. Another option is an intravenous saline with Ringer's lactate, which is the preferred IV solution because of the presence of potassium and lactate, or normal saline can be supplemented with K<sup>+</sup>, Mg<sup>++</sup>, glucose, or HCO<sub>3</sub><sup>-</sup>.

**Other infections:** Most ETUs provide empiric therapy for other infections that can complicate Ebola virus disease, including antibiotics for possible gut translocation and antimalarials.

## Appendix J > Knowledge Assessment Questions

### Understand the role of current investigational therapies and vaccines for the treatment of, or prophylaxis against, EVD.

3. Which of the following therapeutic interventions have been tried during the current epidemic? Select all that apply
- Convalescent serum*
  - ZMapp, a monoclonal antibody cocktail by Mapp Bio*
  - TKM-Ebola, a TRNAi therapeutic by Tekmira*

**Answer:** *a, b, and c*

**Answer commentary:** In addition to convalescent serum, ZMapp, and TKM-Ebola, Brincidofovir, and Favipiravir are treatments currently being investigated for the treatment of Ebola virus disease. At present, there are no specific treatments or vaccines for EVD.

### DISINFECTION AND WASTE MANAGEMENT IN THE ETU

#### Identify how and when to use chlorine solution and the correct strengths for different uses

1. State whether the following items require a 0.5% chlorine solution or 0.05% chlorine solution for Ebola virus disinfection.
- |                        |   |
|------------------------|---|
| <i>a. Corpses</i>      | <i>h. Linens (scrubs)</i>   |
| <i>b. Surfaces</i>     | <i>i. Thermometers</i>  |
| <i>c. Bare hands</i>   | <i>j. Blood</i>   |
| <i>d. Vomit</i>        | <i>k. Eating utensils used by patients in the high-risk zone for re-use</i> |
| <i>e. Face</i>         | <i>l. Gloved hands</i>  |
| <i>f. Exposed skin</i> |   |
| <i>g. Diarrhea</i>     |   |

**Answer:**

#### **0.5% Chlorine Solution**

- Corpses
- Surfaces
- Vomit
- Diarrhea
- Blood
- Gloved hands

#### **0.05% Chlorine Solution**

- Bare hands
- Face
- Exposed skin
- Linens (scrubs)
- Thermometers
- Eating utensils used by patients in the high-risk zone for re-use

**Answer commentary:**

**0.5% chlorine solution:** 0.5% chlorine solution is used to disinfect most non-living items, including corpses, contaminated surfaces, infectious body fluids (such as vomit, diarrhea, and blood), and gloved hands.

**0.05% chlorine solution:** 0.05% chlorine solution is used to disinfect living tissue and other chlorine-sensitive materials. These include all living skin, including bare hands, face, and other exposed skin, staff linens (mainly scrubs), thermometers, and eating utensils used by patients and left in the high-risk zone for reuse.

## Appendix J > Knowledge Assessment Questions

### Identify proper ways to dispose of various wastes

2. Complete the sentences below about waste disposal in the ETU.
  - a. Sharps containers ideally should be...
  - b. Trash cans should be used for...
  - c. Body spills and materials used to clean the spills should be...
  - d. Wastewater and human waste are disposed of in...

**Answer:**

- a. Sharps containers ideally should be leak-proof and puncture-resistant.
- b. Trash cans should be used for solid waste.
- c. Body spills and materials used to clean the spills should be double-bagged in biohazard bags and incinerated.
- d. Wastewater and human waste are disposed of in an isolated latrine or toilet designated for waste contaminated with Ebola virus.

**Answer commentary:** Waste disposal practices might vary in different ETUs. However, knowing the various ways to dispose of waste in the ETU reduces contamination and hygiene risks.

### Describe procedures for disinfection in the ETU

3. State whether the following statements are true or false when cleaning and disinfecting ETU surfaces.
  - a. Always wear low-risk PPE when cleaning/disinfecting the ETU
  - b. Only use 0.5% chlorine solution that has been prepared the same day
  - c. Start in “clean” areas and move toward “dirty” areas
  - d. Dry sweep or wipe ETU floors with a broom or dry cloth
  - e. Spray disinfectant into the air in occupied or unoccupied clinical areas

**Answer:**

- a. Always wear low-risk PPE when cleaning/disinfecting the ETU - **False**
- b. Only use 0.5% chlorine solution that has been prepared the same day - **True**
- c. Start in “clean” areas and move toward “dirty” areas - **True**
- d. Dry sweep or wipe ETU floors with a broom or dry cloth - **False**
- e. Spray disinfectant into the air in occupied or unoccupied clinical areas - **False**

**Answer commentary:** When cleaning and disinfecting ETU surfaces, ALWAYS wear full PPE. Do not dry sweep or wipe with a broom or dry cloth. This could pick up particles and spread infectious materials. Similarly, disinfectant should not be sprayed into the air, either in occupied or unoccupied rooms. Ebola virus is not spread by airborne transmission, so spray disinfectant is not effective and it is possibly harmful.

## Appendix J > Knowledge Assessment Questions

### Describe safe handling, moving, and burial of a corpse

4. Which of the following are steps in transporting a deceased patient in the ETU?
  - a. Label an empty body bag with patient's name and ID number before entering the high-risk zone.
  - b. Assess the situation, and confirm the patient is deceased and no obstacles are in the way for safe transport of the corpse.
  - c. Put a screen around the bed of the deceased for privacy.
  - d. Place all soiled materials (linens, clothing) in a leak-proof biohazard bag and incinerate.

**Answer:** a, b, and c

**Answer Commentary:** All soiled materials such as linens and clothing should be placed inside the body bag with the corpse—not in biohazard bags for incineration. The corpse and all soiled materials should then be sprayed with 0.5% chlorine solution inside the body bag. The bag should then be zipped closed, and the outside of the bag should be sprayed with 0.5% chlorine solution.

### EBOLA TREATMENT UNIT

#### Recognize the ETU's place in the system of safety designed to prevent transmission of Ebola

1. What is the ETU's main function in the system of safety that is designed to prevent transmission of Ebola?

**Answer:** The ETU's main function is to keep high-risk patients and activities in one area.

**Answer commentary:** In summary, the main function of the ETU is to keep high-risk patients and activities in one area. The high-risk zone requires special infection prevention and control procedures, including PPE for staff and stringent environmental controls. ETU staff and patient movements always proceed from lower-risk to higher-risk areas—never reverse this flow. ETU infection prevention and control procedures should be consistent and unvarying regardless of the sponsoring organization.

#### Describe the organization design and operating principles of the ETU

2. Describe three organization design and operating principles of the ETU.

**Possible answers:**

- ▶ Infection prevention and control, including patient isolation
- ▶ Staff and patient flow
- ▶ Separation of suspected cases and confirmed cases
- ▶ Waste management
- ▶ Disinfection and hygiene
- ▶ PPE

**Answer commentary:** The ETU is designed to address the mechanism of person-to-person Ebola virus transmission. To review, the Ebola virus is present in high quantities in body fluids of symptomatic patients, such as blood, vomit, diarrhea, and saliva. Transmission occurs through contact with these infectious body fluids, either through direct contact with broken skin or unprotected mucous membranes, or through indirect contact with contaminated objects like syringes, other medical equipment, and soiled linens. There are several ETU infection prevention and control principles used to control person-to-person transmission of Ebola virus.

## Appendix J > Knowledge Assessment Questions

3. What are the three risk areas to be aware of in and around the ETU?

**Answer:** *The low-risk zone, the high-risk zone, and the area outside of the ETU.*

**Answer commentary:** The low-risk zone is a staff-only area. This includes medical staff, cleaning staff, water and sanitation, and logistics staff.

The main function of the high-risk zone is to care for patients with suspected or confirmed Ebola virus disease. Patient specimens are also collected in the high-risk zone. Everything in the high-risk zone—walls, floors, cots, personal belongings, paperwork, patients, and exposed PPE—should be considered contaminated.

There are several high-risk areas outside of the ETU that we must not forget. In fact, these areas are just as risky, if not more risky, than the ETU because PPE might not be available. For instance, patient triage (or screening) occurs outside the ETU, and several areas in the community can also present risk, such as hospitals with poor infection prevention and control infrastructure or patients' and deceased patients' houses.

### Explain staff and patient flow through the ETU

4. Fill in the blank. Staff movement inside the ETU always flows from \_\_\_\_\_ to \_\_\_\_\_.

**Answer:** *Staff movement inside the ETU always flows from lowest risk to highest risk.*

**Answer commentary:** Movement always flows from lowest risk to highest risk. The ETU is designed to have clearly delineated low-risk and high-risk areas with a well-defined unidirectional flow from low-risk to high-risk zones. Staff and patient movement inside the ETU is important to isolate the high-risk zone. Staff members enter the ETU in the low-risk zone, which is a staff-only area. Patients also move from lowest risk to highest risk, but their movements are confined to the high-risk zone since no patients are allowed in the low-risk zone.

### Describe infection prevention and control practices in the ETU

5. Which chlorine concentration should be used to wash bare hands? Select the one best answer.
- 0.05% chlorine solution
  - 0.5% chlorine solution
  - Either 0.05% or 0.5% chlorine solution (whichever is available)

**Answer:** *a*

**Answer commentary:** There are two different concentrations of chlorine solutions used for different purposes throughout the ETU: 0.5% and 0.05%. The 0.5% chlorine solution is a strong caustic solution. Avoid direct contact with skin and eyes. This chlorine solution should be used to disinfect infectious body fluids such as vomit, diarrhea, and blood, as well as corpses, toilets, gloved hands, floors, beds, and mattress covers. 0.05% chlorine solution can be used to disinfect bare hands and other living skin, thermometers and other medical equipment, staff laundry (such as scrubs, since 0.5% is very harsh on linens), and plates, cups, and eating utensils used by patients and kept in the high-risk zone.

## Appendix J > Knowledge Assessment Questions

### INTERACTIONS WITH THE COMMUNITY: HEALTH PROMOTION AND CONTACT TRACING

#### Explain the role of health promotion in Ebola outbreak management

1. Health promotion is a two-way dialogue between \_\_\_ and \_\_\_ to facilitate outbreak control.

**Answer:** Health promotion is a two-way dialogue between the ETU team and the community to facilitate outbreak control.

**Answer commentary:** As a team member in the ETU, an important part of your role is to be sure patients and other staff receive clear and simple messages. The goal is to have such messages become part of the culture within the ETU.

Within the community, it is important to promote messages to a range of audiences, including local healers, other healthcare workers, and community leaders. It is important to maintain cultural awareness of who will be most effective in delivering the message.

#### Understand the importance of appropriate health promotion messages targeted at the community about the ETU

2. Which of the following are appropriate health promotion messages about the ETU? Select all that apply.
  - a. How does the ETU keep the community safer?
  - b. How can ETU best practices be simulated for at-home care?
  - c. How does the ETU function?
  - d. What treatment is available at the ETU?

**Answer:** a, c, and d

**Answer commentary:** Health promotion messages about simulating ETU design for at-home care are not appropriate health promotion messages. It is important to be able to explain who should go to the ETU and why. Clear messaging needs to explain what treatment is available, how the ETU works, why it can provide the best medical care, and how it helps keep the community safe.

#### Describe the importance of contact tracing

#### Explain the role of healthcare workers in health promotion and contact tracing

3. Which of the following is true about conducting contact tracing? Select all that apply.
  - a. Contact tracing is a process used to identify every person who may have had exposure to a person with Ebola (dead or alive) during the past 21 days.
  - b. Risk level is defined and based on the type of contact that occurred.
  - c. Contact tracing is done by healthcare workers who are directly caring for patients.
  - d. Contact tracers conduct daily visits for 21 days after the contact's last interaction with a confirmed case, and generally do not wear PPE when visiting communities.

**Answer:** a, b, and c

**Answer commentary:** Contact tracing is not done by healthcare workers who are directly caring for patients. Instead, it is conducted by public health workers as part of the epidemiologic component of the response. However, all healthcare workers, as part of the healthcare team, need to understand and facilitate contact tracing.

## Appendix J > Knowledge Assessment Questions

4. What is the key to controlling an Ebola outbreak?

**Answer:** *Rapid identification of contacts through contact tracing is the key to controlling an Ebola outbreak.*

**Answer commentary:** A single case can become a multitude of cases with just one or two exposures. Quick identification of cases allows the ability to isolate them from a larger group of contacts who may expose even more people.

### Recognize interactions that constitute a case contact

5. Please match the interactions on the left with the definitions on the right.

#### Interaction

Contact

**Definition**  
Someone who has been within three feet of a person with EVD for a prolonged time without wearing PPE, such as being in the same household or workplace.

Direct contact

Anyone who had exposure to a person with Ebola (dead or alive) during the past 21 days.

Close contact

Someone exposed by a needlestick, by a splash to the mucous membranes, or by having touched any infected body fluids or a dead body without wearing appropriate PPE.

**Answer:**

#### Interaction

Contact

**Definition**  
A contact is anyone who had exposure to a person with Ebola (dead or alive) during the past 21 days.

Direct contact

Someone exposed by a needlestick, by a splash to the mucous membranes, or by having touched any infected body fluids or a dead body without wearing appropriate PPE.

Close contact

Someone who has been within three feet of a person with EVD for a prolonged time without wearing PPE, such as being in the same household or workplace.

**Answer commentary:** It is important to identify every single contact of every single Ebola case. There are different types of contact. Risk level is defined and based on the type of contact that occurred.

## Appendix J > Knowledge Assessment Questions

### INFECTION PREVENTION AND CONTROL FOR HEALTHCARE WORKERS

#### Explain the rationale for recommended infection prevention and control principles for Ebola virus

1. Which of the following types of transmission are known to have occurred in the current epidemic in West Africa? Select all that apply.
  - a. Contact
  - b. Droplet
  - c. Airborne

**Answer:** a and b

**Answer commentary:** A primary transmission route is contact transmission. Direct contact means body fluids such as blood, saliva, mucus, vomit, urine, or feces from an infected person, whether alive or dead, have touched someone's eyes, nose, mouth, or an open cut, wound, or abrasion.

Ebola can theoretically be transmitted by large droplets generated by coughing, sneezing, or talking. These large droplets may be produced during certain medical procedures, such as resuscitation, suctioning, or bronchoscopy. However, aerosol transmission is unlikely. This would be transmission through tiny airborne droplets containing virus that remain suspended in the air for long periods of time, or dust particles containing the virus. There is no evidence Ebola virus is transmitted this way. Airborne transmission does not fit the epidemiologic pattern seen in this epidemic or other Ebola outbreaks.

#### Describe infection prevention and control principles currently recommended for Ebola virus

2. Name three of the six standard, contact, and droplet principles recommended for managing EVD infection.

**Possible answers:**

- ▶ Hand and respiratory hygiene
- ▶ PPE
- ▶ Infection and medication safety
- ▶ Appropriate use/cleaning of patient care equipment, instruments, and devices
- ▶ Environmental cleaning
- ▶ Safe management of corpses

**Answer commentary:** The key elements of healthcare principles focused on in the *Infection Prevention and Control for Healthcare Workers* lecture are hand and respiratory hygiene, PPE, and injection and medication safety. However, other infection prevention and control issues are critically important, including appropriate use and cleaning of patient care equipment, cleaning of the ETU environment, and safe management of corpses.

## Appendix J > Knowledge Assessment Questions

3. What are the standard infection prevention and control principles for all facilities where patients with Ebola are present? Select all that apply.
- Hand hygiene before and after touching any patient*
  - PPE use, including gloves, suits, and masks, when you interact with suspected patients*
  - Safe injection practices and safe handling of equipment and surfaces that may be contaminated*
  - All of the above*

**Answer:** *d*

**Answer commentary:** Hand hygiene, PPE usage, and injection and medication safety cannot be stressed enough. They are critical infection prevention and control measures to stop the spread of the Ebola virus. PPE will vary depending on the practices of your ETU. However, certain principles shared in the lecture are universal. WHO, MSF, and CDC infection prevention and control guidelines are updated frequently and might differ slightly. But all are based on experience, science, and expert opinion.

### Describe the principles of using PPE safely in the ETU

4. Match the following principles of using PPE to the donning or to the doffing process. Note: not all will apply.
- ▶ Remember how many pieces of PPE you need
  - ▶ Remove the most contaminated PPE first
  - ▶ Remove face and eye protection first
  - ▶ Protect the eyes and mucous membranes
  - ▶ Keep gloved hands clean
  - ▶ Remember to constantly adjust PPE to avoid a safety breach
  - ▶ Ask your buddy to visually inspect your suit and PPE integrity
  - ▶ Follow recommended order to aid muscle memory and adherence to the correct PPE

**Answer:**

Neither “Remember to constantly adjust PPE to avoid a safety breach” nor “Remove face and eye protection first” are principles of using PPE.

- ▶ **Donning:** Remember how many pieces of PPE you need so you always have everything before donning. Follow recommended order of donning to aid muscle memory and adherence to the correct PPE. Ask your buddy to visually inspect your suit and PPE integrity.
- ▶ **Doffing:** Remove the most contaminated PPE first. Protect the eyes and mucous membranes. Keep gloved hands clean so they can remove PPE without spreading contamination.

**Answer commentary:** While wearing PPE, avoid touching or adjusting PPE, especially on your face. Removing goggles too early during doffing is a dangerous mistake because you might contaminate your face.

## Appendix J > Knowledge Assessment Questions

### STAFF HEALTH AND SUPPORT

#### Describe strategies to avoid dehydration, heat illness or heat stroke, malaria, and other health risks both inside and outside the ETU

1. List five strategies to avoid dehydration, heat stroke, malaria, and other health risks both inside and outside the ETU.

**Possible answers:**

- ▶ Know the signs and symptoms of heat illness
- ▶ Monitor yourself and your buddy
- ▶ Gradually build up to working in the heat while wearing PPE
- ▶ Rotate staff between jobs that require PPE and jobs that do not
- ▶ Take recommended malaria prophylaxis faithfully
- ▶ Use insecticide-treated nets when you sleep at night
- ▶ Use insect repellent
- ▶ Frequent handwashing
- ▶ Only drink safe water and ice that has been chlorinated, filtered, or boiled
- ▶ Aim for at least 7-8 hours of sleep every 24 hours

**Answer commentary:** Working in the ETU is exhausting, both mentally and physically. Recognizing this will help you plan and focus on the essential work you will be performing during deployment.

#### Identify actions to take if you suspect you have had an Ebola virus exposure

2. Which of the following are appropriate responses to a breach in PPE? Select all that apply.
  - a. Complete your current task before alerting your buddy.
  - b. Immediately exit the ETU and do not doff PPE.
  - c. Safely exit from high-risk zone, safely doff PPE, and report the incident to the safety manager.
  - d. Report any subsequent symptoms of disease to your clinician-in-charge immediately.

**Answer:** c and d

**Answer commentary:** If exposure is suspected, you should immediately stop working and follow post-exposure protocol. Safely exit from the high-risk zone. It is crucial you safely doff PPE.

3. For a needlestick or similar injury, immerse the exposed site in \_\_\_% alcohol for 30 seconds or \_\_\_% chlorine solution for three minutes.

**Answer:** For a needlestick or similar injury, immerse the exposed site in 70% alcohol for 30 seconds or 0.5% chlorine solution for three minutes.

**Answer commentary:** MSF has guidelines for action to take after a suspected exposure. These are based on common sense, but are unproven.

## Appendix J > Knowledge Assessment Questions

### Recognize when to access physical or emotional care and other support for healthcare workers

#### Describe specific measures staff can take before, during, and after deployment to maintain physical and emotional health

4. Match the following activities to maintain your physical and emotional health to whether they should happen before, during, or after deployment.
  - a. Consult a travel medicine physician and get all recommended vaccinations before you leave.
  - b. Wash hands frequently using soap and water or alcohol-based hand sanitizer.
  - c. Know how to monitor your temperature and symptoms.
  - d. Expect to have an emotional reaction to the deployment.
  - e. Know the signs and symptoms of heat illness, such as nausea, vomiting, poor coordination, or core temperature over 100.6°F.
  - f. Consider ways to reassure your family and friends.
  - g. Start malaria prophylaxis.
  - h. Mentally rehearse and re-rehearse actions you will need to take, especially donning and doffing PPE.
  - i. Follow your sponsor organization's policies on interactions with the community and with other ETU staff.
  - j. Attend scheduled debriefings or counseling.
  - k. Take recommended malaria prophylaxis faithfully.

#### **Answer:**

##### ▶ **Before Deployment**

Consult a travel medicine physician and get all recommended vaccinations before you leave  
Mentally rehearse and re-rehearse actions you will need to take, especially donning and doffing PPE  
Start malaria prophylaxis

##### ▶ **During Deployment**

Wash hands frequently using soap and water or alcohol-based hand sanitizer  
Follow your sponsor organization's policies on interactions with the community and with other ETU staff  
Take recommended malaria prophylaxis faithfully  
Know the signs and symptoms of heat illness, such as nausea, vomiting, poor coordination, or core temperature over 100.6°F

##### ▶ **After Deployment**

Know how to monitor your temperature and symptoms  
Expect to have an emotional reaction to the deployment  
Attend scheduled debriefings or counseling  
Consider ways to reassure your family and friends

**Answer commentary:** To stay safe, adopt a know-before-you-go approach. Risk can be reduced with simple actions.

## Appendix K > Up-to-date Information on the Ebola Epidemic

### Up-to-date Information on the Ebola Epidemic

- ▶ Centers for Disease Control and Prevention (CDC) - <http://www.cdc.gov/vhf/ebola/>
  - Ebola Case Information - <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>
- ▶ Médecins Sans Frontières (MSF) - <http://www.msf.org/diseases/ebola>
- ▶ World Health Organization (WHO) - <http://apps.who.int/ebola/>
  - Outbreak Map - <http://www.who.int/csr/disease/ebola/maps/en/>

### Health Protocols, Guidelines, and Recommendations

- ▶ Case Definition Recommendations for Ebola or Marburg Virus Diseases (WHO) - <http://www.who.int/csr/resources/publications/ebola/ebola-case-definition-contact-en.pdf>
- ▶ Clinical Management of Patients with Viral Haemorrhagic Fever: A Pocket Guide for the Front-line Health Workers (WHO) - <http://www.who.int/csr/resources/publications/clinical-management-patients/en/>
- ▶ Ebola Lab Guidance (CDC) - <http://www.cdc.gov/vhf/ebola/pdf/ebola-lab-guidance.pdf>
- ▶ Ebola Response Roadmap (WHO) - <http://www.who.int/csr/resources/publications/ebola/response-roadmap/en/>
- ▶ Emergency Responder Health Monitoring and Surveillance (CDC) - <http://www.cdc.gov/niosh/topics/erhms/predeploy.html>
- ▶ Filovirus Haemorrhagic Fever Guideline (MSF) - <http://www.slamviweb.org/es/ebola/FHFfinal.pdf>
- ▶ Filovirus Haemorrhagic Fever in Health-Care Settings, with Focus on Ebola (WHO) - <http://www.who.int/csr/resources/publications/who-ipc-guidance-ebolafinal-09082014.pdf>
- ▶ For General Healthcare Settings in West Africa: Personal Protective Equipment (PPE) Recommended for Low Resource Settings (CDC) - <http://www.cdc.gov/vhf/ebola/hcp/international/recommended-ppe.html>
- ▶ Guidance on Personal Protective Equipment to Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On (Donning) and Removing (Doffing) (CDC) - <http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html>
- ▶ Hand Hygiene in Health Care in the Context of Filovirus Disease Outbreak Response (WHO) - <http://www.who.int/csr/resources/publications/ebola/hand-hygiene/en/>
- ▶ Health Information for International Travel 2014 - Yellow Book (CDC) - <http://wwwnc.cdc.gov/travel/page/yellowbook-home-2014>
- ▶ Infection Control for Viral Haemorrhagic Fevers in the African Health Care Setting (WHO) - <http://www.who.int/csr/resources/publications/ebola/whoemcesr982sec1-4.pdf>
- ▶ Infection Prevention and Control Guidance in Health-care Settings, with Focus on Ebola (WHO) - [http://www.who.int/csr/resources/publications/ebola/filovirus\\_infection\\_control/en/](http://www.who.int/csr/resources/publications/ebola/filovirus_infection_control/en/)
- ▶ Interim Guidance for Healthcare Workers Providing Care in West African Countries Affected by the Ebola Outbreak: Limiting Heat Burden While Wearing Personal Protective Equipment (CDC) - <http://www.cdc.gov/vhf/ebola/hcp/limiting-heat-burden.html>
- ▶ Interim Guideline: Nutritional Care of Children and Adults with Ebola Virus Disease in Treatment Centres (WHO) - [http://apps.who.int/iris/bitstream/10665/137425/1/9789241508056\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/137425/1/9789241508056_eng.pdf)
- ▶ Interim U.S. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure (CDC) - <http://www.cdc.gov/vhf/ebola/exposure/monitoring-and-movement-of-persons-with-exposure.html>

## Appendix L > Health Protocols, Guidelines, and Recommendations Website

- ▶ Personal Protective Equipment, General Requirements (Occupational Safety and Health Administration [OSHA]) - [https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=standards&p\\_id=9777](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9777)
- ▶ Personal Protective Equipment in the Context of Filovirus Disease Outbreak Response (WHO) - <http://who.int/csr/resources/publications/ebola/ppe-guideline/en/>
- ▶ Personal Protective Equipment, Respiratory Protection (OSHA)- [https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_id=12716&p\\_table=STANDARDS](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=STANDARDS)
- ▶ Psychological First Aid During Ebola Virus Disease Outbreaks (WHO) - [http://apps.who.int/iris/bitstream/10665/131682/1/9789241548847\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/131682/1/9789241548847_eng.pdf?ua=1)
- ▶ Psychological First Aid Provider Care (Veterans Administration) - <http://www.ptsd.va.gov/professional/materials/manuals/psych-first-aid.asp>
- ▶ Toxic and Hazardous Substances, Bloodborne Pathogens (OSHA) - [https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=standards&p\\_id=10051](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=10051)

## Appendix M > Other Ebola Resources

### Other Ebola Resources

- ▶ Contact tracing can stop Ebola in its tracks (CDC) - <http://www.cdc.gov/vhf/ebola/outbreaks/what-is-contact-tracing.html>
- ▶ Discovery and clinical trials Brincidofovir (Chimerix) - <http://www.chimerix.com/discovery-clinical-trials/brincidofovir/>
- ▶ Ebola Clinical Trials - <http://www.clinicaltrials.gov>
- ▶ National Center for Cultural Competence - <http://nccc.georgetown.edu/>
- ▶ National Institutes for Health Cultural Competency in Healthcare - <http://www.nih.gov/clearcommunication/culturalcompetency.htm>
- ▶ Returning Traveler Algorithm (CDC) - <http://www.cdc.gov/vhf/ebola/pdf/ebola-algorithm.pdf>
- ▶ The Buddy System (CDC) - <http://www.cdc.gov/vhf/ebola/pdf/buddy-system.pdf>

## Appendix N > Journal Articles

### Journal Articles

- ▶ Assessment of the risk of Ebola virus transmission from bodily fluids and fomites (Journal of Infectious Diseases [JID]) - [http://jid.oxfordjournals.org/content/196/Supplement\\_2/S142.full](http://jid.oxfordjournals.org/content/196/Supplement_2/S142.full)
- ▶ Clinical illness and outcomes in patients with Ebola in Sierra Leone (New England Journal of Medicine [NEJM]) - <http://www.nejm.org/doi/full/10.1056/NEJMOa1411680>
- ▶ Delayed treatment of Ebola virus infection with plan-derived monoclonal antibodies provides protection in rhesus macaques (Proceedings of the National Academy of Sciences of the United States of America [PNAS]) - <http://www.pnas.org/content/109/44/18030.abstract>
- ▶ Ebola hemorrhagic fever: Evaluation of passive immunotherapy in nonhuman primates (JID) - [http://jid.oxfordjournals.org/content/196/Supplement\\_2/S400.full.pdf](http://jid.oxfordjournals.org/content/196/Supplement_2/S400.full.pdf)
- ▶ Ebola virus disease in West Africa – The first 9 months of the epidemic and forward projections (NEJM) - <http://www.nejm.org/doi/pdf/10.1056/NEJMOa1411100>
- ▶ Ebola virus disease outbreak – Nigeria, July-September 2014 (CDC) - [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6339a5.htm?s\\_cid=mm6339a5\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6339a5.htm?s_cid=mm6339a5_w)
- ▶ Ebola virus disease outbreak – West Africa, September 2014 (CDC) - [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6339a4.htm?s\\_cid=mm6339a4\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6339a4.htm?s_cid=mm6339a4_w)
- ▶ Ebola virus recombinant adenovirus vaccine AdC7-ZGP encoding GP (Virology) - [http://www.violinet.org/vaxquery/vaccine\\_detail.php?c\\_vaccine\\_id=3579](http://www.violinet.org/vaxquery/vaccine_detail.php?c_vaccine_id=3579)
- ▶ Estimating the future number of cases in the Ebola epidemic – Liberia and Sierra Leone, 2014-2015 (CDC) - [http://www.cdc.gov/mmwr/preview/mmwrhtml/su6303a1.htm?s\\_cid=su6303a1\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/su6303a1.htm?s_cid=su6303a1_w)
- ▶ Favipiravir (T-705), a novel viral RNA polymerase inhibitor (Antiviral Research) - <http://www.rmrc.colostate.edu/pages/accomplishments/Publication%20PDFs/Gowen%20Antiviral%20Res%202013.pdf>
- ▶ Importation and containment of Ebola virus disease – Senegal, August – September 2014 (CDC) - [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6339a6.htm?s\\_cid=mm6339a6\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6339a6.htm?s_cid=mm6339a6_w)
- ▶ mAbs and Ad-vectored IFN- $\alpha$  therapy rescue Ebola-infected nonhuman primates when administered after the detection of viremia and symptoms (American Association for the Advance of Science) - <http://stm.sciencemag.org/content/5/207/207ra143>
- ▶ Management of heat stroke and heat exhaustion (American Academy of Family Physicians) - <http://www.aafp.org/afp/2005/0601/p2133.html>
- ▶ Postexposure antibody prophylaxis protects nonhuman primates from filovirus disease – (PNAS) - <http://www.pnas.org/content/109/13/5034.abstract>
- ▶ Postexposure protection of non-human primates against a lethal Ebola virus challenge with RNA interference: A proof-of-concept study (Lancet) - <http://www.ncbi.nlm.nih.gov/pubmed/20511019>
- ▶ Protecting Workers from the Effects of Heat (OSHA) - [https://www.osha.gov/OshDoc/data/Hurricane\\_Facts/heat\\_stress.pdf](https://www.osha.gov/OshDoc/data/Hurricane_Facts/heat_stress.pdf)
- ▶ Recombinant vesicular stomatitis virus-based vaccines against Ebola and Marburg virus infections (JID) - [http://jid.oxfordjournals.org/content/204/suppl\\_3/S1075.full](http://jid.oxfordjournals.org/content/204/suppl_3/S1075.full)

## Appendix N > Journal Articles

- ▶ Sierra Leone: Helping the Ebola survivors turn the page (WHO) - <http://www.who.int/features/2014/post-ebola-syndrome/en/>
- ▶ Successful treatment of advanced Ebola virus infection with T-705 (favipiravir) in a small animal model (Antiviral Research) - <http://www.ncbi.nlm.nih.gov/pubmed/24583123>
- ▶ Treatment of Ebola hemorrhagic fever with blood transfusions from convalescent patients (JID) - [http://jid.oxfordjournals.org/content/179/Supplement\\_1/S18.full.pdf](http://jid.oxfordjournals.org/content/179/Supplement_1/S18.full.pdf)
- ▶ Unprecedented number of medical staff infected with Ebola (WHO) - <http://www.who.int/mediacentre/news/ebola/25-august-2014/en/>
- ▶ WHO congratulates Senegal on ending Ebola transmission (WHO) - <http://www.who.int/mediacentre/news/statements/2014/senegal-ends-ebola/en/>

### Course Resources

- ▶ ETU Practical Exercise Videos
  - Combined with all stations and opening and closing - <http://youtu.be/69NPrZOMvrA>
  - Opening - <http://youtu.be/4pcrGvBBh1I>
  - Station 1 - Entrance to the Low-risk Zone - <http://youtu.be/IdoQB7xyQLo>
  - Station 2 - Scrubs and Boots - <http://youtu.be/qaXPrmBPLVI>
  - Station 3 - Briefing - <http://youtu.be/lcUkBY1cQXo>
  - Station 4 - Donning High-risk PPE - <http://youtu.be/Sto2K1DEFYM>
  - Station 5 - High-risk Zone Activities - [http://youtu.be/\\_98Di5yPI4w](http://youtu.be/_98Di5yPI4w)
  - Station 6 - Doffing High-risk PPE - <http://youtu.be/j1JWAfJjlo>
  - Station 7 - Debriefing - <http://youtu.be/zGpMivK1vKY>
  - Closing - <http://youtu.be/gIYtJiqg33c>
  - Low-risk PPE Donning and Doffing - <http://youtu.be/PPHqj2v2dko>



1

2

3

# Ebola Treatment Unit (ETU) Practical Exercise

**PREPARING**  
Healthcare Workers TO WORK IN  
**Ebola** Treatment Units (ETUs)  
IN AFRICA: Training Toolkit



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

## Disclaimer

These Ebola response training materials are intended only for healthcare workers preparing to work in Ebola Treatment Units (ETUs) in Africa in response to the Ebola epidemic; they are not intended to prepare healthcare workers to work in the United States. The information in these materials is accurate as of December 2014. Additionally, the mention of any product name in these materials is not meant to serve as an official endorsement of any such product by the Centers for Disease Control and Prevention (CDC) or any other entity of the United States government.

This exercise is designed to illustrate best practices for infection prevention and control principles. It is based on information from similar courses developed by Médecins Sans Frontières (MSF) and the World Health Organization (WHO), and on CDC guidelines for infection prevention and control. It is not intended to endorse a particular protocol, product, or procedure. In a real ETU, supplies, conditions, and protocols will vary. When healthcare workers deploy to work in real ETUs, they are expected to receive additional training and coaching before they begin working independently.

Cover: Healthcare worker in high-risk PPE.

## CONTENTS

<b>Overview .....</b>	<b>202</b>
<b>Exercise Objectives .....</b>	<b>203</b>
<b>ETU Stations and Activities .....</b>	<b>204</b>
▶ Stations.....	204
▶ Activities.....	205
<b>Exercise Management .....</b>	<b>205</b>
▶ Group Size .....	205
▶ Flow.....	205
▶ Timing.....	206
<b>Safety Matters.....</b>	<b>206</b>
<b>Practical Exercise Staff Roles .....</b>	<b>207</b>
<b>Trainer Overview .....</b>	<b>209</b>
<b>Preparation for Trainers and Students.....</b>	<b>210</b>
▶ ETU Practical Exercise Trainer Guide.....	211
▶ ETU Three-Day Practical Exercise At-a-Glance .....	259
▶ Day 1 Trainer Guide .....	261
▶ Day 2 Trainer Guide.....	283
▶ Day 3 Trainer Guide.....	307

### Overview

This booklet provides information on conducting the Ebola Treatment Unit (ETU) practical exercise. It describes the ETU stations and activities, including exercise management, timing, staff roles, and preparation for trainers and students. It concludes with the daily trainer guides. The ETU practical exercise is conducted in a mock ETU environment where students apply infection prevention and control principles in activities that simulate triage, care, and transport of patients with Ebola virus disease (EVD). The ETU practical exercise has seven stations and multiple activities aimed at helping students:

- ▶ Apply the concepts they learn in the lectures and discuss in tabletop exercises.
- ▶ Practice donning (putting on) and doffing (taking off) personal protective equipment (PPE).
- ▶ Perform simulated patient care activities while wearing PPE.
- ▶ Experience an environment similar to working in a real ETU.

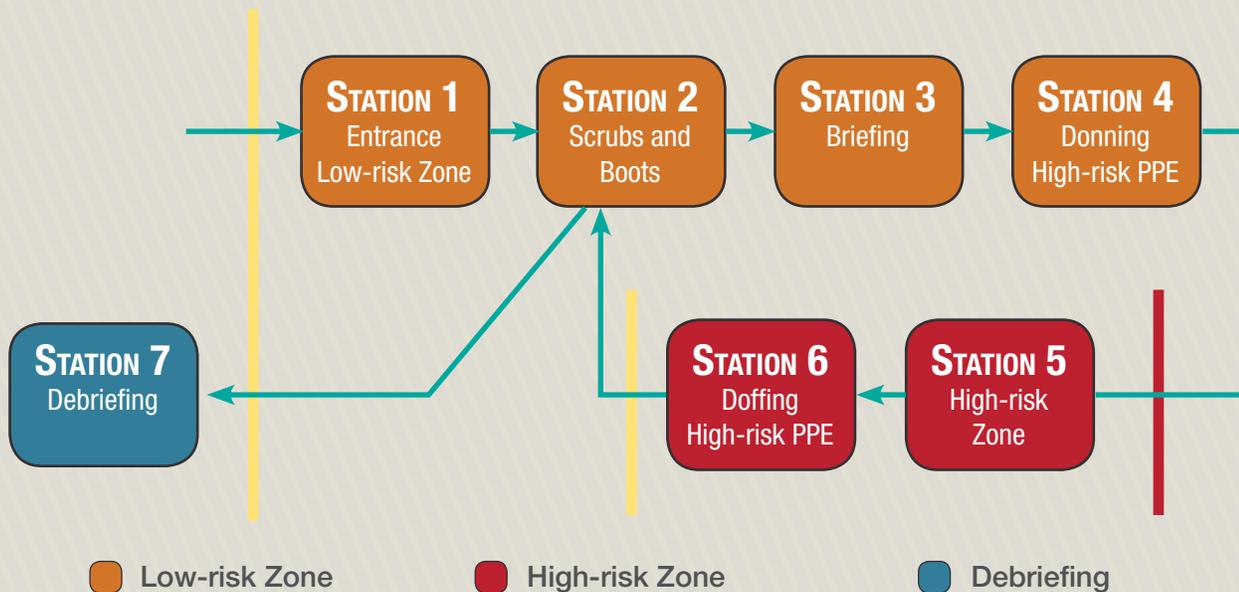
The exercise is designed to be an open, no-fault, non-judgmental environment in which diverse viewpoints will be expressed. Students will respond to various scenarios by using their knowledge and insights and following directions from the trainers. When they deploy to work in real ETUs, students are expected to receive additional training and coaching before they begin working independently.

### Exercise Objectives

During the three-day ETU practical exercise, students will participate in various activities to meet the following learning objectives targeted at working safely in an ETU:

1. Don and doff PPE to reduce risk of exposure to Ebola virus while working in the ETU high-risk zone.
2. Draw blood from a patient for diagnostic purposes and safely package the specimen for transport to a diagnostic lab.
3. Respond appropriately to a breach in PPE.
4. Develop a prioritized list of tasks to complete during an ETU shift that considers safe movement through the ETU.
5. Clean and disinfect patient care areas, including contamination caused by body spills (e.g., vomit).
6. Transport a corpse from the confirmed patient area to the morgue.
7. Triage new patients presenting to the ETU, decide whether to admit, and transport a patient with a suspected case of EVD into the ETU high-risk zone.

## ETU Stations and Activities



The [ETU Three-Day Practical Exercise At-A-Glance](#) provides a one-page summary of stations and activities. Having a printed copy on hand while you review this booklet will simplify following the sequence of the stations and activities.

## STATIONS

The exercise moves students through simulated activities at seven stations.

- ▶ Station 1: Entrance to ETU Low-risk Zone
- ▶ Station 2: Scrubs and Boots
- ▶ Station 3: Briefing
- ▶ Station 4: Donning High-risk PPE
- ▶ Station 5: High-risk Zone
- ▶ Station 6: Doffing High-risk PPE
- ▶ Station 7: Debriefing

## ETU Practical Exercise > Exercise Management

### ACTIVITIES

---

Students participate in various activities each day of the exercise; a short phrase describes the theme for each day.

**Day 1: Blood and Breach** - While wearing high-risk PPE, students will draw blood, transport the specimen to the lab, and experience a breach in PPE.

**Day 2: Clean and Corpse** - While wearing high-risk PPE, students will clean up a body spill (e.g., vomit) and dispose of it safely. They will also prepare a corpse for transport to the morgue.

**Day 3: Triage and Transport** - While wearing low-risk PPE, students will triage new patients and determine whether they should be admitted to the ETU. They will change into high-risk PPE to transport a patient with a suspected case of EVD into the ETU.

### Exercise Management

#### GROUP SIZE

---

Students move through the exercise in small groups. The size of the groups should be based on the facility size and how best to maximize the flow of students through the exercise while ensuring high performance. In CDC's mock ETU, groups are typically four students. Students should work in pairs as they would in a real ETU. A buddy is critical for safety when working in an ETU.

#### FLOW

---

#### Enhancing Student Experience While Not in the ETU

Before the exercise begins, students convene in a waiting area for an orientation from the exercise manager. Given space and time constraints, students will move through the ETU practical exercise in small groups rather than at the same time. Additional opportunities for productive learning experiences may be provided for students while they wait for the exercise to start or after they have doffed their PPE, including:

#### Learning experiences before the exercise

- ▶ Participate in tabletop exercises
- ▶ Review lecture content with instructors
- ▶ Dialogue with returned responders
- ▶ View Ebola-related videos (such as the Ebola Outbreak Public Broadcasting Station Frontline™ video-*Lectures and Tabletop Exercises*, [Appendix A](#))

#### Learning experiences after doffing PPE

- ▶ Practice additional donning and doffing of PPE
- ▶ Practice one-minute handwashing technique (consider using Glo Germ to assess handwashing technique)
- ▶ Participate in tabletop exercises
- ▶ View Ebola-related videos (such as the Ebola Outbreak PBS Frontline™ video-*Lectures and Tabletop Exercises*, [Appendix A](#))
- ▶ Debrief with returned responders (a required activity at Station 7)

### Facilitating Movement of Student Groups through the Exercise

Depending on the schedule (see the *Course Administration and Evaluation*, [Appendix B](#)) selected for the course, multiple activities could occur simultaneously. The following steps are recommended to facilitate student flow:

- ▶ Provide an escort (trainer or support staff member) to direct students to the starting place for the exercise and from one station or activity to the next.
- ▶ Place directional arrows (made of colored tape) on the floor.
- ▶ Provide instructions on where to go next, either orally or with small signs or both.

Students will need more guidance on the first day of training when they are unfamiliar with the facility and after doffing when they are tired.

### TIMING

Timing is critical at each station to keep the exercise on schedule without significant backlog. Station 3 (Briefing) and Station 4 (Donning High-risk PPE) are particularly important for timekeeping purposes. Staying on time at Station 3 is essential because it affects the flow of the entire exercise. The Station 3 trainer should be positioned to observe Stations 1, 2, and 4 to facilitate timekeeping. Another option is to have support staff assist with the exercise and movement of student groups from one station to another. For example, the Station 3 trainer or support staff member can signal the Station 1 trainer when it is time to bring another group of students to wait at Station 1. The Station 3 trainer can also hold students if Station 4 is not ready to receive them, and the Station 4 trainer can hold students if Station 5 is not ready to receive them.

Recording time is important, and notepads and pens should be placed at each station for trainers to note the time when students arrive and depart the station. Analysis of the recorded times helps to assess whether adjustments in the activities are needed (e.g., adding an additional lane to the doffing station if there is significant backlog, or nudging trainers to keep on task and complete activities on schedule).

### Safety Matters

Personal safety is the top priority when working in an ETU, whether in a simulation or in a real ETU. By rigorously adhering to infection prevention and control principles taught in the lectures and applying them systematically in the simulation, students learn to provide care safely and avoid exposure.

Include the following safety practices in your course:

- ▶ Ensure that all students have received prior medical clearance that focuses on assessment of fitness and ability to safely and effectively deploy on an Ebola response before they participate in the training and before deployment.
- ▶ Ensure that students always work with a buddy.
- ▶ Recognize that students can get hot while wearing PPE and heat illness can occur and can even result in death. If students show signs of heat illness during the exercise, students should notify the trainer and exit safely. The Occupational Safety and Health Administration (OSHA) has published a fact sheet on protecting workers from the effects of heat stress at [https://www.osha.gov/OshDoc/data\\_Hurricane\\_Facts/heat\\_stress.pdf](https://www.osha.gov/OshDoc/data_Hurricane_Facts/heat_stress.pdf).

## ETU Practical Exercise > Safety Matters

- ▶ Emphasize that hand hygiene is the most important action to avoid infection, and hands should be washed frequently for at least one minute while working in an ETU.

Use **only** water to simulate the chlorine solution used throughout a real ETU for cleaning and disinfecting. Label containers as appropriate for their use.

- ▶ A 0.5% chlorine solution to clean non-living items, including deceased patients, surfaces, body fluids, and gloved hands.
- ▶ A 0.05% chlorine solution to clean any living tissues, including bare hands.

Your organization should also implement the following standards and guidelines as appropriate:

- ▶ If your organization is located in the United States and will be using N95 respirators, you must ensure compliance with all elements of the OSHA Respiratory Protection Standard, [29 CFR 1910.134](#), including fit testing, medical evaluation, and healthcare worker training.
- ▶ If your organization is not located in the United States, consider following the OSHA Respiratory Protection Standard, [29 CFR 1910.134](#), to ensure the health and safety of healthcare workers.
- ▶ Depending on where your course is held, other risk and safety procedures may be required. For example, additional OSHA standards, including Bloodborne Pathogens ([29 CFR 1910.1030](#)) and Personal Protective Equipment ([29 CFR 1910.132](#)), may apply.
- ▶ Check pulse and blood pressure of students before donning and after doffing PPE. This helps to ensure appropriate precautions for working in a hot environment. Students can get hot while wearing PPE during the exercise. CDC provides recommendations for healthcare workers on how to limit heat burden and prevent heat illnesses while wearing PPE during treatment of patients with Ebola at <http://www.cdc.gov/vhf/ebola/hcp/limiting-heat-burden.html>.

### Practical Exercise Staff Roles

A number of staff members are needed for various roles in preparing for and conducting the exercise.

#### Exercise Manager:

Responsible for overseeing the ETU practical exercise and the students' health and safety by:

- ▶ Coordinating with logistics personnel to ensure that exercise stations are prepared and ready each day,
- ▶ Providing an introductory train-the-trainer session before the start of the three-day course,
- ▶ Walking through the stations to observe trainers' and students' performance, answer questions, and address issues,
- ▶ Holding a daily debriefing session with station trainers at the end of each day to review any questions, observations, and lessons learned, and
- ▶ Ensuring that all relevant health and safety regulations, policies, and procedures are followed by students and exercise staff.

## ETU Practical Exercise > Safety Matters

### Station Trainers:

Responsible for delivering the scenario at the station and reinforcing safety principles during the ETU practical exercise by:

- ▶ Ensuring that the assigned station is ready when students arrive and helping to clean and secure the station following the exercise each day,
- ▶ Initiating the tasks students perform at the station and facilitating discussions,
- ▶ Coaching students through the activities by asking thoughtful questions, and
- ▶ Providing additional information and resolving questions as required.

### Logistics Manager:

Responsible for securing and preparing the facility for the ETU practical exercise by:

- ▶ Coordinating logistics and ordering supplies, including PPE, for the ETU practical exercise, and
- ▶ Storing and caring for PPE supplies and overseeing the daily setup of the ETU.

### An optional role:

- ▶ Support staff to assist with the exercise by setting up or moving props, guiding students from one station to the next, or informing students of times for pulse and blood pressure checks.

### Trainer Overview

Capable trainers are critical to the success of the exercise because they coach and guide students through the stations. Trainers should have the following skills and characteristics:

- ▶ Strong interpersonal skills to interact constructively with students and members of the team,
- ▶ Coaching skills to guide the students through the exercise and be comfortable with both roles of trainer and coach,
- ▶ Ability to stay on task by following scripted materials without interjecting their own experiences or revisions, and
- ▶ Calm demeanor to guide students methodically through the stations in a high-stress environment.

### Trainers' responsibilities include:

- ▶ Arriving early to allow sufficient time to prepare the area and staying after the exercise to review the day's activities,
- ▶ Observing students and the environment carefully to ensure the exercise is being conducted safely,
- ▶ Keeping station activities to the allotted time to stay on schedule and avoid backlog,
- ▶ Staying on script to avoid confusion among the students,
- ▶ Staying at the assigned station as groups move through the exercise and being ready for the next group, and
- ▶ Managing group behaviors to avert inappropriate comments or actions that would interfere with learning.

### Before the practical exercise begins, trainers should:

- ▶ Review the the trainer guide for each day of the exercise,
- ▶ Attend required briefings and pick up the trainer identification item (e.g., orange vest),
- ▶ Verify that all needed supplies are at the assigned station and in proper working order,
- ▶ Ensure notepad and pen are at the station to record time of arrival and departure of teams, and
- ▶ Obtain or locate necessary communications equipment and test it to ensure that it works properly.

### When a group of students arrives at the station, trainers should:

- ▶ Describe the day's activities for students, either verbally or with brief written materials, and
- ▶ Respond to students' questions while remaining aware of time constraints.

### Trainers should not:

- ▶ Prompt students regarding what a specific response should be (unless directed to do so),
- ▶ Give information to students about progress of the scenario event or other students' methods of resolving problems,
- ▶ Engage in personal conversations with students, or
- ▶ Deviate from the script.

Following the exercise, trainers also attend a daily debriefing session with the exercise manager to discuss the day's activities and prepare for the next day.

### Preparation for Trainers and Students

Course sponsors and exercise managers prepare the trainers and the students for the exercise. The CDC course does this by holding the following sessions:

#### Trainer Preparation

- ▶ A pre-course conference call describing what they should expect (e.g., course logistics and role)
- ▶ An on-site train-the-trainer session before the beginning of the course that covers their role and concepts such as:
  - Safety is the number one priority, and
  - Trainers wear orange vests (flow in an ETU is always one way, moving from low-risk to high-risk, but those in orange vests may move freely through the stations).
- ▶ Daily debriefing session for all trainers with course and exercise managers.

#### Student Preparation

To prepare students for the exercise, an orientation is held on the first day before training begins. On subsequent days, daily meetings with students are held before the exercise to promote consistency and readiness. Cover the following concepts and key points during the student orientation:

#### Infection prevention and control

- ▶ Apply infection prevention and control principles to provide care safely and avoid exposure.
- ▶ Personal safety is the number one priority.
- ▶ Hand hygiene is the most important action to take to avoid infection in an ETU. Hands should be washed for at least one minute each time. Consider areas commonly missed such as webs of fingers and thumbs.
- ▶ The procedures and ritual of donning and doffing are as important as the equipment—be mindful and deliberate with the process.
- ▶ Chlorine is essential for decontamination. For this training, only water is used to simulate the chlorine solutions. Within an ETU, two chlorine solution strengths are used.
  - A 0.5% chlorine solution to clean non-living items, including deceased patients, surfaces, body spills, and gloved hands.
  - A 0.05% chlorine solution to clean any living tissues, including bare hands.

#### The ETU and high-risk zone

- ▶ Trainers wear orange vests.
- ▶ Always work with a buddy.
- ▶ Hold hands in front of you and above the waist when not performing a required activity. This keeps you conscious of not touching any surfaces or your PPE.
- ▶ Flow in the ETU is always one-way: low-risk to high-risk. Anything that goes into the high-risk zone stays in the high-risk zone.
- ▶ Always assess the safety of the situation, including assessing patient status and the surrounding environment.
- ▶ Any procedure in an ETU can be risky, including activities like drawing blood, moving corpses, or cleaning body fluid spills.
- ▶ Consider everything in the high-risk zone as highly contaminated, including waste, body fluids, surfaces, patients, and corpses, and apply infection prevention and control principles.

# ETU Practical Exercise Trainer Guide

The ETU practical exercise has seven stations and multiple activities that are described in this trainer guide. The trainer guide is organized by station and includes:

- ▶ Purpose of each station or activity,
- ▶ Key points for students,
- ▶ Station preparation (time allotted, number of trainers, and supplies),
- ▶ Trainer script and notes, and
- ▶ Links to the videos.

Daily versions of the station trainer guide are also provided.

The [ETU Three-Day Practical Exercise At-A-Glance](#) is a helpful visual tool that provides a succinct one-page summary of stations and activities.

## Videos

To assist you in replicating the course, this trainer guide contains links to videos of the ETU Practical Exercise. The videos illustrate the simulated ETU learning environment and supplement the detailed information in the written materials. There are links for:

- ▶ [Opening video](#)
- ▶ Stations 1 - 7 videos
  - Station 1 - Entrance to the Low-risk Zone - <http://youtu.be/IdoQB7xyQLO>
  - Station 2 - Scrubs and Boots - <http://youtu.be/qaXPrmBPLVI>
  - Station 3 - Briefing - <http://youtu.be/lcUkBY1cQXo>
  - Station 4 - Donning High-risk PPE - <http://youtu.be/Sto2K1DEFYM>
  - Station 5 - High-risk Zone Activities - [http://youtu.be/\\_98Di5yPI4w](http://youtu.be/_98Di5yPI4w)
  - Station 6 - Doffing High-risk PPE - <http://youtu.be/j1JWafuJjlo>
  - Station 7 - Debriefing - <http://youtu.be/zGpMivK1vKY>
- ▶ [Low-risk PPE donning and doffing video](#)
- ▶ [Closing video](#)

In addition to the separate videos, a combined version with the opening, all stations, and closing is provided at <http://youtu.be/69NPrZOMvrA>.

**Note:** the combined video does not include low-risk PPE donning and doffing.

## Opening video:

<http://youtu.be/4pcrGvBBh1I>

## Station 1: Entrance to ETU Low-risk Zone

### ACTIVITY 1: ENTER ETU LOW-RISK ZONE

#### Purpose

Prepare students for entering the ETU; trainer sprays their shoes and students wash their hands.

#### Key points for students

- ▶ Before entering the ETU, use the restroom, leave all personal items in a secure place.
- ▶ Ensure eyeglasses are secured with a strap.
- ▶ Ensure hair is pulled back and secured.

#### Station 1 video:

<http://youtu.be/IdoQB7xyQLO>

### Activity 1: Enter ETU Low-risk Zone

#### Station Preparation

**Time allotted:** 2 minutes  
**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Sprayer
- ▶ Handwashing station

#### Trainer Script and Notes



Note time when students have arrived.



*You are now at the staff entrance to the low-risk zone of the ETU. You are entering from the outside in your street clothes. Before entering the ETU for your shift, you should:*

- ▶ *Use the restroom.*
- ▶ *Leave all personal items, including cell phones, watches, rings, earrings, and other jewelry, in a secure place.*

*Because this is an entry into the ETU, I will spray your shoes with 0.5% chlorine solution to prevent tracking in any contaminants. You will then wash your bare hands with 0.05% chlorine solution.*

*Next you will go to the changing area, where you will remove your street clothes, except undergarments, and change into scrubs and rubber boots.*



### Activity 1: Enter ETU Low-risk Zone



*Remember you should also:*

- ▶ *Secure eyeglasses with a tie or retainer strap.*
- ▶ *Pull back long hair securely in a bun or very short ponytail so it can be fully covered under a hood and not catch on the elastic straps of the N95 respirator when you are trying to remove it. Pin back bangs.*
- ▶ *If you have any remaining personal items with you, place them in a numbered container in the changing area.*

*When I open the gate, you will enter the ETU one at a time. Face away from the sprayer and bend your legs one at a time so the bottom of your shoes face the sprayer.*



Spray the bottom of each shoe with 0.5% chlorine solution.



*Wash your hands with 0.05% chlorine solution and pour some chlorine solution from your cupped hands on top of the tap.*

*Now you will go to Station 2, which is the changing area.*



Note time when students leave.

### Options

Students can begin the exercise while wearing their scrubs to save time changing out of street clothes in Station 2 (Scrubs and Boots).

Support staff can assist with the exercise to facilitate movement of the student groups from one station to another.



Record time



Say what is in italics



Things to do



Transition

## Station 2: Scrubs and Boots

### ACTIVITY 2: CHANGE INTO SCRUBS AND BOOTS

#### Purpose

- ▶ Change from street clothes into scrubs (if students have not done so before the start of the exercise).
- ▶ Remove shoes and put on rubber boots.
- ▶ Leave any remaining personal items in a numbered container for retrieval after the exercise.

#### Key points for students

- ▶ Remove and store all personal items, including jewelry, watches, and cell phones, before donning PPE.
- ▶ Secure glasses and hair, including bangs, to avoid possible contamination at doffing.

#### Station 2 video

<http://youtu.be/qaXPrmBPLVI>

### Activity 2: Change into scrubs and boots

#### Station preparation

**Time allotted:** 6 minutes

**Number of trainers:** 1 trainer or support staff member or trainers from Stations 1 or 3 can facilitate.

#### Verify that these supplies are ready:

- ▶ Numbered containers or buckets for personal belongings

#### Trainer Script and Notes



Station 2 can be self-directed or a trainer or support staff can be available to answer questions. Students should pick up their boots, proceed to the male or female changing area, and change into their scrubs (if they are still in their street clothes). They should leave all personal belongings in numbered containers, secure their eyeglasses, pull back their hair, and proceed to Station 3 (Briefing).

Students will see signs that direct them to Station 3.

#### Options

Students can begin the exercise wearing their scrubs to save time changing out of street clothes in this station.

Consider having hair bands, bobby pins, and eyeglass straps available, as well as scrubs for those who forget to bring them.



## Station 3: Briefing

### OVERVIEW OF STATION 3 ACTIVITIES: 3a, 3b, AND 3c

- ▶ **Day 1:** Briefing on blood and breach (3a)
- ▶ **Day 2:** Briefing on clean and corpse (3b)
- ▶ **Day 3:** Briefing on triage and transport (3c)

### Purpose

- ▶ Provide a daily briefing for students on the scenarios for each day's activities. In a real ETU, this would be the briefing held before the start of each shift.
- ▶ Prompt students to think through the processes they will undertake and anticipate supplies they will need in the high-risk zone.

### Timing

Staying on time at Station 3 is critical for controlling the flow of the entire exercise. The Station 3 trainer should be positioned to be able to observe Stations 1, 2, and 4. This allows the Station 3 trainer to facilitate timekeeping that affects the entire exercise.

### Option

Support staff can assist with the exercise to facilitate the movement of student groups from one station to another. For example, a support staff member at Station 3 can signal the Station 1 trainer to bring another group of students to wait at Station 1.

### Station 3 video

<http://youtu.be/lcUkBY1cQXo>



Record time



Say what is in italics



Things to do



Transition

### 3a: Briefing (Day 1: Blood and Breach)

#### ACTIVITY 3a: BRIEFING ON BLOOD AND BREACH

On Day 1, students will draw blood, transport the specimen to the lab, and experience a breach in PPE.

#### Purpose

- ▶ Prepare students to perform Day 1 activities in the high-risk zone while wearing high-risk PPE. Day 1 activities include drawing blood from a patient, preparing blood samples for transport to the lab, and responding to a breach in PPE.

#### Key points for students

- ▶ Collect and label the supplies you need to take in – you will not be able to return for additional supplies.
- ▶ Assess the safety of the situation, including the patient’s status and the environment.
- ▶ Flow in the ETU is always one-way: low-risk to high-risk. Anything that goes into the high-risk zone stays in the high-risk zone.

#### Activity 3a: Briefing on blood draw and PPE breach

##### Station Preparation

**Time allotted:** 6 minutes  
(this station is critical for controlling the time for the entire exercise)

**Number of trainers:** 1

##### Verify that these supplies are ready:

- ▶ Chairs are arranged in a semicircle for students.
- ▶ Markers and flip chart or whiteboard on which the following is written:

##### Specimens

- ▶ **Suspected:** Yaya Sesay ID #0321
- ▶ **Confirmed:** John Komora ID #0310

##### Trainer Script and Notes



Note time when students have arrived.



The Station 3 trainer asks

- ▶ *Did you remove all personal items, including cell phones, watches, rings, earrings, and other jewelry either before entering the ETU, or place them in a numbered container in the changing area?*
- ▶ *Is your cell phone out of your scrubs pocket?*
- ▶ *Did you secure eyeglasses with a tie or retainer strap?*
- ▶ *Did you tie back long hair and pin bangs?*



**Activity 3a: Briefing on blood draw and PPE breach**



*Please sit down for your briefing. This is where you will begin to learn how to develop a ritual while in the ETU. Although we know this a simulation, we ask that you stay in the mindset that you are in a real ETU. Your personal safety in the ETU is the top priority. The flow in the ETU is only one way, from low-risk to high-risk; anything that goes into the high-risk zone stays there.*

*You will collect blood from two patients, Yaya Sesay ID number 0321, a patient with suspected Ebola, and John Komora ID number 0310, who is confirmed to have Ebola. As with any procedure, you should always assess the safety of the situation, including the status of the patient and the environment.*

*After you don your PPE, you will collect and label supplies for drawing blood before you enter the high-risk zone. You will label the test tubes by writing on a piece of tape so the tubes can be reused in the exercise. After you draw the blood, you will inform lab personnel that a specimen is on the way. The lab tech will be ready and waiting in low-risk PPE (eye protection, gloves, mask).*

*Are there any questions?*

*Ok, remember to be careful. Now you will go to the donning area.*



Hold students at the station until the donning area is ready to receive them. You might need to improvise dialogue with the students to extend or shorten the briefing time, depending on how the subsequent stations are progressing.



Note time when students leave.



Direct students to the donning area.

The Station 3 trainer or a support staff member should signal the Station 1 trainer to bring another group of students to wait to start Station 1.



## Station 3: Briefing (Day 2: Clean and Corpse)

### ACTIVITY 3b: BRIEFING ON CLEAN AND CORPSE

On Day 2, the students will clean up vomit and remove a corpse. During the briefing, they will be given a lot of clinical information that is meant to overload them. They need to take notes, sort through them, respond to the trainer's questions, and prioritize their actions.

#### Purpose

Prepare students to perform Day 2 activities in the high-risk zone while wearing high-risk PPE, including the processes for:

- ▶ Considering clinical information on patient status to prioritize actions,
- ▶ Cleaning and disinfecting a body fluid spill (e.g., vomit) safely, and
- ▶ Preparing a corpse for transport to the morgue.

#### Key points for students

- ▶ Plan procedures to work safely and efficiently.
- ▶ Collect and label the supplies you need to take into the high-risk zone. You will not be able to return for additional supplies.
- ▶ Body spills must be cleaned and disinfected immediately.
- ▶ Patients who have died of Ebola are highly infectious; transporting a corpse is a high-risk activity.



### Activity 3b: Briefing on clean and corpse

#### Station preparation

**Time allotted:** 5 minutes  
(this station is critical for controlling the time of the entire exercise)

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Chairs arranged in a semicircle for students
- ▶ 4 Notepads
- ▶ 4 Pens
- ▶ Markers and flip chart or whiteboard on which the following is written:

#### Afternoon Shift

##### Suspect area

- ▶ 2 pools of vomit
- ▶ 2 patients tested positive
- ▶ 3 patients tested negative (1 has symptoms that began yesterday, 2 have symptoms that began 7-8 days ago)

##### Confirmed area

- ▶ 2 patients died overnight (bodies taken to morgue):
  - Baby Sesaye
  - Fatuma Dukuly
- ▶ 3 patients are very ill, need attention:
  - Togar Nagbe
  - Ibrahim Conte
  - Yaya Sesay (just died)

#### Trainer Script and Notes



Note time when students have arrived.



The Station 3 trainer asks

- ▶ *Did you remove all personal items, including cell phones, watches, rings, earrings, and other jewelry either before entering the ETU or place them in a numbered container in the changing area?*
- ▶ *Is your cell phone out of your scrubs pocket?*
- ▶ *Did you secure eyeglasses with a tie or retainer strap?*
- ▶ *Did you tie back long hair and pin bangs?*



Record time



Say what is in italics



Things to do



Transition

**Activity 3b: Briefing on clean and corpse**



Please sit down for your briefing.

1. *I'd like to welcome you to the ETU this afternoon. You need to plan what you'll do now so you can get your work done safely and efficiently.*
2. *First, I'll tell you about the suspect patient area.*
  - a. *Some patients have been vomiting. There are 2 pools of vomit you need to clean up.*
  - b. *Two patients tested positive for EVD. Both were admitted from triage yesterday. What should you do about them? Move to confirmed area. Point out that in a real ETU, they would confirm a cot is available.*
  - c. *Three patients tested negative. Skip the following questions if running short on time.*
  - d. *What should you do about them? Find out how many days they had symptoms before the blood sample was taken. Elicit from students that a negative real-time reverse transcription polymerase chain reaction (RT-PCR) test can be used to make clinical decisions only if the blood sample was taken at least 72 hours after the onset of symptoms.*
    - i. *One patient developed symptoms yesterday. Would you discharge him? No.*
    - ii. *The other 2 patients have had symptoms for 7-8 days. Would you discharge them? They should ask when the blood samples were taken. If the samples were taken at least 72 hours after symptoms began, patients should be discharged to home or to a non-ETU hospital.*
    - iii. *So you can discharge only 2 patients. How would you have them leave the ETU? Say or elicit from students: patients must be discharged directly from the suspect area; they cannot walk through the confirmed area.*
3. *Now I'll tell you about the confirmed patient area.*
  - e. *Two patients died and their bodies were moved to the morgue: Baby Sesaye and Fatuma Dukuly. I'm telling you because you knew them and you may see their families.*
  - f. *Two patients are very ill: Togar Nagbe and Ibrahim Conte. Yaya Sesay was one of the patients you drew blood from yesterday in the suspect area. Her test was positive, and she was moved to the confirmed area; sadly, I just got a report she has died but you will need to confirm.*
    - i. *What should you do when you are in the high-risk zone? When you see the patient, you will confirm she is dead. If so, you must prepare the body and transport it to the morgue.*
    - ii. *What do you need to bring with you? Students will pick up a body bag after donning PPE. One student should label it with the patient's name and identification number. Another student should check that the name and ID number are correct because many names are similar. Note for training purposes, students write on duct tape because the body bag will be reused. There are a lot of things to do today in the suspect and confirmed areas. In what order will you do them? Start in the suspect area because you cannot return to it after you enter the confirmed area. Start by cleaning up vomit so it does not spread as people move around. Then discharge any patients who were suspected cases with negative RT-PCR tests who had symptoms for more than 3 days before testing. Move patients with positive tests to the confirmed area and provide care for them. Then take the body to the morgue.*
4. *For this exercise, you will only clean up vomit and prepare and move the corpse.*



**Activity 3b: Briefing on clean and corpse**



Hold students at the station until Station 4 is ready to receive them. You might need to improvise dialogue with the students to extend or shorten the briefing time, depending on how the subsequent stations are progressing.



Note time when students leave.



**When students leave, they need to take with them their notes on patients and tasks.**

Direct students to the donning area.

The Station 3 trainer or a support staff member should signal the Station 1 trainer to bring another group of students to wait to start Station 1.



Record time



Say what is in italics



Things to do



Transition

## Station 3: Briefing (Day 3: Triage and Transport)

### ACTIVITY 3c: BRIEFING ON TRIAGE AND TRANSPORT

On Day 3, the students will triage new patients while wearing low-risk PPE, then don high-risk PPE to transport a patient into the ETU high-risk zone.

#### Purpose

Prepare students to perform Day 3 activities, including the processes for:

- ▶ Triageing new patients outside the ETU while wearing low-risk PPE,
- ▶ Determining whether a patient should be admitted, and
- ▶ Transporting a patient who is too ill to move independently.

#### Key points for students

- ▶ Triage is performed by using low-risk PPE, which includes gloves, surgical mask, and goggles or full face shield.

### Activity 3c: Briefing on triage and transport

#### Station Preparation

**Time allotted:** 5 minutes  
(this station is critical for controlling the time for the entire exercise)

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Chairs arranged in a semicircle for students
- ▶ Goggles
- ▶ Surgical masks
- ▶ Long-cuff exam gloves

#### Trainer Script and Notes



Note time when students have arrived.



The Station 3 trainer asks

- ▶ *Did you remove all personal items, including cell phones, watches, rings, earrings, and other jewelry, either before entering the ETU, or place them in a numbered container in the changing area?*
- ▶ *Is your cell phone out of your scrubs pocket?*
- ▶ *Did you secure eyeglasses with a tie or retainer strap?*
- ▶ *Did you tie back long hair and pin bangs?*

As students take their seats, the trainer pretends to receive a call on a cell phone or walkie-talkie, and says: *Excuse me just a moment. I'm receiving a call from the high-risk zone.*

The trainer walks away from the students and pretends to chat for about 10 seconds, then returns and says: *There's been a change of plans. I was just notified there are several patients who have arrived at the ETU and need to be triaged. You need to go out and triage; please come with me.*



### Activity 3c: Briefing on triage and transport



The trainer walks toward the triage location; hopefully, a student will ask if they need to don PPE. If the students don't ask, the trainer will remind them they need to don low-risk PPE:

- ▶ Goggles
- ▶ Surgical mask
- ▶ Long-cuff exam gloves



The Station 3 trainer guides the students to don low-risk PPE (activity 5e), then takes them out to meet a triage trainer (activity 5f).



Record time



Say what is in italics



Things to do



Transition

## Station 4: Donning High-risk PPE

### OVERVIEW OF STATION 4 ACTIVITIES: 4a, 4b

At Station 4, students don high-risk PPE. Students arrive at Station 4 in scrubs and boots. Whether PPE is used for an exercise or in a real ETU, there will likely be differences in the PPE and donning protocols. Regardless of equipment used, PPE must be donned properly to provide adequate protection.

- ▶ **Activity 4a:** Don high-risk PPE (long-cuff exam gloves)
- ▶ **Activity 4b:** Don high-risk PPE (heavy-duty rubber gloves)

### Purpose

- ▶ Practice supervised donning of high-risk PPE
- ▶ Learn principles of donning PPE correctly

### Key points for students

- ▶ Donning will be supervised by a trainer to ensure it is done correctly in this exercise; in a real ETU, trained observers should monitor to make sure PPE is used correctly.
- ▶ Buddies should check each other's PPE.
- ▶ Students should check themselves in a full-length mirror.

### About high-risk PPE used in this exercise:

High-risk PPE includes 7 pieces of equipment. Note that students are already wearing scrubs and boots.

1. **Inner gloves.** Hands are the primary means of contact between healthcare workers and patients, so gloves are essential. This exercise uses non-sterile, powder-free, long-cuff examination gloves.
2. **Impermeable protective suit.** This suit should cover the body and include wrist and ankle elastics, thumb loops or thumb holes to prevent sleeves from riding up, a front zipper with a self-adhesive zipper flap closure system, and an adhesive flap seal over the neck. Different styles may be used, including suits that have an attached hood; however, use of an attached hood is not described in this exercise.
3. **Surgical N95 respirator** (referred to hereafter as N95 respirator). This exercise uses a duckbill style.
4. **Hood.** This exercise uses a separate hood. Suits with attached hoods are sometimes the only type available and are adapted for use. If the suit has an attached hood, students are directed to fold over the hood as a collar.
5. **Fluid-resistant or impermeable apron.** This exercise uses a disposable apron that is reused for training purposes. A reusable heavy-duty apron is another option.
6. **Full face shield.** This exercise uses a full face shield; goggles are another option for eye protection.
7. **Outer gloves.** The type of outer gloves depends on the work that will be performed.
  - a. For patient care, use non-sterile, powder-free, long-cuff examination gloves (for Day 1 activities 5a and 5b). When exam gloves are used as both inner and outer gloves, it is best to use two different colors.
  - b. For cleaning up body spills or transporting a patient or corpse, use heavy-duty rubber gloves (for Day 2 activities 5c and 5d and Day 3 activities 5h, 5i, and 5j).

### Station 4 video

<http://youtu.be/Sto2K1DEFYM>



### Activities 4a and 4b: Donning high-risk PPE

#### Station preparation

**Time allotted:** 20 minutes  
(this station is critical for controlling the time for the entire exercise)

**Timekeeping:** Trainers should check on progress at Station 5 to ensure timely flow of students through the stations

**Number of trainers:** 1 trainer for each pair of students. An extra trainer is helpful to assist students with gathering supplies to take into the high-risk zone for each day's activities.

#### Verify that these supplies are ready:

- ▶ High-risk PPE laid out in the order to be donned (for this exercise, high-risk PPE includes 7 pieces of equipment – inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and outer gloves)
- ▶ Chairs for students to sit when donning the suit, if necessary
- ▶ Mirrors for students to check their PPE
- ▶ Duct tape and marker to mark time entering the ETU on the PPE suit
- ▶ Tray to hold blood draw supplies, including blood collection tube, needle, tourniquet, alcohol wipes, bandage, gauze pad, alcohol wipe, 1 sealable plastic bag, 1 red biohazard bag, paper towel
- ▶ Body bag to transport corpse to morgue
- ▶ Stretcher to transport new patient from triage to ETU high-risk zone
- ▶ Sprayer

#### Trainer Script and Notes



Note time when students have arrived.



*This is the high-risk PPE donning station. High-risk PPE includes 7 pieces of equipment: a pair of inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and a pair of outer gloves. Trainers will direct you to be sure you don each piece correctly. Remember you should always enter the high-risk zone and perform your work with a buddy. You and your buddy should check each other's PPE before entering and throughout the shift.*



As students go through the process of donning, the trainer should ask questions to facilitate learning. This also helps students remember how many pieces of PPE they need. For example, trainers can ask about the next step in the process or explain why they are doing things in a particular way. Encourage students to think independently about the steps.



Record time



Say what is in italics



Things to do



Transition

**Activities 4a and 4b: Donning high-risk PPE**



1. *Put on the inner gloves. Check the gloves and each item of PPE carefully to make sure there are no holes or tears.*
2. *Put on the suit. After unzipping the suit, roll back the top while gathering the sleeves to prevent them from dragging.*
  - a. *Put on the suit one leg at a time, being careful not to tear the suit as you pull it over the boots.*
  - b. *Chair may be used, if needed. The trainer assists the student with getting the suit over the shoulders and straightening the arms.*
  - c. *Zip the suit zipper up to the neck.*
  - d. *Close the flap over the zipper if the suit has a flap covering. In this exercise, do not remove the adhesive tape covering because we will reuse the suits. In a real ETU, you will seal the adhesive flap.*
  - e. *Make sure the gloved thumb goes through the thumb loops or thumb hole.*
3. *Put on the N95 respirator, touching only the edges.*
  - a. *Bend nose piece slightly into a curve to open it and separate the straps.*
  - b. *Pull one strap above the ears and the other below the ears.*
  - c. *Use both hands to mold the nose piece around the bridge of the nose.*
  - d. *The N95 should fit snugly around the face and below the chin.*
  - e. *Perform a seal check.*
4. *Put on the hood.*
  - a. *Place the upper part of the face opening at the top of the eyebrows (supraorbital arch).*
  - b. *Place the lower part of the face opening just below the chin and on top of the respirator.*
  - c. *Do not tuck the hood into the collar of the suit because droplets on the hood could then drip under the suit.*
  - d. *The trainer ensures the top of the hood is smooth and flush with the skull and straightens the hood at the back and front.*
5. *I will assist you with the apron.*
  - a. *Pull the top apron strap over your head so it helps secure the hood.*
  - b. *The trainer ties the apron at the back as follows:*
    - i. *Thread one side strap through the top strap that is around the neck.*
    - ii. *Pull down tightly on the side strap to raise the apron up near the chin.*
    - iii. *Tie the apron straps in a bow fashion, leaving a long strap on one end. This will help students find the strap to untie the apron when they are doffing.*
6. *Put on the face shield; this is your eye protection. The trainer assists with centering the face shield, ensuring that the top rests just above the eyebrows.*
7. *Now look at yourself in the full-length mirror to make sure the PPE is donned correctly. Make sure the face shield is centered correctly on your face and head.*
8. *Put on the outer gloves. Pull the cuff of the glove up your forearm on top of the suit as far as possible. The choice of outer gloves varies depending on the activity the students will perform.*
9. *Take a moment to move around in the suit to make sure you are comfortable. Then check your buddy's PPE.*



### Activities 4a and 4b: Donning high-risk PPE



*NOTE: Day-specific outer glove variations:*

4a variation: on Day 1, students don long-cuff exam gloves.

4b variation: on Days 2 and 3, students don heavy-duty rubber gloves.



10. *At this point, you should not make any other adjustments. You should not touch your face again until you doff your PPE.* The trainer can make any necessary adjustments.
11. Before entering the high-risk zone, students should note the time. Write the time on the student's sleeve to provide a reminder of how long the students are in their PPE. In this exercise, duct tape is applied to the suit sleeve and the time is written on the tape so suits can be reused. Before the students depart for the high-risk zone, the trainer and each buddy check the fit and do a visual evaluation to ensure the PPE is on correctly and no skin is exposed.



When students leave, they need to take the following supplies:

For Day 1, activities 5a and 5b

- ▶ Tray to hold blood draw supplies, including blood collection tube, needle, tourniquet, alcohol wipes, bandage, gauze pad, 1 sealable plastic bag, 1 red biohazard bag, paper towel

For Day 2, activity 5d

- ▶ Pre-labeled body bag to transport corpse to morgue

For Day 3, activity 5h

- ▶ Stretcher to transport new patient from triage to ETU high-risk zone
- ▶ Sprayer

On Days 1 and 2, a Station 4 trainer escorts students in high-risk PPE to the gate of the ETU high-risk zone. On Day 3, the students return to the triage area.



Note time when students leave.

### Options

#### Other PPE options:

1. Médecins Sans Frontières (MSF) uses a hood with a built-in surgical mask containing a slit. An N95 respirator fits through the slit. To imitate the MSF hood, a fluid-resistant surgical mask with a slit torn horizontally through the center can be used to fit over the N95.
2. Goggles are an option for eye protection in place of the face shield. If goggles are used,
  - Have the student check himself in the mirror to make sure no skin is exposed outside of the goggles, and
  - Have the buddies check each other.



Record time



Say what is in italics



Things to do



Transition

## Station 5: High-risk Zone

### OVERVIEW OF STATION 5 ACTIVITIES: 5a–5j

In the ETU high-risk zone, there are 2 patient areas: 1 for patients with suspected Ebola infection and another for patients with confirmed infection. The lab, morgue, and burn pit are adjacent to the confirmed patient area. The activities in Station 5 vary over the 3 days. All the activities take place in the ETU high-risk zone except the triage activity on Day 3 (activities 5e, 5f, and 5g).

- ▶ **Day 1:** Blood and Breach
- ▶ **Day 2:** Clean and Corpse
- ▶ **Day 3:** Triage and Transport

### Purpose

- ▶ Prioritize activities and bring needed supplies into the high-risk zone.
- ▶ Safely enter the high-risk zone and move from the suspect area to the confirmed area.
- ▶ Experience the challenges of performing procedures while wearing high-risk PPE.

### Key points for students

- ▶ Any procedure in an ETU can be risky.
- ▶ Always assess the safety of the situation.

### Station 5 video

[http://youtu.be/\\_98Di5yPI4w](http://youtu.be/_98Di5yPI4w)

### Station 5: High-risk Zone (Day 1: Blood and Breach)

#### Activity 5a: Draw blood from patients

##### Station preparation

##### Time allotted for station:

15 minutes

##### Number of trainers: 2

(1 for each pair of students)

##### Verify that these supplies are ready:

- ▶ Mannequins with names and ID numbers that match the briefing information
- ▶ Sharps container
- ▶ Small trash can
- ▶ 2 Small tables or stools
- ▶ Sprayer

##### Make sure the students bring:

Tray with supplies for drawing blood

##### Trainer script and notes



Note time when students have arrived.



**Activity 5a: Draw blood from patients**



*Walk through the footbath of 0.5% chlorine solution. One student opens the gate and the others walk through the 0.5% chlorine solution footbath. They bring in the supplies by passing them one to the other so that no one is holding the tray while in the footbath. The trainer instructs the student who opened the gate to wash his/her hands.*

Once all students have crossed into the high-risk zone, continue the script.

*As you learned in the earlier briefing, you will be drawing blood from 2 patients in the high-risk zone; 1 patient is on the suspect side and the other patient is on the confirmed side. Do you remember the names of the patients and where they are located? Give students time to answer -- Yaya Sesay ID number 0321, who is suspected of having Ebola, and John Komora ID number 0310, who is confirmed to have Ebola. Now we are going to divide into pairs and complete the blood draws for both patients.*



One trainer keeps a pair of students in the suspect area and proceeds to the named patient. Another trainer takes the other pair of students into the confirmed area. One student opens the gate to the confirmed area and the students walk through the 0.5% chlorine solution footbath. They bring in the supplies by passing them from one to the other. The trainer instructs the student who opened the gate to wash his/her hands.



*In West Africa, people often have similar sounding names, so it is imperative that an identification number is assigned to each patient. You will check the patient's wristband to verify the name and ID number before starting any procedures.*

Once students identify their patients, the trainers continue the script.

*Blood draws, like any procedure in an ETU, can be risky and require careful attention to detail to avoid healthcare worker exposure. You should always assess the safety of every situation. This involves assessing the status of the patient and the environment. In a real ETU, you would make sure the patient is cooperative and not combative. If a patient is combative, a blood draw should not be attempted.*

*Determine the best position in which to draw blood. If the cots in the ETU are on the floor, and the patient is able to move unassisted or can be moved without risk to the healthcare worker, it may be preferable to have the patient sit in a chair for the procedure for safety and to reduce the risk of contamination. The floor or cot could be covered in contaminated materials (e.g., feces, vomit, or blood).*

*It is always important to work with one of the local staff who can translate for you to explain to the patient what you are going to do and why, and to ask for the patient's permission. Also, it is important to inform the lab of any specimen that you will be sending.*

*Let's get back to safely assessing the situation. Always make sure that you have adequate lighting. Also, make sure you have all of your supplies ahead of time and place them, including the sharps container, within easy reach. Make sure that you have good visibility with whatever type of eye protection you are wearing. I realize performing these procedures in PPE might be new to you, so it is important to feel confident about your skills. Once you have arranged all supplies in a safe manner, we will proceed with the blood draw.*



Record time



Say what is in italics



Things to do



Transition

### Activity 5a: Draw blood from patients



Trainer allows time for the students to arrange their supplies, guiding them to place the sharps container right next to the student who will be drawing the blood. Also, the buddy should be nearby so the blood collection tube does not have to travel a long distance to be placed in the bag. Once this is completed, the trainer continues the script.



*Why would you draw blood from a patient in the suspect area?* The answer is to confirm the patient as a case. Patients who have a negative RT-PCR test but have had symptoms for less than 3 days might still be infected. Thus, another test is required 3 days after onset of symptoms to confirm a patient is not infected.



*Why would you draw blood from a patient in the confirmed area?* The answer is to see if a patient who is no longer having symptoms is RT-PCR negative and can be discharged. Confirmed patients with Ebola who appear to have become symptom-free may be discharged if they have a negative RT-PCR test.



**Activity 5a: Draw blood from patients**



*You are all healthcare professionals and know how to draw blood, but it is important to plan the steps before you do the procedure in an ETU. Let's go through the steps of drawing blood safely.*



1. *First, you should always work with a buddy. Decide who will draw the blood and who will assist.*
2. *Introduce yourselves and discuss the procedure with the patient.*
3. *Set down the tray of supplies and arrange them within easy reach. Ensure the sharps container is directly next to the person drawing blood.*
4. *Instruct the student who is assisting to prepare 2 plastic bags.*
  - a. *First, take the sealable bag and spray it inside and out. Place a paper towel in the bag to dry up any excess chlorine solution or blood from the tube.*
  - b. *Next, take a red biohazard bag and spray it inside and out. Place the first bag inside the second.*
5. *Instruct the student who is assisting: Set the bags down on the tray and pick up the labeled blood collection tube.*
6. *Instruct the student who is drawing the blood: Apply the tourniquet, cleanse the site, hold the patient's arm distal to the insertion site with one hand, and simulate inserting the needle. In this exercise, students do not actually expose the needle or puncture the mannequin. It is important to emphasize: Hands should never be near the needle insertion site and needles should never be recapped.*
7. *Instruct the student who is assisting: Give the labeled blood collection tube to your buddy drawing blood.*
8. *Instruct the student who is drawing the blood: After drawing the blood, pull out the collection tube and give it to your buddy.*
9. *Instruct the student who is assisting: Spray the tube, keeping it low to avoid splashing contaminants; then place it in the sealable bag with the paper towel and seal the bag. Tie the red biohazard bag in a knot.*
10. *Instruct the student who is drawing the blood: At the same time your buddy is taking care of the tube, you will remove the tourniquet, then the needle, and dispose of the needle in the sharps container. Then, apply pressure, bandage the patient, and wash your hands with 0.5% chlorine solution.*

*You are now ready to transfer the specimen to the lab.*

Students who are in the suspect area will move to the confirmed area. The student who drew the blood holds the gate for the buddy holding the biohazard bag.

Students who are in the confirmed area go directly to the lab. To avoid potential contamination, the student holding the specimen bag should not pass it to the buddy as they are walking to the lab.



Note time when students leave.



When students leave this station, they should take the specimen bags.



Record time



Say what is in italics



Things to do



Transition

ACTIVITY 5b: PREPARE SPECIMEN FOR LAB AND RESPOND TO PPE BREACH

Purpose

- ▶ Learn how to transfer a properly bagged blood specimen to the ETU lab.
- ▶ Manage a breach in the PPE.

Key points for students

- ▶ Always assess the safety of the situation.
- ▶ Blood and other samples are considered highly infectious.
- ▶ If a breach in PPE occurs, stay calm and go immediately with your buddy to doffing.

Activity 5b: Prepare specimen for lab and respond to PPE breach

Station preparation

Time allotted for station:

5 minutes

Number of trainers: 2

(1 for each pair of students)

Verify that these supplies are ready:

- ▶ Medium trash bag (for lab tech)
- ▶ Sprayer
- ▶ Low-risk PPE for the lab tech – mask, goggles, and gloves
- ▶ Marker (for a trainer to mark the breach in PPE suit)

Trainer script and notes



Note time when students have arrived at the lab.



The trainer posing as a lab tech says: *We have been expecting you. Thank you for calling us ahead of time. Notice that I am wearing low-risk PPE; it is important to keep the biohazard bag low and to avoid splashing any contaminants when spraying. I am going to ask the person who is not holding the bag to open the gate. Please be mindful that the gate may flap open. You should avoid having the gate brush against you, your buddy, or me. When placing the biohazard bag into my bag, try not to touch the edges of the bag as you gently place the specimen inside.*



Once the gate to the lab is open, the lab tech sprays the inside of a medium trash bag as well as the outside of the biohazard bag from the student, making sure the bags are sprayed as low as possible to avoid splashing.

After receiving the specimen, the lab tech says: *Nice job. You can now close the gate and wash your hands.*

The student who opened the gate now closes it. Both students go toward the handwashing station to wash their hands with 0.5% chlorine solution (remind students to pour some chlorine solution from cupped hands over the tap).



**Activity 5b: Prepare specimen for lab and respond to PPE breach**



As the student is closing the gate, a trainer places a mark with the marker on the leg or arm of that student's suit. As both students are going to the handwashing station, the trainer instructs the students:



*It looks like there was a breach in your PPE. While closing the gate, your suit was caught in the fence.*

Have the buddy inspect the student's suit to identify where the breach occurred.

*What should you do?*

Allow students time to answer the question. The trainer follows up by saying: *It's important to stay calm. Since you have a breach, both you and your buddy must leave the ETU and head immediately to doffing. In a real ETU, you would also follow the procedures of the sponsoring organization to address a breach.*

Students walk through the footbath of 0.5% chlorine solution to exit Station 5 and proceed to doffing.



Note time when students leave.



The trainer brings the students to the doffing station, where the trainer for Station 6 (Doffing) takes over.



Record time



Say what is in italics



Things to do



Transition

### Station 5: High-risk Zone (Day 2: Clean and Corpse)

On Day 2, while wearing high-risk PPE, students will safely clean up a body spill (i.e, vomit) in the suspect area and dispose of it safely. The same process would be used for other body fluids such as blood or feces. In the confirmed area they will prepare a corpse for transport to the morgue.

#### ACTIVITY 5c: CLEAN A BODY SPILL (E.G., VOMIT)

##### Purpose

Learn how to clean, disinfect, and dispose of a body spill (e.g., vomit).

##### Key points for students

- ▶ Spills of body fluids must be safely cleaned, disinfected, and disposed of immediately.
- ▶ Always wear high-risk PPE when cleaning body fluids and when handling corpses.

#### Activity 5c: Cleaning a body spill (e.g., vomit)

##### Station preparation

##### Time allotted for station:

15 minutes

##### Number of trainers: 2

(1 for each pair of students)

##### Verify that these supplies are ready:

- ▶ Food to be used as vomit (e.g., oatmeal, hash browns)
- ▶ 2 Mannequins lying on cots
- ▶ Disposable absorbent pads
- ▶ 2 Buckets marked “vomit”
- ▶ Bucket with 0.5% chlorine solution and measuring cup
- ▶ 2 Tables or stools on which to place supplies

##### Make sure the students bring:

- ▶ 4 Red biohazard bags (2 bags for each pair of students)
- ▶ Body bag labeled with the patient’s name and identification number on duct tape

##### Trainer script and notes



Note time when students have arrived.



*As you know from the briefing, there are 2 pools of vomit in the suspect area and a corpse in the confirmed area to take to the morgue.*

*Your group must work together to apply 0.5% chlorine solution to the vomit and remove it from the floor. You must also prepare and move the corpse to the morgue. Which activity should you do first? Wait for response. Remember the flow through the ETU is one-way. If we went into the confirmed area to get the corpse, we could not return to the suspect area to clean up the vomit. So let’s clean up the vomit in the suspect area and then go to the confirmed area to take the corpse to the morgue. One of you will bring in the body bag and set it aside while you do the clean-up.*

*Remember, all waste from a high-risk zone is considered highly contaminated. Body spills must be cleaned and disinfected immediately.*



### Activity 5c: Cleaning a body spill (e.g., vomit)



Instruct students to step through the footbath of 0.5% chlorine solution. After all students cross into the suspect area of the high-risk zone, they should divide into pairs and follow their assigned trainer.



Ask students to divide into pairs, and remind them their first job is to look out for their own and their buddy's safety. They need to work as a team.



1. Select one student to be the cleaner and one to be the bagger.
2. *Assess the size of the spill.*
3. Instruct the cleaner: *Determine how many disposable absorbent pads you will need; then get them from the table or stool in the suspect area.*
4. Instruct the bagger: *Spray the absorbent pad with 0.5% chlorine solution. Do not soak it because a soaked pad cannot absorb as much vomit.*
5. Instruct the cleaner: *Place the absorbent pad over the vomit and then wash your hands. In a real ETU, the pad would remain on the vomit for 15 minutes.*
6. Instruct the bagger to prepare the bags to dispose of the vomit:
  - a. *Get 1 red biohazard bag. Turn the rim inside out about 2 inches to avoid contaminating the outside of the bag when you place the pad with vomit in the bag.*
  - b. *Spray the inside and outside of the bag with 0.5% chlorine solution.*
7. Instruct the cleaner:
  - a. *Make sure your buddy holds the bag in a safe place within easy reach.*
  - b. *Pour a half cup of 0.5% chlorine solution into the bottom of the bag.*
  - c. *Be sure your aprons do not touch the vomit or the pad. Try to protect your apron from touching the vomit or the floor by bending at the waist rather than the knees. If your apron touches the floor, you should spray it with 0.5% chlorine solution after cleaning the vomit.*
  - d. *Working from the outside edges of the pad toward the center, carefully pick up all solids with the pad and place them in the prepared biohazard bag. Do not wipe the floor because this could spread the virus. Push the pad with the vomit away from you when picking it up.*
  - e. *If you cannot pick up all the vomit with 1 pad, wash your hands, get another pad, have the bagger spray it, lay it over the vomit, and repeat the process.*
8. Instruct the bagger: *Seal the bag by tying the ends in a knot.*
9. Instruct the cleaner: *Wash your hands with 0.5% chlorine solution, and pour some solution from your cupped hands over the tap. Get a second biohazard bag. Fold the rim of the bag inside out about 2 inches; then spray the inside and outside with 0.5% chlorine solution.*
10. Instruct the bagger: *Place the first sealed biohazard bag inside the second biohazard bag. Wash hands with 0.5% chlorine solution, and pour some solution from your cupped hands over the tap.*



**Activity 5c: Cleaning a body spill (e.g., vomit)**

11. Instruct the cleaner (now holding the double bag): *Seal the second bag by tying the ends in a knot.*
12. Instruct the bagger: *Spray 0.5% chlorine solution onto the floor, covering the soiled area completely. Chlorine solution should stay on the area for 15 minutes.*
13. If necessary, remind students to take the body bag with them when they go to the confirmed area.
14. Instruct students to cross over into the confirmed area in pairs, by first stepping into the footbath of 0.5% chlorine solution. A student who is not carrying a biohazard bag opens the gate and holds it while the others pass through.
15. The students bring the biohazard bags and discard them in the burn pit; then all students wash their hands.



Note time when students leave.



**When students leave, they need to take:**

- ▶ Biohazard bags for disposal in the burn pit
- ▶ Pre-labeled body bag



**ACTIVITY 5d: TRANSPORTING A CORPSE TO THE MORGUE**

**Purpose:**

Learn how to prepare the body of a deceased patient, safely place it in a body bag, and transport it to the morgue.

**Key points for students**

- ▶ Transporting the body of a patient who died from EVD is a high-risk activity because of the high viral load and infectivity of the body.
- ▶ High-risk PPE must always be worn when touching or moving a corpse.
- ▶ Try to focus any contact with the body bag on your apron so you do not contaminate the rest of your suit.
- ▶ Corpse transport requires at least 4 people.

**Activity 5d: Transporting a corpse to the morgue**

**Station preparation**

**Time allotted for station:**

15 minutes

**Number of trainers:** 1 for each group of 4 students

**Verify that these supplies are ready:**

- ▶ Mannequin on cot with name and ID number on wristband
- ▶ Sheets (optional)

**Make sure the students bring**

- ▶ Their notes from the briefing
- ▶ Body bag labeled with patient's name and identification number

**Trainer script and notes**



Note time when students have arrived.



Record time



Say what is in italics



Things to do



Transition

**Activity 5d: Transporting a corpse to the morgue**



**Steps to prepare and transport a corpse to the morgue**



1. The trainer leads students to a cot and says: *As you know, this patient was reported dead. What do you need to do first?* One student checks the patient's wristband to confirm the name and identification number are the same as on the body bag. The same student ensures the patient is dead by checking for a pulse and visible respirations. The trainer confirms the patient is deceased.
2. Instruct the student who touched the body: *Wash your hands with 0.5% chlorine solution, and pour some solution over the tap.*
3. *Create a safe working area around the cot.*
  - a. *Put a screen around the cot for privacy.*
  - b. *Ask mobile patients to leave the room if able. In a real ETU, any patients who are nearby and well enough to walk are asked to move away from the deceased patient's cot.*
  - c. *Clear an area near the cot that is larger than the size of the body bag, and remove any buckets or equipment that might be in the way.*
  - d. *Spray the cleared area on the floor next to the cot (larger than the size of the body bag) with 0.5% chlorine solution.*
4. *Cover the corpse with a sheet (if one is available).*
5. *Saturate the sheet and all exposed parts of the body with 0.5% chlorine solution.*
6. Instruct the students who cleared the area and moved the screen: *Wash your hands with 0.5% chlorine solution, and pour some solution over the tap.*
7. Instruct two students: *Place the body bag on the floor with the zipper side close to the body so the flap opens away from the body. Unzip it; then wash your hands with 0.5% chlorine solution, and pour some solution over the tap. If your apron touches the ground, it should be sprayed.*
8. Instruct one student: *Spray the empty body bag inside and out with 0.5% chlorine solution.*
9. Instruct another student: *Place a disposable absorbent pad in the body bag; then wash your hands.*
10. Instruct another student: *Spray the absorbent pad with 0.5% chlorine solution.*
11. *I will help you decide how you will lift the body from the cot into the bag. Keep in mind that the heaviest area is at the shoulders. Three students should move the body and one should hold the body bag open. If the corpse is a child, two people can move it.*
12. *Place the body inside the body bag. In a real ETU, the patient's sheets, blankets, and clothing are also placed in the bag.*
13. *All of you should wash your hands immediately with 0.5% chlorine solution, and pour some solution over the tap.*
14. Instruct one student: *Spray all students' aprons; then spray the body in the body bag. Zip the bag closed with the zipper pulls ending at the head (this allows the patient's face to be shown to the family). Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



**Activity 5d: Transporting a corpse to the morgue**



15. *Spray the outside of the body bag with 0.5% chlorine solution, concentrating on the zipper.*



16. *Now you will transport the body bag to the morgue inside the high-risk zone. Try to focus any contact with the body bag on your apron so you do not contaminate the rest of your suit. Place the body with the head toward the wall so all bodies are positioned in the same direction. The four students should position themselves facing the body bag as they prepare to lift it. While lifting, they should try to minimize contact with the body bag. As they carry the body bag to the morgue, they should not walk backward. Students' backs should never be to the body bag. The back of the suit is the least protected area.*

17. *All of you should wash your hands with 0.5% chlorine solution, and pour some solution over the tap.*

18. *In a real ETU, the patient's family has 24 hours to come and view the body. They can bring items to add to the bag. None of the patient's jewelry or personal effects are allowed to leave the ETU, so they cannot be returned to the family. Now return to the patient's cot.*

19. *One of you should spray 0.5% chlorine solution on the cot, walls, and floor of the deceased patient's space, then wash your hands.*

20. *In a real ETU, you would spray all patient effects with 0.5% chlorine solution and put them into a trash bag. You would tie the bag and spray the outside. Then you would put that bag in another bag, tie the outer bag, spray the outside of the bag, and take it to the burn pit. The hygienist would disinfect the area after the body is removed.*

21. *Instruct students to walk through the footbath of 0.5% chlorine solution to exit Station 5 and proceed to doffing.*



Note time when students leave.



Escort students to the doffing area.

When students leave, they should take nothing with them. Remember, anything they brought into the high-risk zone, such as their notes, must be left there to be disposed of with other waste.



Record time



Say what is in italics



Things to do



Transition

## Station 5: High-risk Zone (Day 3: Triage and Transport)

**NOTE:** While 5e, 5f, and 5g activities are listed under Station 5 (high-risk zone activities), together, they are a low-risk PPE activity on Day 3. (See [ETU Three-Day Practical Exercise At-A-Glance](#))

### ACTIVITIES 5e, 5f, AND 5g: TRIAGE AND LOW-RISK PPE

#### Purpose

- ▶ Experience wearing low-risk PPE to perform triage; students, wearing scrubs and boots, don gloves, a surgical mask, and goggles or a full face shield.
- ▶ Triage new patients to determine whether they should be admitted to the ETU.

#### Key points for students

- ▶ All patients must be safely triaged before entering an ETU.
- ▶ Healthcare workers should rapidly triage patients while wearing low-risk PPE.
- ▶ When in low-risk PPE, always maintain a minimum distance of 1 meter, or 3 feet, from a patient.

#### Low-risk PPE donning and doffing video

<http://youtu.be/PPHqj2v2dKo>

### Activities 5e, 5f, and 5g: Triage and low-risk PPE

#### Station preparation

##### Time allotted for station:

15 minutes

##### Number of trainers: 2:

1 to coach; 1 to play the role of the mother

##### Verify that these supplies are ready:

- ▶ Low-risk PPE—surgical mask, gloves, and goggles or face shield
- ▶ Glo Germ (a product that uses an ultraviolet light to simulate the spread of germs and show how quickly and broadly germs can be spread in a short period of time)
- ▶ Adult mannequin with blood on the face and vomit on the clothing
- ▶ Child mannequin with a bandage on one leg

#### Trainer script and notes



Note time when students have arrived.



Before the students' arrival, sprinkle Glo Germ on the adult mannequin that will be triaged.



#### Activity 5e

The trainer from the 3c briefing escorts the students to the low-risk PPE area.

After donning the low-risk PPE (gloves, surgical mask, and goggles or face shield), students exit the ETU low-risk zone and move outside to the triage area. A Station 5 trainer is waiting outside the ETU to escort them to triage.



Activities 5e, 5f, and 5g: Triage and low-risk PPE



Activity 5f



1. Lead the students to the adult mannequin. Instruct the students: *One of our staff members saw a car drive by and leave this man alone before speeding off down the road. He's unresponsive and bleeding a little from his nose and gums. There is vomit on his clothing. What are you going to do?*
2. Questions and prompts for the students:
  - a. *Stay 1 meter, or 3 feet, from the patient.*
  - b. *Do you believe this person needs to be admitted to the ETU?*
  - c. *How would you get the person to the ETU?*
  - d. *What kind of PPE would you wear to move this person to the ETU?*

If questioned about whether or not the patient has a fever, tell the students you don't know because they didn't bring a thermometer. Ask them whether a fever is necessary for ETU admission. Remind the students that the unexplained bleeding makes the patient a suspected case according to the algorithm studied in the lectures, even if the patient is afebrile.

3. Once the students have decided to admit the patient to the ETU, draw their attention to the second patient, a child being held by his parent. A trainer plays the role of the parent and says: *My child has been hit by a car. Can you help us?* The purpose of the second patient is to emphasize the need for early and safe referral. Not all patients coming to triage will be suspected of having Ebola. There are three triage decisions: admit, refer to a non-ETU healthcare facility, or discharge to the community.
4. Instructions for trainer playing the role of child's parent: the mother of this child has walked 4 kilometers from her village carrying her child. She heard there were doctors here that could help her child. The nearest general healthcare facility is 8 kilometers away. The child was near the road this morning and was hit by a car, suffering a broken leg. The mother is worried and desperate to get care for her child, who is badly injured. She doesn't understand why the students are asking so many questions unrelated to his leg when it's obvious the child is in pain. The mother does not volunteer any other history or information other than the injury to the leg. When asked direct questions, she does respond but quickly returns to asking why they aren't helping her child when it is obvious the leg is broken. The child has no symptoms of Ebola. The mother and other family members have no symptoms of Ebola and have not been in contact with anyone who has Ebola. She and the family live in a village where Ebola cases and deaths have occurred, but they have stayed in their home away from all sick people. They have not attended any funerals. The mother is insistent her child receive care at this ETU.



**Activities 5e, 5f, and 5g: Triage and low-risk PPE**

5. Questions and prompts for the students:
  - a. *Will you admit this child to the ETU, refer to another healthcare facility, or discharge to the community?*
  - b. *How will you refer this child to another facility? Would you put him in the ETU ambulance? Even when disinfected, an Ebola ambulance could pose a risk. What about taxis? How available are they? How safe are they?*
  - c. *Would you treat the child in any way before sending him to another facility?* No, the ETU would not provide any care. Discuss the ethical challenges of not being able to treat the child.
  - d. *How long would you keep the child in the area near the ETU (for example, to arrange transport)? The longer the child stays near the ETU, the greater the risk of exposure to Ebola for him and his mother.*

**Activity 5g**

1. Following the triage discussions about the two patients, the trainer sends the students back into the ETU to doff the low-risk PPE and don high-risk PPE. The students pass through the staff entrance into the low-risk zone.
  - a. Each student steps through the 0.5% chlorine solution footbath into the low-risk zone.
  - b. *Wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
  - c. *Remove your goggles and place them in the bucket of 0.5% chlorine solution.*
  - d. *Wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
  - e. *Remove your surgical mask by untying it or breaking it in the back and discard it in the trash.*
  - f. *Wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
  - g. *Remove your gloves using aseptic technique and discard them in the trash.*
  - h. *Wash your hands with 0.05% chlorine solution and pour some solution on top of the tap.*



Note the time when the last student has doffed the low-risk PPE and gone to the donning station.



Students proceed to Station 4 to don high-risk PPE and return to the triage area with a sprayer and a stretcher to transport the patient.



ACTIVITY 5h: TRANSPORT PATIENT FROM TRIAGE TO ETU HIGH-RISK ZONE

**Purpose**

Transport a new patient into the ETU suspect area while in high-risk PPE.

**Key points for students**

- ▶ Moving or transporting patients with Ebola requires wearing high-risk PPE and careful attention to other infection prevention and control measures.
- ▶ To safely transport the patient, four people should carry the stretcher. Do not walk backwards.
- ▶ During transport, backs should never be to the stretcher. The back is the least protected area of the suit.
- ▶ Try to focus any contact with the patient or stretcher on your apron so you do not contaminate the rest of your suit.
- ▶ Avoid being directly over a patient's face when transporting a patient.

**Activity 5h: Transport patient from triage to ETU high-risk zone**

**Station preparation**

**Time allotted for station:**

10 minutes

**Make sure the students bring:**

- ▶ Stretcher
- ▶ Sprayer

**Number of trainers:** 1

**Trainer script and notes**



Note the time when all students are at the triage area ready to begin transporting the patient.



The trainer meets the students, now dressed in high-risk PPE and carrying the stretcher, as they exit the low-risk zone to return to the triage area.

The trainer walks with the students back to the triage area to transport the patient into the ETU.



Record time



Say what is in italics



Things to do



Transition

**Activity 5h: Transport patient from triage to ETU high-risk zone**



1. *Find a level area on the ground, spray the area with 0.5% chlorine solution, and open the stretcher on the ground. Confirm the stretcher is locked and will not fold onto itself.*
2. *Work together to move the patient from the ground to the stretcher with the least amount of contamination. Three students move the patient's head and upper body and one student moves the patient's feet.*
3. *Once the patient is transferred to the stretcher, the trainer instructs the students: Spray your hands with 0.5% chlorine solution. The sprayer is used when a handwashing station is not available.*
4. *Instruct one student: Spray the area where the patient was lying with 0.5% chlorine solution.*
5. *How will you arrange yourselves to transport this patient to the ETU? Give students a little time to answer. The students must coordinate their actions.*
6. *The trainer will confirm or instruct students: The two in the front should walk with the stretcher at their sides; the two in the back can walk with the stretcher in front of them. To safely transport the patient, four students should carry the stretcher. No one should walk backwards. Your back should never be to the stretcher, as it is not covered by the apron.*



Note time when students leave.



Before transporting the patient, students should confirm a cot is available in the suspect area of the ETU. The students carry the stretcher to the triage entrance of the suspect area of the ETU. When they reach the ETU, the trainer opens the gate. As they enter, students step through the footbath of 0.5% chlorine solution. The trainer closes the gate.

The students await instructions from the trainer (activity 5i) before they transfer the patient to the cot.

When students depart this station they need to take a mannequin on a stretcher.



ACTIVITY 5i: TRANSFER PATIENT FROM STRETCHER TO COT

Purpose

Learn how to safely transfer a patient from a stretcher to a cot while in high-risk PPE.

Key points for students

- ▶ Moving or transporting patients with Ebola requires wearing high-risk PPE and careful attention to infection prevention and control measures.
- ▶ Avoid being directly over a patient’s face when transferring a patient from a stretcher to a cot.
- ▶ Assess the environment and make sure adequate room is available to safely transfer a patient from a stretcher to a cot.

Activity 5i: Transfer patient from stretcher to cot

Station preparation

Time allotted for station:

5 minutes

Verify that these supplies are ready:

- ▶ Footbath where students enter high-risk zone from triage

Number of trainers: 1

Trainer script and notes



Note time when students have arrived.



Wait for the students at the entrance to the high-risk zone.



1. When the students have entered the high-risk zone, the trainer instructs them: *Assess the area to make sure you have room to maneuver the patient safely to the cot.*
2. Ask students: *How will you safely transfer the patient from the stretcher to the cot?* Give students a little time to answer.
3. Instruct students: *Rest one side of the stretcher on the cot. Two of you should hold the stretcher securely in place. The other two will slide the patient onto the cot. You should avoid being directly over the patient’s face.*
4. Ask students: *What should you do with the stretcher?* Give students a little time to answer. *In a real ETU, a hygienist would spray the stretcher with 0.5% chlorine solution and remove it for disinfection.*
5. Instruct students: *When the patient is on the cot, wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
6. Students are ready to exit the suspect area. They step through a 0.5% footbath and are escorted to a room past the confirmed area for an activity using Glo Germ (5j).



Note time when students leave.



Record time



Say what is in italics



Things to do



Transition

ACTIVITY 5j: GLO GERM CONTAMINATION ASSESSMENT PRE-DOFFING

Purpose

Use Glo Germ to illustrate how effectively students have avoided contaminating their PPE.

Key points for students

- ▶ There are various ways to contaminate PPE, such as brushing against a contaminated surface or adjusting PPE with contaminated gloves.
- ▶ Frequent and proper hand hygiene is essential. Consider areas commonly missed such as webs of fingers and thumbs.
- ▶ Each PPE layer serves a critical purpose.

Activity 5j: Glo Germ contamination assessment pre-doffing

Station preparation

Time allotted for station:

5 minutes

Verify that these supplies/facilities are ready:

- ▶ Ultraviolet (black) light
- ▶ Dark room

Number of trainers: 1

Trainer script and notes



Trainer escorts students to a dark room to use Glo Germ to assess how effectively students have avoided contaminating their PPE.



Note time when students have arrived.



*Transporting a patient is one of many activities in the ETU that can lead to high levels of contamination. The mannequin in the triage area was pre-treated with Glo Germ. Glo Germ is a liquid, gel, or powder that illuminates when exposed to an ultraviolet, or black, light. This activity will show how effectively you performed the triage activity without contaminating yourselves. I will now close the door and turn on the black light to see if any areas of your PPE were contaminated.*



The trainer closes the door and turns on the black light. The trainer passes the black light up and down the students' PPE to illuminate contaminated areas. Important areas to assess:

- ▶ Back (students might have brushed against the stretcher or mannequin during transport).
- ▶ Face, neck, and shoulder areas (ask students if they or their group members made any adjustments to PPE).
- ▶ Hands (highlight the importance of proper hand hygiene; students should always pay close attention to areas commonly missed such as webs of fingers and thumbs).
- ▶ The underside of the apron (highlight why several layers of PPE are important; in an ETU, healthcare workers will be surrounded by patients excreting body fluids containing Ebola virus).



**Activity 5j: Glo Germ contamination assessment pre-doffing**



*You will now doff your PPE. There will be another black light activity after doffing. This last activity is designed to show that if doffing is done correctly, no contamination will be observed on your body.*



The trainer opens the door and guides the students to the footbath of 0.5% chlorine solution that leads to Station 6.



Note time when students leave.



After the students walk through the footbath of 0.5% chlorine solution, the trainer leads them to the doffing area, where the trainer for Station 6 (Doffing) takes over.



Record time



Say what is in italics



Things to do



Transition

## Station 6: Doffing High-risk PPE

At Station 6, students doff their high-risk PPE. Doffing PPE is a process that should not be done alone in training or in a real ETU. In this exercise, the trainer coaches and supervises the doffing process. Posters are used to assist trainers with the doffing sequence. In a real ETU, a trained observer watches the doffing process to reduce the risk of error.

During the three days of the ETU exercise, the type of outer gloves differs depending on the activity being performed. The sequence of removing PPE varies, depending on which type of gloves are worn.

### OVERVIEW OF STATION 6 ACTIVITIES: 6a, 6b, AND 6c

- ▶ **Day 1:** Doffing high-risk PPE when long-cuff exam gloves are used (activity 6a)
- ▶ **Days 2 and 3:** Doffing high-risk PPE when heavy-duty gloves are used (activity 6b)
- ▶ **Day 3:** Glo Germ is used to illustrate how effectively students have avoided contamination during the doffing process (activity 6c)

### Option for Day 3

Students may assist other students with doffing (under trainer supervision). Students can spray the other students as they doff, following the process outlined in activity 6b.

**Note:** *This option is voluntary and dependent on student level of exhaustion and capability.*

### Purpose

- ▶ Learn how to avoid self-contamination while doffing PPE.
- ▶ Learn how to ensure high-risk PPE is doffed correctly.

### Key points for students

- ▶ Doffing contaminated PPE carries a high risk for exposure to Ebola virus. The trainer always observes and coaches students during the doffing process. Doffing should be performed methodically and in the same order every time.
- ▶ Different protocols may require the use of different gloves depending on the activity to be performed. Remember to follow the doffing order for that specific protocol.
- ▶ When doffing, always remove the most heavily contaminated PPE first. The sequence will vary depending on the type of outer gloves worn.
- ▶ Hand hygiene between every step of doffing is critical. Washing gloved hands in 0.5% chlorine solution between every step allows students to remove PPE without spreading contamination.
- ▶ In general, the order for removing PPE goes from dirtiest to cleanest. Dirty touches dirty; clean touches clean.
- ▶ Students should protect their faces by holding their chins up and closing eyes when removing PPE from the head or when they get sprayed.

### Station 6 video

<http://youtu.be/j1JWafiJjlo>



**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**

**Station preparation**

**Time allotted for station:**

12 minutes

**Number of trainers:** 4

**Verify that these supplies are ready:**

- ▶ 4 Containers (2 between doffing lane -- 1 for reusable PPE and 1 for trash)
- ▶ 4 Sprayers (1 at each doffing lane)

**For exercise purposes only:**

- ▶ Some items (e.g., apron, face shield, and impermeable suit) are collected and disinfected for reuse.
- ▶ Students may keep some pieces (N95 and hood) for individual reuse to practice additional donning and doffing (an additional activity if time permits at the end of the exercise).

**Trainer script and notes**



Note time when students have arrived. Doffing begins when the trainers signal the students into their lanes.



1. Make sure students enter the doffing station through the 0.5% chlorine footbath.
2. *I know you are ready to get out of your PPE. I will guide you through each step. There is nothing you need to remember. All you have to do is stay centered and calm. For each step, wait until I tell you what to do and be sure you do it slowly and deliberately. If you want to know the sequence, you can see it on the poster on the wall.*



3. *In a real ETU, all PPE except your boots and scrubs will stay inside the high-risk zone; some is disposed of and some is decontaminated.*
4. *Hold your arms out to the sides and look up slightly.* Spray suit front and back with 0.5% chlorine solution, from nipple line down, avoiding face. Do not touch the PPE with the spray wand.
5. *Think about the order in which you remove items, from dirtiest to cleanest.*



Record time



Say what is in italics



Things to do



Transition

**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**



**Apron**



1. *You will now remove the apron. Turn around so I can guide you to find the long end of the apron strap. Pull it to untie the strap. Now face me.*
2. *Use your thumbs to loosen and pull the apron from your body. With your eyes closed, bend forward at the waist and use both hands to grab the apron near the top. Alternately, because safety is the top priority, if there is a concern about the student remaining balanced with eyes closed, first have the student bend forward at the waist and grab the apron before closing eyes.*
3. *Gently lift the apron over your head, making sure it does not touch the face area.*
4. *Touch the clean side of the apron, fold it, and place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
6. *Close your eyes and tilt your head back slightly. Extend your arms out at your sides. Spray the suit front (not back), concentrating on the zipper.*
7. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Outer gloves (exam gloves)**

1. *You'll now remove the outer exam gloves using aseptic technique; be careful not to contaminate the inner gloves during the removal process. Discard them in the trash container.*
2. *Wash your inner gloves with 0.5% chlorine solution and pour some solution over the tap.*

**Face shield (if using goggles for eye protection, the process is the same)**

1. *You'll now remove your face shield.*
2. *Bend forward 90 degrees at the waist.*

*Using both hands, grab the face shield at the sides, and close your eyes. **Note:** If you are concerned that your faceshield may be contaminated you can also remove the faceshield by grabbing the headband at the back of your head.*

3. *Slowly pull the face shield down and away from your head. Try not to let the strap snap to avoid splashing any contaminants.*
4. *Place the face shield in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Hood**

1. *Next you will remove your hood.*
2. *Bend forward at the waist 90 degrees.*
3. *With both hands, grab the hood at the crown of your head, close your eyes, and lift the hood off your head.*
4. *Discard the hood in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**



**Suit**



1. *Now you will carefully remove the suit.*
2. *Look up slightly.*
3. *Start at mid-chest and move up to find your zipper pull. Don't rush. Do this slowly so you don't touch your neck. You can use a mirror to help students find the zipper pull.*
4. *While looking up, unzip your suit.*
5. *I will coach you so the outside of the suit doesn't touch your scrubs or skin. Grab the outside of the suit at your shoulders or at your sides toward the back to pull the suit off your shoulders.*
6. *Shrug your shoulders to help get the suit off, turning it inside out. Touch the outside of the suit as little as possible.*
7. *Pull your arms up and out to get your arms out of the sleeves. With your hands at your sides, bend your elbows so the sleeves fall inside out to cover your gloved hands.*
8. *Stop when the sleeves are at your wrist. Now you can use the sleeves like mittens.*
9. *Pull the suit down to the top of your boots, taking care NOT to touch your boots. Now pull your hands out of the sleeves.*
10. *Remember you are wearing only the inner pair of exam gloves; touch only the inside of the suit.*
11. *Next you will step out of the suit. Step on a slack area of the suit and kick one leg backward. Repeat with your other foot. Continue repeating these steps until you are out of the suit. Step away from the suit. Notice where you step so you can touch a cleaner part of the suit when you pick it up.*
12. *The trainer then sprays the suit with 0.5% chlorine solution.*
13. *To avoid letting the suit touch your scrubs, carefully pick up the suit with a pinching motion, touching a part you have not stepped on and keeping the suit away from your body. Place the suit in the designated container.*
14. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**N95 respirator**

1. *I will now tell you how to remove the N95 respirator. This should be done slowly to avoid letting the straps snap and prevent spreading contamination.*
2. *Bend forward 90 at the waist degrees.*
3. *Using both hands, grab the N95 respirator on the side seams close to the front and close your eyes.*
4. *Pull the N95 respirator down and away from your head. Place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Inner gloves**

1. *Remove your inner gloves using aseptic technique and discard them in the trash.*

**Do not wash your bare hands in the high-risk zone, which is considered highly contaminated.**



Record time



Say what is in italics



Things to do



Transition

**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**



**Exiting the High-risk Zone**



1. *I will now spray your boots. Before leaving the high-risk zone, your boots must be disinfected with 0.5% chlorine solution.*
2. *Stand parallel to the line that marks the exit from the high-risk zone.*
3. *Remain sideways and pick up the foot closest to the line, keeping it in the high-risk zone until I finish spraying. Then place that foot across the line. Now, we will repeat the process for the other foot. The trainer sprays both sides of the students' boots. You will then step across the line into the low-risk zone.*
4. *Now that you are out of the high-risk zone, wash your bare hands with 0.05% chlorine solution.*
5. *Before removing boots and scrubs, step into the 0.5% chlorine solution footbath to clean your boots.*
6. *Now you can proceed to the boot removal area. Use the bootjack to pull off your boots without touching the boots or the bootjack. A hygienist will disinfect the boots and hang them to dry. You can now remove your scrubs and change into street clothes.*



After students doff, the trainers remove the doffed PPE students may want to reuse for additional practice from the containers and place the items in the low-risk zone for the students to retrieve.



When students depart this station, they need to retrieve their used PPE if they plan to practice donning and doffing again (an additional activity if time permits).



Note time when students leave.



**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves (Days 2 and 3)**

**Station preparation**

**Time allotted for station:**

12 minutes

**Number of trainers:** 4

**Verify these supplies are ready.**

- ▶ 4 Containers (2 between doffing lane – 1 for reusable PPE and 1 for trash)
- ▶ 4 Sprayers (1 for each doffing lane)

**For exercise purposes only:**

- ▶ Some items (e.g., apron, face shield, and impermeable suit) are collected and disinfected for reuse.
- ▶ Students may keep some pieces (N95 and hood) for individual reuse to practice additional donning and doffing (an additional activity if time permits at the end of the exercise).

**Trainer script and notes**



Note time when students have arrived.



Doffing begins when the trainers signal the students into their lanes.



1. Make sure students enter the doffing station through the 0.5% chlorine footbath.
2. *I know you are ready to get out of your PPE. I will guide you through each step. There is nothing you need to remember. All you have to do is stay centered and calm. For each step, wait until I tell you what to do, and be sure you do it slowly and deliberately. If you want to know the sequence, you can see it on the poster on the wall.*
3. *In a real ETU, all PPE except your boots and scrubs will stay inside the high-risk zone; some is disposed of and some is decontaminated.*
4. *Hold your arms out to the sides and look up slightly.* Spray suit front and back with 0.5% chlorine solution, from nipple line down, avoiding face.
5. *Think about the order in which you remove items, from dirtiest to cleanest. You should remove the heavy-duty outer gloves.*



Record time



Say what is in italics



Things to do



Transition

**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves (Days 2 and 3)**



**Outer gloves (heavy-duty rubber gloves)**



1. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
2. *Remove your heavy-duty rubber gloves using aseptic technique. Put the rubber gloves in the bucket of 0.5% chlorine solution near the handwashing station.*
3. *Wash your inner gloves with 0.5% chlorine solution and pour some solution over the tap.*

**Apron**

1. *You will now remove the apron. Turn around so I can guide you to find the long end of the apron strap. Pull it to untie the strap. Now face me.*
2. *Use your thumbs to loosen and pull the apron from your body. With your eyes closed, bend forward at the waist and use both hands to grab the apron near the top. Alternately, because safety is the top priority, if there is a concern about the student remaining balanced with eyes closed, first have the student bend forward at the waist and grab the apron before closing eyes.*
3. *Gently lift it over your head, making sure it does not touch your face area.*
4. *Touching the clean side of the apron, fold it, and place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
6. *Close your eyes and tilt your head back slightly. Extend your arms out at your sides. Spray suit front (not back), concentrating on the zipper.*
7. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Face shield (if using goggles for eye protection, the process is the same)**

1. *You'll now remove your face shield.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the face shield on the sides and close your eyes. **Note:** If you are concerned that your faceshield may be contaminated you can also remove the faceshield by grabbing the headband at the back of your head.*
4. *Slowly pull the face shield down and away from your head. Try not to let the strap snap to avoid splashing any contaminants.*
5. *Place the face shield in the designated container.*
6. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Hood**

1. *Next you will remove your hood.*
2. *Bend forward at the waist 90 degrees.*
3. *With both hands, grab the hood at the crown of your head, close your eyes, and lift the hood off your head.*
4. *Discard the hood in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves (Days 2 and 3)**



**Suit**



1. *Now you will carefully remove the suit.*
2. *Look up slightly.*
3. *Start at mid-chest and move up to find your zipper pull. Don't rush. Do this slowly so you don't touch your neck. You can use a mirror to help students find the zipper pull.*
4. *While looking up, unzip your suit.*
5. *I will help you so the outside of your suit doesn't touch your scrubs or skin. Grab the outside of the suit at your shoulders or at your sides toward the back to pull the suit off your shoulders.*
6. *Shrug your shoulders to help get the suit off, turning it inside out. Touch the outside of the suit as little as possible.*
7. *Pull your arms up and out to get your arms out of the sleeves. With your hands at your sides, bend your elbows so the sleeves fall inside out to cover your gloved hands.*
8. *Stop when the sleeves are at your wrist. Now you can use the sleeves like mittens.*
9. *Pull the suit down to the top of your boots, taking care NOT to touch your boots. Now pull your hands out of the sleeves.*
10. *Remember you are wearing only the inner pair of exam gloves; touch only the inside of the suit.*
11. *Next you will step out of the suit. Step on a slack area of the suit and kick one leg backward. Repeat with your other foot. Continue repeating these steps until you are out of the suit. Step away from the suit. Notice where you step so you can touch a cleaner part of the suit when you pick it up.*
12. *The trainer then sprays the suit with 0.5% chlorine solution.*
13. *To avoid letting the suit touch your scrubs, carefully pick up the suit with a pinching motion, touching a part you have not stepped on and keeping the suit away from your body. Place the suit in the designated container.*
14. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**N95 respirator**

1. *I will now tell you how to remove the N95 respirator. This should be done slowly to avoid letting the straps snap and prevent spreading contamination.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the N95 respirator on the side seams close to the front and close your eyes.*
4. *Pull the N95 respirator down and away from your head. Place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Inner gloves**

1. *Remove your inner gloves using aseptic technique and discard them in the trash.*

**Do not wash your bare hands in the high-risk zone, which is considered highly contaminated.**



Record time



Say what is in italics



Things to do



Transition

**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves (Days 2 and 3)**



**Exiting the High-risk Zone**



1. *I will now spray your boots. Before you leave the high-risk zone, your boots must be disinfected with 0.5% chlorine solution.*
2. *Stand parallel to the line that marks the exit from the high-risk zone.*
3. *Remain sideways, pick up the foot closest to the line, keeping it in the high-risk zone until I finish spraying. Then place that foot across the line. Now we will repeat the process on the other foot. The trainer sprays both sides of the students' boots. You will step across the line into the low-risk zone.*
4. *Now that you are out of the high-risk zone, wash your bare hands with 0.05% chlorine solution.*
5. *Before removing boots and scrubs, step into the 0.5% chlorine footbath to clean your boots.*
6. *Now you can proceed to the boot removal area. Use the bootjack to pull off your boots without touching the boots or the bootjack. A hygienist will disinfect the boots and hang them to dry. You can now remove your scrubs and change into street clothes.*



After students doff, the trainers remove the doffed PPE students may want to reuse for additional practice from the containers and place items in the low-risk zone for the students to retrieve.



When students depart this station, they need to retrieve their used PPE if they are going to practice donning and doffing (an additional activity if time permits).



Note time when students leave the station.



## Station 6: Doffing High-risk PPE (Day 3)

### ACTIVITY 6c: GLO GERM CONTAMINATION ASSESSMENT POST-DOFFING

#### Purpose:

Use Glo Germ to illustrate how effectively students have avoided contamination during the doffing process (activity 6b).

#### Key points for students

- ▶ Doffing contaminated PPE carries a high risk for exposure to Ebola virus. Doffing should be performed methodically and in the same order every time.
- ▶ Following safe procedures minimizes risk of contamination during doffing.
- ▶ Frequent and proper hand hygiene is essential. Consider areas commonly missed such as webs of fingers and thumbs.

### Activity 6c: Glo Germ contamination assessment post-doffing (Day 3)

#### Station preparation

##### Time allotted for station:

2 minutes

##### Number of trainers: 1

##### Verify that these supplies/facilities are ready:

- ▶ Black or ultraviolet light
- ▶ Dark room

#### Trainer script and notes



The trainer escorts students to a dark room to assess how effectively they have avoided contamination during the doffing process.



*After transporting a patient today that was pretreated with Glo Germ, you assessed how much potential contamination was on your PPE. Doffing high-risk PPE is one of many activities in the ETU that can lead to high levels of contamination. Using the ultraviolet light, we will determine how effectively you doffed the contaminated PPE. I will now close the door and turn on the black light to see if any areas of your clothes or skin were contaminated.*



The trainer closes the door and turns on the black light. The trainer passes the black light up and down the students' exposed skin, scrubs, and boots to illuminate contaminated areas. Important areas to assess:

- ▶ Back
- ▶ Face, neck, and shoulder areas
- ▶ Hands (highlight the importance of proper hand hygiene; they should always pay close attention to areas commonly missed such as webs of fingers and thumbs)
- ▶ Scrubs
- ▶ Boots



When students depart this station, they should take their used PPE if they are going to practice donning and doffing (an additional activity if time permits).



Record time



Say what is in italics



Things to do



Transition

## Station 7: Debriefing

### ACTIVITY 7: DEBRIEFING

#### Purpose

Participate in a debriefing session with a facilitator.

Station 7 is the final station of the exercise. If possible, the facilitator should be a healthcare worker who has returned from working in an ETU in West Africa.

#### Station 7 video

<http://youtu.be/zGpMivK1vKY>

### Activity 7: Debriefing

#### Station preparation

**Time allotted:** 10-20 minutes, depending on subsequent activities

**Number of trainers:** 1-2 (if possible, at least 1 should be a returned responder)

#### Verify that these supplies are ready:

- ▶ Chairs in a quiet area
- ▶ Water and snacks

#### Trainer script and notes



Students have removed their PPE and picked up water and a light snack on their way to the debriefing. Students can get hot while wearing PPE and should be reminded to rehydrate after removing it.

Students sit in a circle in a quiet area. If possible, the facilitator is a healthcare worker who has returned from working in an ETU in West Africa and can discuss the experience.

Ask students how the exercise went (e.g., what went well for them, what they need to work on, how it compared with the day before, and how they felt). Remind them to have their pulse and blood pressure checked (if your organization is implementing this practice).

#### Options

Additional activities can take place concurrently with or following the debriefing.

1. Practice donning and doffing with the PPE students have saved.
2. Practice 1-minute handwashing technique.
3. Participate in tabletop exercises.

#### Closing video

<http://youtu.be/gIYtJiqg33c>



ETU Three-Day Practical Exercise At-a-Glance

	DAY 1	DAY 2	DAY 3
<b>Station 1: Entrance Low-risk Zone</b>	Enter ETU low-risk zone		
<b>Station 2: Scrubs and Boots</b>	Change into scrubs and boots		
<b>Station 3: Briefing</b>	3a: Briefing on blood draw and PPE breach	3b: Briefing on cleaning body spills and transferring corpse to morgue	3c: Briefing on triage and transporting new patients into ETU
			<b>LOW-RISK PPE Activities*</b> <b>Triage</b> and Transport (part 1 in low-risk PPE) 5e: Don low-risk PPE 5f: Triage in low-risk PPE 5g: Doff low-risk PPE
<b>Station 4: Donning High-risk PPE</b>	4a: Don high-risk PPE (long-cuff exam gloves)	4b: Don high-risk PPE (heavy-duty rubber gloves)	4b: Don high-risk PPE (heavy-duty rubber gloves)
<b>Station 5: High-risk Activities</b>	<b>Blood and Breach</b> 5a: Draw blood from patients 5b: Prepare specimen for lab and respond to PPE breach	<b>Clean and Corpse</b> 5c: Clean a body spill (e.g., vomit) 5d: Transport a corpse to the morgue	<b>Triage and Transport</b> (part 2 in high-risk PPE) 5h: Transport patient from triage to ETU high-risk zone 5i: Transfer patient from stretcher to cot 5j: Glo Germ contamination assessment pre-doffing
<b>Station 6: Doffing High-risk PPE</b>	6a: Doff high-risk PPE (long-cuff exam gloves)	6b: Doff high-risk PPE (heavy-duty rubber gloves)	6b: Doff high-risk PPE (heavy-duty rubber gloves) 6c: Glo Germ contamination assessment post-doffing
<b>Station 7: Debriefing</b>	Debrief with trainers or returned responders		

\* Note change of station sequence on Day 3 to include low-risk PPE activity



Record time



Say what is in italics



Things to do



Transition



# Day 1 Trainer Guide

## Station 1: Entrance to ETU Low-risk Zone

### ACTIVITY 1: ENTER ETU LOW-RISK ZONE

#### Purpose

Prepare students for entering the ETU; trainer sprays their shoes and students wash their hands.

#### Key points for students

- ▶ Before entering the ETU, use the restroom, leave all personal items in a secure place.
- ▶ Ensure eyeglasses are secured with a strap.
- ▶ Ensure hair is pulled back and secured.

#### Station 1 video:

<http://youtu.be/IdoQB7xyQLo>

### Activity 1: Enter ETU Low-risk Zone

#### Station Preparation

**Time allotted:** 2 minutes

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Sprayer
- ▶ Handwashing station

#### Trainer Script and Notes



Note time when students have arrived.

**Activity 1: Enter ETU Low-risk Zone**



*You are now at the staff entrance to the low-risk zone of the ETU. You are entering from the outside in your street clothes. Before entering the ETU for your shift, you should:*

- ▶ *Use the restroom.*
- ▶ *Leave all personal items, including cell phones, watches, rings, earrings, and other jewelry, in a secure place.*

*Because this is an entry into the ETU, I will spray your shoes with 0.5% chlorine solution to prevent tracking in any contaminants. You will then wash your bare hands with 0.05% chlorine solution.*

*Next you will go to the changing area, where you will remove your street clothes, except undergarments, and change into scrubs and rubber boots.*

*Remember you should also*

- ▶ *Secure eyeglasses with a tie or retainer strap.*
- ▶ *Pull back long hair securely in a bun or very short ponytail so it can be fully covered under a hood and not catch on the elastic straps of the N95 respirator when you are trying to remove it. Pin back bangs.*
- ▶ *If you have any remaining personal items with you, place them in a numbered container in the changing area.*

*When I open the gate, you will enter the ETU one at a time. Face away from the sprayer and bend your legs one at a time so the bottom of your shoes face the sprayer.*



Spray the bottom of each shoe with 0.5% chlorine solution.



*Wash your hands with 0.05% chlorine solution and pour some chlorine solution from your cupped hands on top of the tap.*

*Now you will go to Station 2, which is the changing area.*



Note time when students leave.

**Options**

Students can begin the exercise while wearing their scrubs to save time changing out of street clothes in Station 2 (Scrubs and Boots).

Support staff can assist with the exercise to facilitate movement of the student groups from one station to another.



## Station 2: Scrubs and Boots

### ACTIVITY 2: CHANGE INTO SCRUBS AND BOOTS

#### Purpose

- ▶ Change from street clothes into scrubs (if students have not done so before the start of the exercise).
- ▶ Remove shoes and put on rubber boots.
- ▶ Leave any remaining personal items in a numbered container for retrieval after the exercise.

#### Key points for students

- ▶ Remove and store all personal items, including jewelry, watches, and cell phones, before donning PPE.
- ▶ Secure glasses and hair, including bangs, to avoid possible contamination at doffing.

#### Station 2 video

<http://youtu.be/qaXPrmBPLVI>

### Activity 2: Change into scrubs and boots

#### Station preparation

**Time allotted:** 6 minutes

**Number of trainers:** 1 trainer or support staff member or trainers from Stations 1 or 3 can facilitate.

#### Verify that these supplies are ready:

- ▶ Numbered containers or buckets for personal belongings

#### Trainer Script and Notes



Station 2 can be self-directed or a trainer or support staff can be available to answer questions. Students should pick up their boots, proceed to the male or female changing area, and change into their scrubs (if they are still in their street clothes). They should leave all personal belongings in numbered containers, secure their eyeglasses, pull back their hair, and proceed to Station 3 (Briefing).

Students will see signs that direct them to Station 3.

#### Options

Students can begin the exercise wearing their scrubs to save time changing out of street clothes in this station.

Consider having hair bands, bobby pins, and eyeglass straps available, as well as scrubs for those who forget to bring them.



Record time



Say what is in italics



Things to do



Transition

## Station 3: Briefing: Blood and Breach

### OVERVIEW

---

- ▶ **Day 1:** Briefing on blood and breach (3a)

### Purpose

- ▶ Provide a daily briefing for students on the scenarios for each day's activities. In a real ETU, this would be the briefing held before the start of each shift.
- ▶ Prompt students to think through the processes they will undertake and anticipate supplies they will need in the high-risk zone.

### Timing

Staying on time at Station 3 is critical for controlling the flow of the entire exercise. The Station 3 trainer should be positioned to be able to observe Stations 1, 2, and 4. This allows the Station 3 trainer to facilitate timekeeping that affects the entire exercise.

### Option

Support staff can assist with the exercise to facilitate the movement of student groups from one station to another. For example, a support staff member at Station 3 can signal the Station 1 trainer to bring another group of students to wait at Station 1.

### Station 3 video

<http://youtu.be/lcUkBY1cQXo>



### ACTIVITY 3a: BRIEFING ON BLOOD AND BREACH

On Day 1, students will draw blood, transport the specimen to the lab, and experience a breach in PPE.

#### Purpose

- ▶ Prepare students to perform Day 1 activities in the high-risk zone while wearing high-risk PPE. Day 1 activities include drawing blood from a patient, preparing blood samples for transport to the lab, and responding to a breach in PPE.

#### Key points for students

- ▶ Collect and label the supplies you need to take in – you will not be able to return for additional supplies.
- ▶ Assess the safety of the situation, including the patient’s status and the environment.
- ▶ Flow in the ETU is always one-way: low-risk to high-risk. Anything that goes into the high-risk zone stays in the high-risk zone.

### Activity 3a: Briefing on blood draw and PPE breach

#### Station Preparation

**Time allotted:** 6 minutes  
(this station is critical for controlling the time for the entire exercise)

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Chairs are arranged in a semicircle for students.
- ▶ Markers and flip chart or whiteboard on which the following is written:

#### Specimens

- ▶ **Suspect:** Yaya Sesay ID #0321
- ▶ **Confirmed:** John Komora ID #0310

#### Trainer Script and Notes



Note time when students have arrived.



The Station 3 trainer asks

- ▶ *Did you remove all personal items, including cell phones, watches, rings, earrings, and other jewelry either before entering the ETU, or place them in a numbered container in the changing area?*
- ▶ *Is your cell phone out of your scrubs pocket?*
- ▶ *Did you secure eyeglasses with a tie or retainer strap?*
- ▶ *Did you tie back long hair and pin bangs?*



Record time



Say what is in italics



Things to do



Transition

**Activity 3a: Briefing on blood draw and PPE breach**



*Please sit down for your briefing. This is where you will begin to learn how to develop a ritual while in the ETU. Although we know this a simulation, we ask that you stay in the mindset that you are in a real ETU. Your personal safety in the ETU is the top priority. The flow in the ETU is only one way, from low-risk to high-risk; anything that goes into the high-risk zone stays there.*

*You will collect blood from two patients, Yaya Sesay ID number 0321, a patient with suspected Ebola, and John Komora ID number 0310, who is confirmed to have Ebola. As with any procedure, you should always assess the safety of the situation, including the status of the patient and the environment.*

*After you don your PPE, you will collect and label supplies for drawing blood before you enter the high-risk zone. You will label the test tubes by writing on a piece of tape so the tubes can be reused in the exercise. After you draw the blood, you will inform lab personnel that a specimen is on the way. The lab tech will be ready and waiting in low-risk PPE (eye protection, gloves, mask).*

*Are there any questions?*

*Ok, remember to be careful. Now you will go to the donning area.*



Hold students at the station until the donning area is ready to receive them. You might need to improvise dialogue with the students to extend or shorten the briefing time, depending on how the subsequent stations are progressing.



Note time when students leave.



Direct students to the donning area.

The Station 3 trainer or a support staff member should signal the Station 1 trainer to bring another group of students to wait to start Station 1.



## Station 4: Donning High-risk PPE

### OVERVIEW

At Station 4, students don high-risk PPE. Students arrive at Station 4 in scrubs and boots. Whether PPE is used for an exercise or in a real ETU, there will likely be differences in the PPE and donning protocols. Regardless of equipment used, PPE must be donned properly to provide adequate protection.

- ▶ **Activity 4a:** Don high-risk PPE (long-cuff exam gloves)

### Purpose

- ▶ Practice supervised donning of high-risk PPE
- ▶ Learn principles of donning PPE correctly

### Key points for students

- ▶ Donning will be supervised by a trainer to ensure it is done correctly in this exercise; in a real ETU, trained observers should monitor to make sure PPE is used correctly.
- ▶ Buddies should check each other's PPE.
- ▶ Students should check themselves in a full-length mirror.

### About high-risk PPE used in this exercise:

High-risk PPE includes 7 pieces of equipment. Note that students are already wearing scrubs and boots.

1. **Inner gloves.** Hands are the primary means of contact between healthcare workers and patients, so gloves are essential. This exercise uses non-sterile, powder-free, long-cuff examination gloves.
2. **Impermeable protective suit.** This suit should cover the body and include wrist and ankle elastics, thumb loops or thumb holes to prevent sleeves from riding up, a front zipper with a self-adhesive zipper flap closure system, and an adhesive flap seal over the neck. Different styles may be used, including suits that have an attached hood; however, use of an attached hood is not described in this exercise.
3. **Surgical N95 respirator** (referred to hereafter as N95 respirator). This exercise uses a duckbill style.
4. **Hood.** This exercise uses a separate hood. Suits with attached hoods are sometimes the only type available and are adapted for use. If the suit has an attached hood, students are directed to fold over the hood as a collar.
5. **Fluid-resistant or impermeable apron.** This exercise uses a disposable apron that is reused for training purposes. A reusable heavy-duty apron is another option.
6. **Full face shield.** This exercise uses a full face shield; goggles are another option for eye protection.
7. **Outer gloves.** The type of outer gloves depends on the work that will be performed.
  - a. For patient care, use non-sterile, powder-free, long-cuff examination gloves (for Day 1 activities 5a and 5b). When exam gloves are used as both inner and outer gloves, it is best to use two different colors.

### Station 4 video

<http://youtu.be/Sto2K1DEFYM>



Record time



Say what is in italics



Things to do



Transition

**Activity 4a: Donning high-risk PPE**

**Station preparation**

**Time allotted:** 20 minutes  
(this station is critical for controlling the time for the entire exercise)

**Timekeeping:** Trainers should check on progress at Station 5 to ensure timely flow of students through the stations  
**Number of trainers:** 1 trainer for each pair of students. An extra trainer is helpful to assist students with gathering supplies to take into the high-risk zone for each day's activities.

**Verify that these supplies are ready:**

- ▶ High-risk PPE laid out in the order to be donned (for this exercise, high-risk PPE includes 7 pieces of equipment - inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and outer gloves)
- ▶ Chairs for students to sit when donning the suit, if necessary
- ▶ Mirrors for students to check their PPE
- ▶ Duct tape and marker to mark time entering the ETU on the PPE suit
- ▶ Tray to hold blood draw supplies, including blood collection tube, needle, tourniquet, alcohol wipes, bandage, gauze pad, alcohol wipe, 1 sealable plastic bag, 1 red biohazard bag, paper towel
- ▶ Body bag to transport corpse to morgue
- ▶ Stretcher to transport new patient from triage to ETU high-risk zone
- ▶ Sprayer

**Trainer Script and Notes**



Note time when students have arrived.



*This is the high-risk PPE donning station. High-risk PPE includes 7 pieces of equipment: a pair of inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and a pair of outer gloves. Trainers will direct you to be sure you don each piece correctly. Remember you should always enter the high-risk zone and perform your work with a buddy. You and your buddy should check each other's PPE before entering and throughout the shift.*



As students go through the process of donning, the trainer should ask questions to facilitate learning. This also helps students remember how many pieces of PPE they need. For example, trainers can ask about the next step in the process or explain why they are doing things in a particular way. Encourage students to think independently about the steps.



**Activity 4a: Donning high-risk PPE**



1. *Put on the inner gloves. Check the gloves and each item of PPE carefully to make sure there are no holes or tears.*
2. *Put on the suit. After unzipping the suit, roll back the top while gathering the sleeves to prevent them from dragging.*
  - a. *Put on the suit one leg at a time, being careful not to tear the suit as you pull it over the boots.*
  - b. *Chair may be used, if needed. The trainer assists the student with getting the suit over the shoulders and straightening the arms.*
  - c. *Zip the suit zipper up to the neck.*
  - d. *Close the flap over the zipper if the suit has a flap covering. In this exercise, do not remove the adhesive tape covering because we will reuse the suits. In a real ETU, you will seal the adhesive flap.*
  - e. *Make sure the gloved thumb goes through the thumb loops or thumb hole.*
3. *Put on the N95 respirator, touching only the edges.*
  - a. *Bend nose piece slightly into a curve to open it and separate the straps.*
  - b. *Pull one strap above the ears and the other below the ears.*
  - c. *Use both hands to mold the nose piece around the bridge of the nose.*
  - d. *The N95 should fit snugly around the face and below the chin.*
  - e. *Perform a seal check.*
4. *Put on the hood.*
  - a. *Place the upper part of the face opening at the top of the eyebrows (supraorbital arch).*
  - b. *Place the lower part of the face opening just below the chin and on top of the respirator.*
  - c. *Do not tuck the hood into the collar of the suit because droplets on the hood could then drip under the suit.*
  - d. *The trainer ensures the top of the hood is smooth and flush with the skull and straightens the hood at the back and front.*
5. *I will assist you with the apron.*
  - a. *Pull the top apron strap over your head so it helps secure the hood.*
  - b. *The trainer ties the apron at the back as follows:*
    - i. *Thread one side strap through the top strap that is around the neck.*
    - ii. *Pull down tightly on the side strap to raise the apron up near the chin.*
    - iii. *Tie the apron straps in a bow fashion, leaving a long strap on one end. This will help students find the strap to untie the apron when they are doffing.*
6. *Put on the face shield; this is your eye protection.* *The trainer assists with centering the face shield, ensuring that the top rests just above the eyebrows.*
7. *Now look at yourself in the full-length mirror to make sure the PPE is donned correctly. Make sure the face shield is centered correctly on your face and head.*
8. *Put on the outer gloves. Pull the cuff of the glove up your forearm on top of the suit as far as possible.* *The choice of outer gloves varies depending on the activity the students will perform.*
9. *Take a moment to move around in the suit to make sure you are comfortable. Then check your buddy's PPE.*



Record time



Say what is in italics



Things to do



Transition

### Activity 4a: Donning high-risk PPE



10. *At this point, you should not make any other adjustments. You should not touch your face again until you doff your PPE.* The trainer can make any necessary adjustments.



11. Before entering the high-risk zone, students should note the time. Write the time on the students' sleeves provide a reminder of how long the students are in their PPE. In this exercise, duct tape is applied to the suit sleeve and the time is written on the tape so suits can be reused. Before the students depart for the high-risk zone, the trainer and each buddy check the fit and do a visual evaluation to ensure the PPE is on correctly and no skin is exposed.



When students leave, they need to take the following supplies:

- ▶ Tray to hold blood draw supplies, including blood collection tube, needle, tourniquet, alcohol wipes, bandage, gauze pad, 1 sealable plastic bag, 1 red biohazard bag, paper towel

On Day 1, a Station 4 trainer escorts students in high-risk PPE to the gate of the ETU high-risk zone.



Note time when students leave.

### Options

#### Other PPE options:

1. Médecins Sans Frontières (MSF) uses a hood with a built-in surgical mask containing a slit. An N95 respirator fits through the slit. To imitate the MSF hood, a fluid-resistant surgical mask with a slit torn horizontally through the center can be used to fit over the N95.
2. Goggles are an option for eye protection in place of the face shield. If goggles are used,
  - Have the student check himself in the mirror to make sure no skin is exposed outside of the goggles, and
  - Have the buddies check each other.



## Station 5: High-risk Zone: Blood and Breach

### OVERVIEW

In the ETU high-risk zone, there are 2 patient areas: 1 for patients with suspected Ebola infection and another for patients with confirmed infection. The lab, morgue, and burn pit are adjacent to the confirmed patient area. All the activities take place in the ETU high-risk zone.

- ▶ **Day 1:** Blood and Breach.

### Purpose

- ▶ Prioritize activities and bring needed supplies into the high-risk zone.
- ▶ Safely enter the high-risk zone and move from the suspect area to the confirmed area.
- ▶ Experience the challenges of performing procedures while wearing high-risk PPE.

### Key points for students

- ▶ Any procedure in an ETU can be risky.
- ▶ Always assess the safety of the situation.

### Station 5 video

[http://youtu.be/\\_98Di5yPI4w](http://youtu.be/_98Di5yPI4w)

### Activity 5a: Draw blood from patients

#### Station preparation

##### Time allotted for station:

15 minutes

##### Number of trainers: 2

(1 for each pair of students)

##### Verify that these supplies are ready:

- ▶ Mannequins with names and ID numbers that match the briefing information
- ▶ Sharps container
- ▶ Small trash can
- ▶ 2 Small tables or stools
- ▶ Sprayer

##### Make sure the students bring:

Tray with supplies for drawing blood

#### Trainer script and notes



Note time when students have arrived.



Record time



Say what is in italics



Things to do



Transition

### Activity 5a: Draw blood from patients



*Walk through the footbath of 0.5% chlorine solution. One student opens the gate and the others walk through the 0.5% chlorine solution footbath. They bring in the supplies by passing them one to the other so that no one is holding the tray while in the footbath. The trainer instructs the student who opened the gate to wash his/her hands.*

Once all students have crossed into the high-risk zone, continue the script.

*As you learned in the earlier briefing, you will be drawing blood from 2 patients in the high-risk zone; 1 patient is on the suspect side and the other patient is on the confirmed side. Do you remember the names of the patients and where they are located? Give students time to answer -- Yaya Sesay ID number 0321, who is suspected of having Ebola, and John Komora ID number 0310, who is confirmed to have Ebola. Now we are going to divide into pairs and complete the blood draws for both patients.*



One trainer keeps a pair of students in the suspect area and proceeds to the named patient. Another trainer takes the other pair of students into the confirmed area. One student opens the gate to the confirmed area and the students walk through the 0.5% chlorine solution footbath. They bring in the supplies by passing them from one to the other. The trainer instructs the student who opened the gate to wash his/her hands.



*In West Africa, people often have similar sounding names, so it is imperative that an identification number is assigned to each patient. You will check the patient's wristband to verify the name and ID number before starting any procedures.*

Once students identify their patients, the trainers continue the script.

*Blood draws, like any procedure in an ETU, can be risky and require careful attention to detail to avoid healthcare worker exposure. You should always assess the safety of every situation. This involves assessing the status of the patient and the environment. In a real ETU, you would make sure the patient is cooperative and not combative. If a patient is combative, a blood draw should not be attempted.*

*Determine the best position in which to draw blood. If the cots in the ETU are on the floor, and the patient is able to move unassisted or can be moved without risk to the healthcare worker, it may be preferable to have the patient sit in a chair for the procedure for safety and to reduce the risk of contamination. The floor or cot could be covered in contaminated materials (e.g., feces, vomit, or blood).*

*It is always important to work with one of the local staff who can translate for you to explain to the patient what you are going to do and why, and to ask for the patient's permission. Also, it is important to inform the lab of any specimen that you will be sending.*

*Let's get back to safely assessing the situation. Always make sure that you have adequate lighting. Also, make sure you have all of your supplies ahead of time and place them, including the sharps container, within easy reach. Make sure that you have good visibility with whatever type of eye protection you are wearing. I realize performing these procedures in PPE might be new to you, so it is important to feel confident about your skills. Once you have arranged all supplies in a safe manner, we will proceed with the blood draw.*



### Activity 5a: Draw blood from patients



Trainer allows time for the students to arrange their supplies, guiding them to place the sharps container right next to the student who will be drawing the blood. Also, the buddy should be nearby so the blood collection tube does not have to travel a long distance to be placed in the bag. Once this is completed, the trainer continues the script.



*Why would you draw blood from a patient in the suspect area?* The answer is to confirm the patient as a case. Patients who have a negative RT-PCR test but have had symptoms for less than 3 days might still be infected. Thus, another test is required 3 days after onset of symptoms to confirm a patient is not infected.



*Why would you draw blood from a patient in the confirmed area?* The answer is to see if a patient who is no longer having symptoms is RT-PCR negative and can be discharged. Confirmed patients with Ebola who appear to have become symptom-free may be discharged if they have a negative RT-PCR test.

*You are all healthcare professionals and know how to draw blood, but it is important to plan the steps before you do the procedure in an ETU. Let's go through the steps of drawing blood safely.*

1. *First, you should always work with a buddy. Decide who will draw the blood and who will assist.*
2. *Introduce yourselves and discuss the procedure with the patient.*
3. *Set down the tray of supplies and arrange them within easy reach. Ensure the sharps container is directly next to the person drawing blood.*
4. *Instruct the student who is assisting to prepare 2 plastic bags.*
  - a. *First, take the sealable bag and spray it inside and out. Place a paper towel in the bag to dry up any excess chlorine solution or blood from the tube.*
  - b. *Next, take a red biohazard bag and spray it inside and out. Place the first bag inside the second.*
5. *Instruct the student who is assisting: Set the bags down on the tray and pick up the labeled blood collection tube.*
6. *Instruct the student who is drawing the blood: Apply the tourniquet, cleanse the site, hold the patient's arm distal to the insertion site with one hand, and simulate inserting the needle. In this exercise, students do not actually expose the needle or puncture the mannequin. It is important to emphasize: Hands should never be near the needle insertion site and needles should never be recapped.*
7. *Instruct the student who is assisting: Give the labeled blood collection tube to your buddy drawing blood.*



**Activity 5a: Draw blood from patients**



8. Instruct the student who is drawing the blood: *After drawing the blood, pull out the collection tube and give it to your buddy.*



9. Instruct the student who is assisting: *Spray the tube, keeping it low to avoid splashing contaminants; then place it in the sealable bag with the paper towel and seal the bag. Tie the red biohazard bag in a knot.*

10. Instruct the student who is drawing the blood: *At the same time your buddy is taking care of the tube, you will remove the tourniquet, then the needle, and dispose of the needle in the sharps container. Then, apply pressure, bandage the patient, and wash your hands with 0.5% chlorine solution.*

*You are now ready to transfer the specimen to the lab.*

Students who are in the suspect area will move to the confirmed area. The student who drew the blood holds the gate for the buddy holding the biohazard bag.

Students who are in the confirmed area go directly to the lab. To avoid potential contamination, the student holding the specimen bag should not pass it to the buddy as they are walking to the lab.



Note time when students leave.



When students leave this station, they should take the specimen bags.



## ACTIVITY 5b: PREPARE SPECIMEN FOR LAB AND RESPOND TO PPE BREACH

### Purpose

- ▶ Learn how to transfer a properly bagged blood specimen to the ETU lab.
- ▶ Manage a breach in the PPE.

### Key points for students

- ▶ Always assess the safety of the situation.
- ▶ Blood and other samples are considered highly infectious.
- ▶ If a breach in PPE occurs, stay calm and go immediately with your buddy to doffing.

### Activity 5b: Prepare specimen for lab and respond to PPE breach

#### Station preparation

##### Time allotted for station:

5 minutes

##### Number of trainers: 2

(1 for each pair of students)

##### Verify that these supplies are ready:

- ▶ Medium trash bag (for lab tech)
- ▶ Sprayer
- ▶ Low-risk PPE for the lab tech - mask, goggles, and gloves
- ▶ Marker (for a trainer to mark the breach in PPE suit)

#### Trainer script and notes



Note time when students have arrived at the lab.



The trainer posing as a lab tech says: *We have been expecting you. Thank you for calling us ahead of time. Notice that I am wearing a low-risk PPE; it is important to keep the biohazard bag low and to avoid splashing any contaminants when spraying. I am going to ask the person who is not holding the bag to open the gate. Please be mindful that the gate may flap open. You should avoid having the gate brush against you, your buddy, or me. When placing the biohazard bag into my bag, try not to touch the edges of the bag as you gently place the specimen inside.*



Once the gate to the lab is open, the lab tech sprays the inside of a medium trash bag as well as the outside of the biohazard bag from the student, making sure the bags are sprayed as low as possible to avoid splashing.

After receiving the specimen, the lab tech says: *Nice job. You can now close the gate and wash your hands.*

The student who opened the gate now closes it. Both students go toward the handwashing station to wash their hands with 0.5% chlorine solution (remind students to pour some chlorine solution from cupped hands over the tap).



Record time



Say what is in italics



Things to do



Transition

**Activity 5b: Prepare specimen for lab and respond to PPE breach**



As the student is closing the gate, a trainer places a mark with the marker on the leg or arm of that student's suit. As both students are going to the handwashing station, the trainer instructs the students:



*It looks like there was a breach in your PPE. While closing the gate, your suit was caught in the fence.*

Have the buddy inspect the student's suit to identify where the breach occurred.

*What should you do?*

Allow students time to answer the question. The trainer follows up by saying: *It's important to stay calm. Since you have a breach, both you and your buddy must leave the ETU and head immediately to doffing. In a real ETU, you would also follow the procedures of the sponsoring organization to address a breach.*

Students walk through the footbath of 0.5% chlorine solution to exit Station 5 and proceed to doffing.



Note time when students leave.



The trainer brings the students to the doffing station, where the trainer for Station 6 (Doffing) takes over.



## Station 6: Doffing High-risk PPE

At Station 6, students doff their high-risk PPE. Doffing PPE is a process that should not be done alone in training or in a real ETU. In this exercise, the trainer coaches and supervises the doffing process. Posters are used to assist trainers with the doffing sequence. In a real ETU, a trained observer watches the doffing process to reduce the risk of error.

During the three days of the ETU exercise, the type of outer gloves differs depending on the activity being performed. The sequence of removing PPE varies, depending on which type of gloves are worn.

### OVERVIEW

- ▶ **Day 1:** Doffing high-risk PPE when long-cuff exam gloves are used (activity 6a)

### Purpose

- ▶ Learn how to avoid self-contamination while doffing PPE.
- ▶ Learn how to ensure high-risk PPE is doffed correctly.

### Key points for students

- ▶ Doffing contaminated PPE carries a high risk for exposure to Ebola virus. The trainer always observes and coaches students during the doffing process. Doffing should be performed methodically and in the same order every time.
- ▶ Different protocols may require the use of different gloves depending on the activity to be performed. Remember to follow the doffing order for that specific protocol.
- ▶ When doffing, always remove the most heavily contaminated PPE first. The sequence will vary depending on the type of outer gloves worn.
- ▶ Hand hygiene between every step of doffing is critical. Washing gloved hands in 0.5% chlorine solution between every step allows students to remove PPE without spreading contamination.
- ▶ In general, the order for removing PPE goes from dirtiest to cleanest. Dirty touches dirty; clean touches clean.
- ▶ Students should protect their faces by holding their chins up and closing eyes when removing PPE from the head or when they get sprayed.

### Station 6 video

<http://youtu.be/j1JWafiJjlo>



Record time



Say what is in italics



Things to do



Transition

**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**

**Station preparation**

**Time allotted for station:**  
12 minutes

**Number of trainers:** 4

**Verify that these supplies are ready:**

- ▶ 4 Containers (2 between doffing lane -- 1 for reusable PPE and 1 for trash)
- ▶ 4 Sprayers (1 at each doffing lane)

**For exercise purposes only**

- ▶ Some items (e.g., apron, face shield, and impermeable suit) are collected and disinfected for reuse.
- ▶ Students may keep some pieces (N95 and hood) for individual reuse to practice additional donning and doffing (an additional activity if time permits at the end of the exercise).

**Trainer script and notes**



Note time when students have arrived. Doffing begins when the trainers signal the students into their lanes.



1. Make sure students enter the doffing station through the 0.5% chlorine footbath.
2. *I know you are ready to get out of your PPE. I will guide you through each step. There is nothing you need to remember. All you have to do is stay centered and calm. For each step, wait until I tell you what to do and be sure you do it slowly and deliberately. If you want to know the sequence, you can see it on the poster on the wall.*



3. *In a real ETU, all PPE except your boots and scrubs will stay inside the high-risk zone; some is disposed of and some is decontaminated.*
4. *Hold your arms out to the sides and look up slightly. Spray suit front and back with 0.5% chlorine solution, from nipple line down, avoiding face. Do not touch the PPE with the spray wand.*
5. *Think about the order in which you remove items, from dirtiest to cleanest.*



**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**



**Apron**



1. *You will now remove the apron. Turn around so I can guide you to find the long end of the apron strap. Pull it to untie the strap. Now face me.*
2. *Use your thumbs to loosen and pull the apron from your body. With your eyes closed, bend forward at the waist and use both hands to grab the apron near the top. Alternately, because safety is the top priority, if there is a concern about the student remaining balanced with eyes closed, first have the student bend forward at the waist and grab the apron before closing eyes.*
3. *Gently lift the apron over your head, making sure it does not touch the face area.*
4. *Touch the clean side of the apron, fold it, and place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
6. *Close your eyes and tilt your head back slightly. Extend your arms out at your sides. Spray the suit front (not back), concentrating on the zipper.*
7. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Outer gloves (exam gloves)**

1. *You'll now remove the outer exam gloves using aseptic technique; be careful not to contaminate the inner gloves during the removal process. Discard them in the trash container.*
2. *Wash your inner gloves with 0.5% chlorine solution and pour some solution over the tap.*

**Face shield (if using goggles for eye protection, the process is the same)**

1. *You'll now remove your face shield.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the face shield at the sides, and close your eyes. **Note:** If you are concerned that your faceshield may be contaminated you can also remove the faceshield by grabbing the headband at the back of your head.*
4. *Slowly pull the face shield down and away from your head. Try not to let the strap snap to avoid splashing any contaminants.*
5. *Place the face shield in the designated container.*
6. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Hood**

1. *Next you will remove your hood.*
2. *Bend forward at the waist 90 degrees.*
3. *With both hands, grab the hood at the crown of your head, close your eyes, and lift the hood off your head.*
4. *Discard the hood in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



Record time



Say what is in italics



Things to do



Transition

**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**



**Suit**



1. *Now you will carefully remove the suit.*
2. *Look up slightly.*
3. *Start at mid-chest and move up to find your zipper pull. Don't rush. Do this slowly so you don't touch your neck. You can use a mirror to help students find the zipper pull.*
4. *While looking up, unzip your suit.*
5. *I will coach you so the outside of the suit doesn't touch your scrubs or skin. Grab the outside of the suit at your shoulders or at your sides toward the back to pull the suit off your shoulders.*
6. *Shrug your shoulders to help get the suit off, turning it inside out. Touch the outside of the suit as little as possible.*
7. *Pull your arms up and out to get your arms out of the sleeves. With your hands at your sides, bend your elbows so the sleeves fall inside out to cover your gloved hands.*
8. *Stop when the sleeves are at your wrist. Now you can use the sleeves like mittens.*
9. *Pull the suit down to the top of your boots, taking care NOT to touch your boots. Now pull your hands out of the sleeves.*
10. *Remember you are wearing only the inner pair of exam gloves; touch only the inside of the suit.*
11. *Next you will step out of the suit. Step on a slack area of the suit and kick one leg backward. Repeat with your other foot. Continue repeating these steps until you are out of the suit. Step away from the suit. Notice where you step so you can touch a cleaner part of the suit when you pick it up.*
12. *The trainer then sprays the suit with 0.5% chlorine solution.*
13. *To avoid letting the suit touch your scrubs, carefully pick up the suit with a pinching motion, touching a part you have not stepped on and keeping the suit away from your body. Place the suit in the designated container.*
14. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**N95 respirator**

1. *I will now tell you how to remove the N95 respirator. This should be done slowly to avoid letting the straps snap and prevent spreading contamination.*
2. *Bend forward 90 degrees at the waist.*
3. *Using both hands, grab the N95 respirator on the side seams close to the front and close your eyes.*
4. *Pull the N95 respirator down and away from your head. Place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Inner gloves**

1. *Remove your inner gloves using aseptic technique and discard them in the trash.*

**Do not wash your bare hands in the high-risk zone, which is considered highly contaminated.**



**Activity 6a: Doffing high-risk PPE with long-cuff exam gloves (Day 1)**



**Exiting the High-risk Zone**



1. *I will now spray your boots. Before leaving the high-risk zone, your boots must be disinfected with 0.5% chlorine solution.*
2. *Stand parallel to the line that marks the exit from the high-risk zone.*
3. *Remain sideways and pick up the foot closest to the line, keeping it in the high-risk zone until I finish spraying. Then place that foot across the line. Now, we will repeat the process for the other foot. The trainer sprays both sides of the students' boots. You will then step across the line into the low-risk zone.*
4. *Now that you are out of the high-risk zone, wash your bare hands with 0.05% chlorine solution.*
5. *Before removing boots and scrubs, step into the 0.5% chlorine solution footbath to clean your boots.*
6. *Now you can proceed to the boot removal area. Use the bootjack to pull off your boots without touching the boots or the bootjack. A hygienist will disinfect the boots and hang them to dry. You can now remove your scrubs and change into street clothes.*



After students doff, the trainers remove the doffed PPE students may want to reuse for additional practice from the containers and place the items in the low-risk zone for the students to retrieve.



When students depart this station, they need to retrieve their used PPE if they plan to practice donning and doffing again (an additional activity if time permits).



Note time when students leave.



Record time



Say what is in italics



Things to do



Transition

## Station 7: Debriefing

### ACTIVITY 7: DEBRIEFING

#### Purpose

Participate in a debriefing session with a facilitator.

Station 7 is the final station of the exercise. If possible, the facilitator should be a healthcare worker who has returned from working in an ETU in West Africa.

#### Station 7 video

<http://youtu.be/zGpMivK1vKY>

### Activity 7: Debriefing

#### Station preparation

**Time allotted:** 10-20 minutes, depending on subsequent activities

**Number of trainers:** 1-2 (if possible, at least 1 should be a returned responder)

#### Verify that these supplies are ready:

- ▶ Chairs in a quiet area
- ▶ Water and snacks

#### Trainer script and notes



Students have removed their PPE and picked up water and a light snack on their way to the debriefing. Students can get hot while wearing PPE and should be reminded to rehydrate after removing it.

Students sit in a circle in a quiet area. If possible, the facilitator is a healthcare worker who has returned from working in an ETU in West Africa and can discuss the experience.

Ask students how the exercise went (e.g., what went well for them, what they need to work on, how it compared with the day before, and how they felt). Remind them to have their pulse and blood pressure checked (if your organization is implementing this practice).

#### Options

Additional activities can take place concurrently with or following the debriefing.

1. Practice donning and doffing with the PPE students have saved.
2. Practice 1-minute handwashing technique.
3. Participate in tabletop exercises.

#### Closing video

<http://youtu.be/gIYtJiqg33c>



# Day 2 Trainer Guide

## Station 1: Entrance to ETU Low-risk Zone

### ACTIVITY 1: ENTER ETU LOW-RISK ZONE

#### Purpose

Prepare students for entering the ETU; trainer sprays their shoes and students wash their hands.

#### Key points for students

- ▶ Before entering the ETU, use the restroom, leave all personal items in a secure place.
- ▶ Ensure eyeglasses are secured with a strap.
- ▶ Ensure hair is pulled back and secured.

#### Station 1 video:

<http://youtu.be/IdoQB7xyQLo>

### Activity 1: Enter ETU Low-Risk Zone

#### Station Preparation

**Time allotted:** 2 minutes

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Sprayer
- ▶ Handwashing station

#### Trainer Script and Notes



Note time when students have arrived.



*You are now at the staff entrance to the low-risk zone of the ETU. You are entering from the outside in your street clothes. Before entering the ETU for your shift, you should:*

- ▶ *Use the restroom.*
- ▶ *Leave all personal items, including cell phones, watches, rings, earrings, and other jewelry, in a secure place.*

*Because this is an entry into the ETU, I will spray your shoes with 0.5% chlorine solution to prevent tracking in any contaminants. You will then wash your bare hands with 0.05% chlorine solution.*

*Next you will go to the changing area, where you will remove your street clothes, except undergarments, and change into scrubs and rubber boots.*

### Activity 1: Enter ETU Low-Risk Zone



*Remember you should also*

- ▶ *Secure eyeglasses with a tie or retainer strap.*
- ▶ *Pull back long hair securely in a bun or very short ponytail so it can be fully covered under a hood and not catch on the elastic straps of the N95 respirator when you are trying to remove it. Pin back bangs.*
- ▶ *If you have any remaining personal items with you, place them in a numbered container in the changing area.*

*When I open the gate, you will enter the ETU one at a time. Face away from the sprayer and bend your legs one at a time so the bottom of your shoes face the sprayer.*



Spray the bottom of each shoe with 0.5% chlorine solution.



*Wash your hands with 0.05% chlorine solution and pour some chlorine solution from your cupped hands on top of the tap.*

*Now you will go to Station 2, which is the changing area.*



Note time when students leave.

### Options

Students can begin the exercise while wearing their scrubs to save time changing out of street clothes in Station 2 (Scrubs and Boots).

Support staff can assist with the exercise to facilitate movement of the student groups from one station to another.



## Station 2: Scrubs and Boots

### ACTIVITY 2: CHANGE INTO SCRUBS AND BOOTS

#### Purpose

- ▶ Change from street clothes into scrubs (if students have not done so before the start of the exercise).
- ▶ Remove shoes and put on rubber boots.
- ▶ Leave any remaining personal items in a numbered container for retrieval after the exercise.

#### Key points for students

- ▶ Remove and store all personal items, including jewelry, watches, and cell phones, before donning PPE.
- ▶ Secure glasses and hair, including bangs, to avoid possible contamination at doffing.

#### Station 2 video

<http://youtu.be/qaXPrmBPLVI>

### Activity 2: Change into scrubs and boots

#### Station preparation

**Time allotted:** 6 minutes

**Number of trainers:** 1 trainer or support staff member or trainers from Stations 1 or 3 can facilitate.

#### Verify that these supplies are ready:

- ▶ Numbered containers or buckets for personal belongings

#### Trainer Script and Notes



Station 2 can be self-directed or a trainer or support staff can be available to answer questions. Students should pick up their boots, proceed to the male or female changing area, and change into their scrubs (if they are still in their street clothes). They should leave all personal belongings in numbered containers, secure their eyeglasses, pull back their hair, and proceed to Station 3 (Briefing).

Students will see signs that direct them to Station 3.

#### Options

Students can begin the exercise wearing their scrubs to save time changing out of street clothes in this station.

Consider having hair bands, bobby pins, and eyeglass straps available, as well as scrubs for those who forget to bring them.



Record time



Say what is in italics



Things to do



Transition

## Station 3: Briefing: Clean and Corpse

### OVERVIEW

---

- ▶ **Day 2:** Briefing on clean and corpse (3b)

### Purpose

- ▶ Provide a daily briefing for students on the scenarios for each day's activities. In a real ETU, this would be the briefing held before the start of each shift.
- ▶ Prompt students to think through the processes they will undertake and anticipate supplies they will need in the high-risk zone.

### Timing

Staying on time at Station 3 is critical for controlling the flow of the entire exercise. The Station 3 trainer should be positioned to be able to observe Stations 1, 2, and 4. This allows the Station 3 trainer to facilitate timekeeping that affects the entire exercise.

### Option

Support staff can assist with the exercise to facilitate the movement of student groups from one station to another. For example, a support staff member at Station 3 can signal the Station 1 trainer to bring another group of students to wait at Station 1.

### Station 3 video

<http://youtu.be/lcUkBY1cQXo>

### ACTIVITY 3b: BRIEFING ON CLEAN AND CORPSE

---

On Day 2, the students will clean up vomit and remove a corpse. During the briefing, they will be given a lot of clinical information that is meant to overload them. They need to take notes, sort through them, respond to the trainer's questions, and prioritize their actions.

### Purpose

Prepare students to perform Day 2 activities in the high-risk zone while wearing high-risk PPE, including the processes for:

- ▶ Considering clinical information on patient status to prioritize actions,
- ▶ Cleaning and disinfecting a body fluid spill (e.g., vomit) safely, and
- ▶ Preparing a corpse for transport to the morgue.

### Key points for students

- ▶ Plan procedures to work safely and efficiently.
- ▶ Collect and label the supplies you need to take into the high-risk zone. You will not be able to return for additional supplies.
- ▶ Body spills must be cleaned and disinfected immediately.



- ▶ Patients who have died of Ebola are highly infectious; transporting a corpse is a high-risk activity.

### Activity 3b: Briefing on clean and corpse

#### Station preparation

**Time allotted:** 5 minutes  
(this station is critical for controlling the time of the entire exercise)

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Chairs arranged in a semicircle for students
- ▶ 4 Notepads
- ▶ 4 Pens
- ▶ Markers and flip chart or whiteboard on which the following is written:

#### Afternoon Shift

##### Suspect area

- ▶ 2 pools of vomit
- ▶ 2 patients tested positive
- ▶ 3 patients tested negative (1 has symptoms that began yesterday, 2 have symptoms that began 7-8 days ago)

##### Confirmed area

- ▶ 2 patients died overnight (bodies taken to morgue):
  - Baby Sesaye
  - Fatuma Dukuly
- ▶ 3 patients are very ill, need attention:
  - Togar Nagbe
  - Ibrahim Conte
  - Yaya Sesay (just died)

#### Trainer Script and Notes



Note time when students have arrived.



The Station 3 trainer asks

- ▶ *Did you remove all personal items, including cell phones, watches, rings, earrings, and other jewelry, either before entering the ETU or place them in a numbered container in the changing area?*
- ▶ *Is your cell phone out of your scrubs pocket?*
- ▶ *Did you secure eyeglasses with a tie or retainer strap?*
- ▶ *Did you tie back long hair and pin bangs?*



Record time



Say what is in italics



Things to do



Transition

**Activity 3b: Briefing on clean and corpse**



Please sit down for your briefing.

1. *I'd like to welcome you to the ETU this afternoon. You need to plan what you'll do now so you can get your work done safely and efficiently.*
2. *First, I'll tell you about the suspect patient area.*
  - a. *Some patients have been vomiting. There are 2 pools of vomit you need to clean up.*
  - b. *Two patients tested positive for EVD. Both were admitted from triage yesterday. What should you do about them?* Move to confirmed area. Point out that in a real ETU, they would confirm a cot is available.
  - c. *Three patients tested negative. Skip the following questions if running short on time.*
  - d. *What should you do about them?* Find out how many days they had symptoms before the blood sample was taken. Elicit from students that a negative real-time reverse transcription polymerase chain reaction (RT-PCR) test can be used to make clinical decisions only if the blood sample was taken at least 72 hours after the onset of symptoms.
    - i. *One patient developed symptoms yesterday. Would you discharge him?* No.
    - ii. *The other 2 patients have had symptoms for 7-8 days. Would you discharge them?* They should ask when the blood samples were taken. If the samples were taken at least 72 hours after symptoms began, patients should be discharged to home or to a non-ETU hospital.
    - iii. *So you can discharge only 2 patients. How would you have them leave the ETU?* Say or elicit from students: patients must be discharged directly from the suspect area; they cannot walk through the confirmed area.
3. *Now I'll tell you about the confirmed patient area.*
  - e. *Two patients died and their bodies were moved to the morgue: Baby Sesaye and Fatuma Dukuly. I'm telling you because you knew them and you may see their families.*
  - f. *Two patients are very ill: Togar Nagbe and Ibrahim Conte. Yaya Sesay was one of the patients you drew blood from yesterday in the suspect area. Her test was positive, and she was moved to the confirmed area; sadly, I just got a report she has died but you will need to confirm.*
    - i. *What should you do when you are in the high-risk zone?* When you see the patient, you will confirm she is dead. If so, you must prepare the body and transport it to the morgue.
    - ii. *What do you need to bring with you?* Students will pick up a body bag after donning PPE. One student should label it with the patient's name and identification number. Another student should check that the name and ID number are correct because many names are similar. Note for training purposes, students write on duct tape because the body bag will be reused. *There are a lot of things to do today in the suspect and confirmed areas. In what order will you do them?* Start in the suspect area because you cannot return to it after you enter the confirmed area. Start by cleaning up vomit so it does not spread as people move around. Then discharge any patients who were suspected cases with negative RT-PCR tests who had symptoms for more than 3 days before testing. Move patients with positive tests to the confirmed area and provide care for them. Then take the body to the morgue.
4. *For this exercise, you will only clean up vomit and prepare and move the corpse.*



### Activity 3b: Briefing on clean and corpse



Hold students at the station until Station 4 is ready to receive them. You might need to improvise dialogue with the students to extend or shorten the briefing time, depending on how the subsequent stations are progressing.



Note time when students leave.



**When students leave, they need to take with them their notes on patients and tasks.**

Direct students to the donning area.

The Station 3 trainer or a support staff member should signal the Station 1 trainer to bring another group of students to wait to start Station 1.



Record time



Say what is in italics



Things to do



Transition

## Station 4: Donning High-risk PPE

### OVERVIEW

At Station 4, students don high-risk PPE. Students arrive at Station 4 in scrubs and boots. Whether PPE is used for an exercise or in a real ETU, there will likely be differences in the PPE and donning protocols. Regardless of equipment used, PPE must be donned properly to provide adequate protection.

- ▶ **Activity 4b:** Don high-risk PPE (heavy-duty rubber gloves)

### Purpose

- ▶ Practice supervised donning of high-risk PPE
- ▶ Learn principles of donning PPE correctly

### Key points for students

- ▶ Donning will be supervised by a trainer to ensure it is done correctly in this exercise; in a real ETU, trained observers should monitor to make sure PPE is used correctly.
- ▶ Buddies should check each other's PPE.
- ▶ Students should check themselves in a full-length mirror.

### About high-risk PPE used in this exercise:

High-risk PPE includes 7 pieces of equipment. Note that students are already wearing scrubs and boots.

1. **Inner gloves.** Hands are the primary means of contact between healthcare workers and patients, so gloves are essential. This exercise uses non-sterile, powder-free, long-cuff examination gloves.
2. **Impermeable protective suit.** This suit should cover the body and include wrist and ankle elastics, thumb loops or thumb holes to prevent sleeves from riding up, a front zipper with a self-adhesive zipper flap closure system, and an adhesive flap seal over the neck. Different styles may be used, including suits that have an attached hood; however, use of an attached hood is not described in this exercise.
3. **Surgical N95 respirator** (referred to hereafter as N95 respirator). This exercise uses a duckbill style.
4. **Hood.** This exercise uses a separate hood. Suits with attached hoods are sometimes the only type available and are adapted for use. If the suit has an attached hood, students are directed to fold over the hood as a collar.
5. **Fluid-resistant or impermeable apron.** This exercise uses a disposable apron that is reused for training purposes. A reusable heavy-duty apron is another option.
6. **Full face shield.** This exercise uses a full face shield; goggles are another option for eye protection.
7. **Outer gloves.** The type of outer gloves depends on the work that will be performed.
  - a. For cleaning up body spills or transporting a patient or corpse, use heavy-duty rubber gloves (for Day 2 activities 5c and 5d).

### Station 4 video

<http://youtu.be/Sto2K1DEFYM>



### Activity 4b: Donning high-risk PPE

#### Station preparation

**Time allotted:** 20 minutes  
(this station is critical for controlling the time for the entire exercise)

**Timekeeping:** Trainers should check on progress at Station 5 to ensure timely flow of students through the stations  
**Number of trainers:** 1 trainer for each pair of students. An extra trainer is helpful to assist students with gathering supplies to take into the high-risk zone for each day's activities.

#### Verify that these supplies are ready:

- ▶ High-risk PPE laid out in the order to be donned (for this exercise, high-risk PPE includes 7 pieces of equipment - inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and outer gloves)
- ▶ Chairs for students to sit when donning the suit, if necessary
- ▶ Mirrors for students to check their PPE
- ▶ Duct tape and marker to mark time entering the ETU on the PPE suit
- ▶ Body bag to transport corpse to morgue

#### Trainer Script and Notes



Note time when students have arrived.



*This is the high-risk PPE donning station. High-risk PPE includes 7 pieces of equipment - a pair of inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and a pair of outer gloves. Trainers will direct you to be sure you don each piece correctly. Remember you should always enter the high-risk zone and perform your work with a buddy. You and your buddy should check each other's PPE before entering and throughout the shift.*



As students go through the process of donning, the trainer should ask questions to facilitate learning. This also helps students remember how many pieces of PPE they need. For example, trainers can ask about the next step in the process or explain why they are doing things in a particular way. Encourage students to think independently about the steps.



Record time



Say what is in italics



Things to do



Transition

**Activity 4b: Donning high-risk PPE**



1. *Put on the inner gloves. Check the gloves and each item of PPE carefully to make sure there are no holes or tears.*
2. *Put on the suit. After unzipping the suit, roll back the top while gathering the sleeves to prevent them from dragging.*
  - a. *Put on the suit one leg at a time, being careful not to tear the suit as you pull it over the boots. Chair may be used, if needed. The trainer assists the student with getting the suit over the shoulders and straightening the arms.*
  - b. *Zip the suit zipper up to the neck.*
  - c. *Close the flap over the zipper if the suit has a flap covering. In this exercise, do not remove the adhesive tape covering because we will reuse the suits. In a real ETU, you will seal the adhesive flap.*
  - d. *Make sure the gloved thumb goes through the thumb loops or thumb hole.*
3. *Put on the N95 respirator, touching only the edges.*
  - a. *Bend nose piece slightly into a curve to open it and separate the straps.*
  - b. *Pull one strap above the ears and the other below the ears.*
  - c. *Use both hands to mold the nose piece around the bridge of the nose.*
  - d. *The N95 should fit snugly around the face and below the chin.*
  - e. *Perform a seal check.*
4. *Put on the hood.*
  - a. *Place the upper part of the face opening at the top of the eyebrows (supraorbital arch).*
  - b. *Place the lower part of the face opening just below the chin and on top of the respirator.*
  - c. *Do not tuck the hood into the collar of the suit because droplets on the hood could then drip under the suit.*
  - d. *The trainer ensures the top of the hood is smooth and flush with the skull and straightens the hood at the back and front.*
5. *I will assist you with the apron.*
  - a. *Pull the top apron strap over your head so it helps secure the hood.*
  - b. *The trainer ties the apron at the back as follows:*
    - i. *Thread one side strap through the top strap that is around the neck.*
    - ii. *Pull down tightly on the side strap to raise the apron up near the chin.*
    - iii. *Tie the apron straps in a bow fashion, leaving a long strap on one end. This will help students find the strap to untie the apron when they are doffing.*
6. *Put on the face shield; this is your eye protection.* *The trainer assists with centering the face shield, ensuring that the top rests just above the eyebrows.*
7. *Now look at yourself in the full-length mirror to make sure the PPE is donned correctly. Make sure the face shield is centered correctly on your face and head.*
8. *Put on the outer gloves. Pull the cuff of the glove up your forearm on top of the suit as far as possible.* *The choice of outer gloves varies depending on the activity the students will perform.*
9. *Take a moment to move around in the suit to make sure you are comfortable. Then check your buddy's PPE.*



### Activity 4b: Donning high-risk PPE



10. *At this point, you should not make any other adjustments. You should not touch your face again until you doff your PPE.* The trainer can make any necessary adjustments.



11. Before entering the high-risk zone, students should note the time. Write the time on the students' sleeves to provide a reminder of how long the students are in their PPE. In this exercise, duct tape is applied to the suit sleeve and the time is written on the tape so suits can be reused. Before the students depart for the high-risk zone, the trainer and each buddy check the fit and do a visual evaluation to ensure the PPE is on correctly and no skin is exposed.



When students leave, they need to take the following supplies:

For Day 2, activity 5d

- ▶ Pre-labeled body bag to transport corpse to morgue

On Day 2, a Station 4 trainer escorts students in high-risk PPE to the gate of the ETU high-risk zone.



Note time when students leave.

### Options

#### Other PPE options:

1. Médecins Sans Frontières (MSF) uses a hood with a built-in surgical mask containing a slit. An N95 respirator fits through the slit. To imitate the MSF hood, a fluid-resistant surgical mask with a slit torn horizontally through the center can be used to fit over the N95.
2. Goggles are an option for eye protection in place of the face shield. If goggles are used,
  - Have the student check himself in the mirror to make sure no skin is exposed outside of the goggles, and
  - Have the buddies check each other.



Record time



Say what is in italics



Things to do



Transition

## Station 5: High-risk Zone: Clean and Corpse

### OVERVIEW

In the ETU high-risk zone, there are 2 patient areas: 1 for patients with suspected Ebola infection and another for patients with confirmed infection. The lab, morgue, and burn pit are adjacent to the confirmed patient area.

- ▶ **Day 2:** Clean and Corpse

### Purpose

- ▶ Prioritize activities and bring needed supplies into the high-risk zone.
- ▶ Safely enter the high-risk zone and move from the suspect area to the confirmed area.
- ▶ Experience the challenges of performing procedures while wearing high-risk PPE.

### Key points for students

- ▶ Any procedure in an ETU can be risky.
- ▶ Always assess the safety of the situation.

### Station 5 video

[http://youtu.be/\\_98Di5yPI4w](http://youtu.be/_98Di5yPI4w)



### ACTIVITY 5c: CLEAN A BODY SPILL (E.G., VOMIT)

On Day 2, while wearing high-risk PPE, students will safely clean up a body fluid spill (i.e, vomit) in the suspect area and dispose of it safely. The same process would be used for other body fluids such as blood or feces. In the confirmed area they will prepare a corpse for transport to the morgue.

#### Purpose

Learn how to clean, disinfect, and dispose of a body spill (e.g, vomit).

#### Key points for students

- ▶ Spills of body fluids must be safely cleaned, disinfected, and disposed of immediately.
- ▶ Always wear high-risk PPE when cleaning body fluids and when handling corpses.

#### Activity 5c: Cleaning a body spill (e.g., vomit)

##### Station preparation

##### Time allotted for station:

15 minutes

##### Number of trainers: 2

(1 for each pair of students)

##### Verify that these supplies are ready:

- ▶ Food to be used as vomit (e.g., oatmeal, hash browns)
- ▶ 2 Mannequins lying on cots
- ▶ Disposable absorbent pads
- ▶ 2 Buckets marked “vomit”
- ▶ Bucket with 0.5% chlorine solution and measuring cup
- ▶ 2 Tables or stools on which to place supplies

##### Make sure the students bring:

- ▶ 4 Red biohazard bags (2 bags for each pair of students)
- ▶ Body bag labeled with the patient’s name and identification number on duct tape

##### Trainer script and notes



Note time when students have arrived.



*As you know from the briefing, there are 2 pools of vomit in the suspect area and a corpse in the confirmed area to take to the morgue.*

*Your group must work together to apply 0.5% chlorine solution to the vomit and remove it from the floor. You must also prepare and move the corpse to the morgue. Which activity should you do first? Wait for response. Remember the flow through the ETU is one-way. If we went into the confirmed area to get the corpse, we could not return to the suspect area to clean up the vomit. So let’s clean up the vomit in the suspect area and then go to the confirmed area to take the corpse to the morgue. One of you will bring in the body bag and set it aside while you do the clean-up.*

*Remember, all waste from a high-risk zone is considered highly contaminated. Body spills must be cleaned and disinfected immediately.*



Record time



Say what is in italics



Things to do



Transition

**Activity 5c: Cleaning a body spill (e.g., vomit)**



Instruct students to step through the footbath of 0.5% chlorine solution. After all students cross into the suspect area of the high-risk zone, they should divide into pairs and follow their assigned trainer.



Ask students to divide into pairs, and remind them their first job is to look out for their own and their buddy's safety. They need to work as a team.



1. Select one student to be the cleaner and one to be the bagger.
2. *Assess the size of the spill.*
3. Instruct the cleaner: *Determine how many disposable absorbent pads you will need; then get them from the table or stool in the suspect area.*
4. Instruct the bagger: *Spray the absorbent pad with 0.5% chlorine solution. Do not soak it because a soaked pad cannot absorb as much vomit.*
5. Instruct the cleaner: *Place the absorbent pad over the vomit and then wash your hands. In a real ETU, the pad would remain on the vomit for 15 minutes.*
6. Instruct the bagger to prepare the bags to dispose of the vomit:
  - a. *Get 1 red biohazard bag. Turn the rim inside out about 2 inches to avoid contaminating the outside of the bag when you place the pad with vomit in the bag.*
  - b. *Spray the inside and outside of the bag with 0.5% chlorine solution.*
7. Instruct the cleaner:
  - a. *Make sure your buddy holds the bag in a safe place within easy reach.*
  - b. *Pour a half cup of 0.5% chlorine solution into the bottom of the bag.*
  - c. *Be sure your aprons do not touch the vomit or the pad. Try to protect your apron from touching the vomit or the floor by bending at the waist rather than the knees. If your apron touches the floor, you should spray it with 0.5% chlorine solution after cleaning the vomit.*
  - d. *Working from the outside edges of the pad toward the center, carefully pick up all solids with the pad and place them in the prepared biohazard bag. Do not wipe the floor because this could spread the virus. Push the pad with the vomit away from you when picking it up.*
  - e. *If you cannot pick up all the vomit with 1 pad, wash your hands, get another pad, have the bagger spray it, lay it over the vomit, and repeat the process.*
8. Instruct the bagger: *Seal the bag by tying the ends in a knot.*
9. Instruct the cleaner: *Wash your hands with 0.5% chlorine solution, and pour some solution from your cupped hands over the tap. Get a second biohazard bag. Fold the rim of the bag inside out about 2 inches; then spray the inside and outside with 0.5% chlorine solution.*
10. Instruct the bagger: *Place the first sealed biohazard bag inside the second biohazard bag. Wash hands with 0.5% chlorine solution, and pour some solution from your cupped hands over the tap.*
11. Instruct the cleaner (now holding the double bag): *Seal the second bag by tying the ends in a knot.*
12. Instruct the bagger: *Spray 0.5% chlorine solution onto the floor, covering the soiled area completely. Chlorine solution should stay on the area for 15 minutes.*
13. If necessary, remind students to take the body bag with them when they go to the confirmed area.
14. Instruct students to cross over into the confirmed area in pairs, by first stepping into the footbath of 0.5% chlorine solution. A student who is not carrying a biohazard bag opens the gate and holds it while the others pass through.
15. The students bring the biohazard bags and discard them in the burn pit; then all students wash their hands.



### Activity 5c: Cleaning a body spill (e.g., vomit)



Note time when students leave.



**When students leave, they need to take:**

- ▶ Biohazard bags for disposal in the burn pit
- ▶ Pre-labeled body bag



Record time



Say what is in italics



Things to do



Transition

**ACTIVITY 5d: TRANSPORTING A CORPSE TO THE MORGUE**

**Purpose:**

Learn how to prepare the body of a deceased patient, safely place it in a body bag, and transport it to the morgue.

**Key points for students**

- ▶ Transporting the body of a patient who died from EVD is a high-risk activity because of the high viral load and infectivity of the body.
- ▶ High-risk PPE must always be worn when touching or moving a corpse.
- ▶ Try to focus any contact with the body bag on your apron so you do not contaminate the rest of your suit.
- ▶ Corpse transport requires at least 4 people.

**Activity 5d: Transporting a corpse to the morgue**

**Station preparation**

**Time allotted for station:**

15 minutes

**Number of trainers:** 1 for each group of 4 students

**Verify that these supplies are ready:**

- ▶ Mannequin on cot with name and ID number on wristband
- ▶ Sheets (optional)

**Make sure the students bring:**

- ▶ Their notes from the briefing
- ▶ Body bag labeled with patient's name and identification number

**Trainer script and notes**



Note time when students have arrived.



### Activity 5d: Transporting a corpse to the morgue



#### Steps to prepare and transport a corpse to the morgue



1. The trainer leads students to a cot and says: *As you know, this patient was reported dead. What do you need to do first?* One student checks the patient's wristband to confirm the name and identification number are the same as on the body bag. The same student ensures the patient is dead by checking for a pulse and visible respirations. The trainer confirms the patient is deceased.
2. Instruct the student who touched the body: *Wash your hands with 0.5% chlorine solution, and pour some solution over the tap.*
3. *Create a safe working area around the cot.*
  - a. *Put a screen around the cot for privacy.*
  - b. *Ask mobile patients to leave the room if able. In a real ETU, any patients who are nearby and well enough to walk are asked to move away from the deceased patient's cot.*
  - c. *Clear an area near the cot that is larger than the size of the body bag, and remove any buckets or equipment that might be in the way.*
  - d. *Spray the cleared area on the floor next to the cot (larger than the size of the body bag) with 0.5% chlorine solution.*
4. *Cover the corpse with a sheet (if one is available).*
5. *Saturate the sheet and all exposed parts of the body with 0.5% chlorine solution.*
6. Instruct the students who cleared the area and moved the screen: *Wash your hands with 0.5% chlorine solution, and pour some solution over the tap.*
7. Instruct two students: *Place the body bag on the floor with the zipper side close to the body so the flap opens away from the body. Unzip it; then wash your hands with 0.5% chlorine solution, and pour some solution over the tap. If your apron touches the ground, it should be sprayed.*
8. Instruct one student: *Spray the empty body bag inside and out with 0.5% chlorine solution.*
9. Instruct another student: *Place a disposable absorbent pad in the body bag; then wash your hands.*
10. Instruct another student: *Spray the absorbent pad with 0.5% chlorine solution.*
11. *I will help you decide how you will lift the body from the cot into the bag. Keep in mind that the heaviest area is at the shoulders. Three students should move the body and one should hold the body bag open. If the corpse is a child, two people can move it.*
12. *Place the body inside the body bag. In a real ETU, the patient's sheets, blankets, and clothing are also placed in the bag.*
13. *All of you should wash your hands immediately with 0.5% chlorine solution, and pour some solution over the tap.*
14. Instruct one student: *Spray all students' aprons; then spray the body in the body bag. Zip the bag closed with the zipper pulls ending at the head (this allows the patient's face to be shown to the family). Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



**Activity 5d: Transporting a corpse to the morgue**

15. *Spray the outside of the body bag with 0.5% chlorine solution, concentrating on the zipper.*
16. *Now you will transport the body bag to the morgue inside the high-risk zone. Try to focus any contact with the body bag on your apron so you do not contaminate the rest of your suit. Place the body with the head toward the wall so all bodies are positioned in the same direction. The four students should position themselves facing the body bag as they prepare to lift it. While lifting, they should try to minimize contact with the body bag. As they carry the body bag to the morgue, they should not walk backward. Students' backs should never be to the body bag. The back of the suit is the least protected area.*
17. *All of you should wash your hands with 0.5% chlorine solution, and pour some solution over the tap.*
18. *In a real ETU, the patient's family has 24 hours to come and view the body. They can bring items to add to the bag. None of the patient's jewelry or personal effects are allowed to leave the ETU, so they cannot be returned to the family. Now return to the patient's cot.*
19. *One of you should spray 0.5% chlorine solution on the cot, walls, and floor of the deceased patient's space, then wash your hands.*
20. *In a real ETU, you would spray all patient effects with 0.5% chlorine solution and put them into a trash bag. You would tie the bag and spray the outside. Then you would put that bag in another bag, tie the outer bag, spray the outside of the bag, and take it to the burn pit. The hygienist would disinfect the area after the body is removed.*
21. *Instruct students to walk through the footbath of 0.5% chlorine solution to exit Station 5 and proceed to doffing.*



Note time when students leave.



Escort students to the doffing area.

When students leave, they should take nothing with them. Remember, anything they brought into the high-risk zone, such as their notes, must be left there to be disposed of with other waste.



## Station 6: Doffing High-risk PPE

At Station 6, students doff their high-risk PPE. Doffing PPE is a process that should not be done alone in training or in a real ETU. In this exercise, the trainer coaches and supervises the doffing process. Posters are used to assist trainers with the doffing sequence. In a real ETU, a trained observer watches the doffing process to reduce the risk of error.

During the three days of the ETU exercise, the type of outer gloves differs depending on the activity being performed. The sequence of removing PPE varies, depending on which type of gloves are worn.

### OVERVIEW

- ▶ **Day 2:** Doffing high-risk PPE when heavy-duty gloves are used (activity 6b)

### Purpose

- ▶ Learn how to avoid self-contamination while doffing PPE.
- ▶ Learn how to ensure high-risk PPE is doffed correctly.

### Key points for students

- ▶ Doffing contaminated PPE carries a high risk for exposure to Ebola virus. The trainer always observes and coaches students during the doffing process. Doffing should be performed methodically and in the same order every time.
- ▶ Different protocols may require the use of different gloves depending on the activity to be performed. Remember to follow the doffing order for that specific protocol.
- ▶ When doffing, always remove the most heavily contaminated PPE first. The sequence will vary depending on the type of outer gloves worn.
- ▶ Hand hygiene between every step of doffing is critical. Washing gloved hands in 0.5% chlorine solution between every step allows students to remove PPE without spreading contamination.
- ▶ In general, the order for removing PPE goes from dirtiest to cleanest. Dirty touches dirty; clean touches clean.
- ▶ Students should protect their faces by holding their chins up and closing eyes when removing PPE from the head or when they get sprayed.

### Station 6 video

<http://youtu.be/j1JWafiJjlo>



Record time



Say what is in italics



Things to do



Transition

**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves**

**Station preparation**

**Time allotted for station:**

12 minutes

**Number of trainers:** 4

**Verify these supplies are ready:**

- ▶ 4 Containers (2 between doffing lane – 1 for reusable PPE and 1 for trash)
- ▶ 4 Sprayers (1 for each doffing lane)

**For exercise purposes only:**

- ▶ Some items (e.g., aprons, face shield, and impermeable suit) are collected and disinfected for reuse.
- ▶ Students may keep some pieces (N95 and hood) for individual reuse to practice additional donning and doffing (an additional activity if time permits at the end of the exercise).

**Trainer script and notes**



Note time when students have arrived.



Doffing begins when the trainers signal the students into their lanes.



1. Make sure students enter the doffing station through the 0.5% chlorine footbath.
2. *I know you are ready to get out of your PPE. I will guide you through each step. There is nothing you need to remember. All you have to do is stay centered and calm. For each step, wait until I tell you what to do, and be sure you do it slowly and deliberately. If you want to know the sequence, you can see it on the poster on the wall.*
3. *In a real ETU, all PPE except your boots and scrubs will stay inside the high-risk zone; some is disposed of and some is decontaminated.*
4. *Hold your arms out to the sides and look up slightly.* Spray suit front and back with 0.5% chlorine solution, from nipple line down, avoiding face.
5. *Think about the order in which you remove items, from dirtiest to cleanest. You should remove the heavy-duty outer gloves.*



### Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves



#### Outer gloves (heavy-duty rubber gloves)



1. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
2. *Remove your heavy-duty rubber gloves using aseptic technique. Put the rubber gloves in the bucket of 0.5% chlorine solution near the handwashing station.*
3. *Wash your inner gloves with 0.5% chlorine solution and pour some solution over the tap.*

#### Apron

1. *You will now remove the apron. Turn around so I can guide you to find the long end of the apron strap. Pull it to untie the strap. Now face me.*
2. *Use your thumbs to loosen and pull the apron from your body. With your eyes closed, bend forward at the waist and use both hands to grab the apron near the top. Alternately, because safety is the top priority, if there is a concern about the student remaining balanced with eyes closed, first have the student bend forward at the waist and grab the apron before closing eyes.*
3. *Gently lift it over your head, making sure it does not touch your face area.*
4. *Touching the clean side of the apron, fold it, and place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
6. *Close your eyes and tilt your head back slightly. Extend your arms out at your sides. Spray suit front (not back), concentrating on the zipper.*
7. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

#### Face shield (if using goggles for eye protection, the process is the same)

1. *You'll now remove your face shield.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the face shield on the sides and close your eyes. **Note:** If you are concerned that your faceshield may be contaminated you can also remove the faceshield by grabbing the headband at the back of your head.*
4. *Slowly pull the face shield down and away from your head. Try not to let the strap snap to avoid splashing any contaminants.*
5. *Place the face shield in the designated container.*
6. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

#### Hood

1. *Next you will remove your hood.*
2. *Bend forward at the waist 90 degrees.*
3. *With both hands, grab the hood at the crown of your head, close your eyes, and lift the hood off your head.*
4. *Discard the hood in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



Record time



Say what is in italics



Things to do



Transition

**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves**



**Suit**



1. *Now you will carefully remove the suit.*
2. *Look up slightly.*
3. *Start at mid-chest and move up to find your zipper pull. Don't rush. Do this slowly so you don't touch your neck. You can use a mirror to help students find the zipper pull.*
4. *While looking up, unzip your suit.*
5. *I will help you so the outside of your suit doesn't touch your scrubs or skin. Grab the outside of the suit at your shoulders or at your sides toward the back to pull the suit off your shoulders.*
6. *Shrug your shoulders to help get the suit off, turning it inside out. Touch the outside of the suit as little as possible.*
7. *Pull your arms up and out to get your arms out of the sleeves. With your hands at your sides, bend your elbows so the sleeves fall inside out to cover your gloved hands.*
8. *Stop when the sleeves are at your wrist. Now you can use the sleeves like mittens.*
9. *Pull the suit down to the top of your boots, taking care NOT to touch your boots. Now pull your hands out of the sleeves.*
10. *Remember you are wearing only the inner pair of exam gloves; touch only the inside of the suit.*
11. *Next you will step out of the suit. Step on a slack area of the suit and kick one leg backward. Repeat with your other foot. Continue repeating these steps until you are out of the suit. Step away from the suit. Notice where you step so you can touch a cleaner part of the suit when you pick it up.*
12. *The trainer then sprays the suit with 0.5% chlorine solution.*
13. *To avoid letting the suit touch your scrubs, carefully pick up the suit with a pinching motion, touching a part you have not stepped on and keeping the suit away from your body. Place the suit in the designated container.*
14. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**N95 respirator**

1. *I will now tell you how to remove the N95 respirator. This should be done slowly to avoid letting the straps snap and prevent spreading contamination.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the N95 respirator on the side seams close to the front and close your eyes.*
4. *Pull the N95 respirator down and away from your head. Place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Inner gloves**

1. *Remove your inner gloves using aseptic technique and discard them in the trash.*

**Do not wash your bare hands in the high-risk zone, which is considered highly contaminated.**



**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves**



**Exiting the High-risk Zone**



1. *I will now spray your boots. Before you leave the high-risk zone, your boots must be disinfected with 0.5% chlorine solution.*
2. *Stand parallel to the line that marks the exit from the high-risk zone.*
3. *Remain sideways, pick up the foot closest to the line, keeping it in the high-risk zone until I finish spraying. Then place that foot across the line. Now we will repeat the process on the other foot. The trainer sprays both sides of the students' boots. You will step across the line into the low-risk zone.*
4. *Now that you are out of the high-risk zone, wash your bare hands with 0.05% chlorine solution.*
5. *Before removing boots and scrubs, step into the 0.5% chlorine footbath to clean your boots.*
6. *Now you can proceed to the boot removal area. Use the bootjack to pull off your boots without touching the boots or the bootjack. A hygienist will disinfect the boots and hang them to dry. You can now remove your scrubs and change into street clothes.*



After students doff, the trainers remove the doffed PPE students may want to reuse for additional practice from the containers and place items in the low-risk zone for the students to retrieve.



When students depart this station, they need to retrieve their used PPE if they are going to practice donning and doffing (an additional activity if time permits).



Note time when students leave the station.



Record time



Say what is in italics



Things to do



Transition

## Station 7: Debriefing

### ACTIVITY 7: DEBRIEFING

#### Purpose

Participate in a debriefing session with a facilitator.

Station 7 is the final station of the exercise. If possible, the facilitator should be a healthcare worker who has returned from working in an ETU in West Africa.

#### Station 7 video

<http://youtu.be/zGpMivK1vKY>

### Activity 7: Debriefing

#### Station preparation

**Time allotted:** 10-20 minutes, depending on subsequent activities

**Number of trainers:** 1-2 (if possible, at least 1 should be a returned responder)

#### Verify that these supplies are ready:

- ▶ Chairs in a quiet area
- ▶ Water and snacks

#### Trainer script and notes



Students have removed their PPE and picked up water and a light snack on their way to the debriefing. Students can get hot while wearing PPE and should be reminded to rehydrate after removing it.

Students sit in a circle in a quiet area. If possible, the facilitator is a healthcare worker who has returned from working in an ETU in West Africa and can discuss the experience.

Ask students how the exercise went (e.g., what went well for them, what they need to work on, how it compared with the day before, and how they felt). Remind them to have their pulse and blood pressure checked (if your organization is implementing this practice).

#### Options

Additional activities can take place concurrently with or following the debriefing.

1. Practice donning and doffing with the PPE students have saved.
2. Practice 1-minute handwashing technique.
3. Participate in tabletop exercises.

#### Closing video

<http://youtu.be/gIYtJiqg33c>



# Day 3 Trainer Guide

## Station 1: Entrance to ETU Low-risk Zone

### ACTIVITY 1: ENTER ETU LOW-RISK ZONE

#### Purpose

Prepare students for entering the ETU; trainer sprays their shoes and students wash their hands.

#### Key points for students

- ▶ Before entering the ETU, use the restroom, leave all personal items in a secure place.
- ▶ Ensure eyeglasses are secured with a strap.
- ▶ Ensure hair is pulled back and secured.

#### Station 1 video:

<http://youtu.be/IdoQB7xyQLo>

### Activity 1: Enter ETU Low-risk Zone

#### Station Preparation

**Time allotted:** 2 minutes

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Sprayer
- ▶ Handwashing station

#### Trainer Script and Notes



Note time when students have arrived.



*You are now at the staff entrance to the low-risk zone of the ETU. You are entering from the outside in your street clothes. Before entering the ETU for your shift, you should:*

- ▶ *Use the restroom.*
- ▶ *Leave all personal items, including cell phones, watches, rings, earrings, and other jewelry, in a secure place.*

*Because this is an entry into the ETU, I will spray your shoes with 0.5% chlorine solution to prevent tracking in any contaminants. You will then wash your bare hands with 0.05% chlorine solution.*

*Next you will go to the changing area, where you will remove your street clothes, except undergarments, and change into scrubs and rubber boots.*

### Activity 1: Enter ETU Low-risk Zone



*Remember you should also*

- ▶ *Secure eyeglasses with a tie or retainer strap.*
- ▶ *Pull back long hair securely in a bun or very short ponytail so it can be fully covered under a hood and not catch on the elastic straps of the N95 respirator when you are trying to remove it. Pin back bangs.*
- ▶ *If you have any remaining personal items with you, place them in a numbered container in the changing area.*

*When I open the gate, you will enter the ETU one at a time. Face away from the sprayer and bend your legs one at a time so the bottom of your shoes face the sprayer.*



Spray the bottom of each shoe with 0.5% chlorine solution.



*Wash your hands with 0.05% chlorine solution and pour some chlorine solution from your cupped hands on top of the tap.*

*Now you will go to Station 2, which is the changing area.*



Note time when students leave.

### Options

Students can begin the exercise while wearing their scrubs to save time changing out of street clothes in Station 2 (Scrubs and Boots).

Support staff can assist with the exercise to facilitate movement of the student groups from one station to another.



## Station 2: Scrubs and Boots

### ACTIVITY 2: CHANGE INTO SCRUBS AND BOOTS

#### Purpose

- ▶ Change from street clothes into scrubs (if students have not done so before the start of the exercise).
- ▶ Remove shoes and put on rubber boots.
- ▶ Leave any remaining personal items in a numbered container for retrieval after the exercise.

#### Key points for students

- ▶ Remove and store all personal items, including jewelry, watches, and cell phones, before donning PPE.
- ▶ Secure glasses and hair, including bangs, to avoid possible contamination at doffing.

#### Station 2 video

<http://youtu.be/qaXPrmBPLVI>

### Activity 2: Change into scrubs and boots

#### Station preparation

**Time allotted:** 6 minutes

**Number of trainers:** 1 trainer or support staff member or trainers from Stations 1 or 3 can facilitate.

#### Verify that these supplies are ready:

- ▶ Numbered containers or buckets for personal belongings

#### Trainer Script and Notes



Station 2 can be self-directed or a trainer or support staff can be available to answer questions. Students should pick up their boots, proceed to the male or female changing area, and change into their scrubs (if they are still in their street clothes). They should leave all personal belongings in numbered containers, secure their eyeglasses, pull back their hair, and proceed to Station 3 (Briefing).

Students will see signs that direct them to Station 3.

#### Options

Students can begin the exercise wearing their scrubs to save time changing out of street clothes in this station.

Consider having hair bands, bobby pins, and eyeglass straps available, as well as scrubs for those who forget to bring them.



Record time



Say what is in italics



Things to do



Transition

## Station 3: Briefing:Triage and Transport

### OVERVIEW

---

- ▶ **Day 3:** Briefing on triage and transport (3c)

### Purpose

- ▶ Provide a daily briefing for students on the scenarios for each day's activities. In a real ETU, this would be the briefing held before the start of each shift.
- ▶ Prompt students to think through the processes they will undertake and anticipate supplies they will need in the high-risk zone.

### Timing

Staying on time at Station 3 is critical for controlling the flow of the entire exercise. The Station 3 trainer should be positioned to be able to observe Stations 1, 2, and 4. This allows the Station 3 trainer to facilitate timekeeping that affects the entire exercise.

### Option

Support staff can assist with the exercise to facilitate the movement of student groups from one station to another. For example, a support staff member at Station 3 can signal the Station 1 trainer to bring another group of students to wait at Station 1.

### Station 3 video

<http://youtu.be/lcUkBY1cQXo>



### ACTIVITY 3c: BRIEFING ON TRIAGE AND TRANSPORT

On Day 3, the students will triage new patients while wearing low-risk PPE, then don high-risk PPE to transport a patient into the ETU high-risk zone.

#### Purpose

Prepare students to perform Day 3 activities, including the processes for:

- ▶ Triageing new patients outside the ETU while wearing low-risk PPE,
- ▶ Determining whether a patient should be admitted, and
- ▶ Transporting a patient who is too ill to move independently.

#### Key points for students

- ▶ Triage is performed by using low-risk PPE, which includes gloves, surgical mask, and goggles or full face shield.

### Activity 3c: Briefing on triage and transporting new patients into ETU

#### Station Preparation

**Time allotted:** 5 minutes  
(this station is critical for controlling the time for the entire exercise)

**Number of trainers:** 1

#### Verify that these supplies are ready:

- ▶ Chairs arranged in a semicircle for students
- ▶ Goggles
- ▶ Surgical masks
- ▶ Long-cuff exam gloves

#### Trainer Script and Notes



Note time when students have arrived.



The Station 3 trainer asks

- ▶ *Did you remove all personal items, including cell phones, watches, rings, earrings, and other jewelry, either before entering the ETU, or place them in a numbered container in the changing area?*
- ▶ *Is your cell phone out of your scrubs pocket?*
- ▶ *Did you secure eyeglasses with a tie or retainer strap?*
- ▶ *Did you tie back long hair and pin bangs?*

As students take their seats, the trainer pretends to receive a call on a cell phone or walkie-talkie, and says: *Excuse me just a moment. I'm receiving a call from the high-risk zone.*

The trainer walks away from the students and pretends to chat for about 10 seconds, then returns and says: *There's been a change of plans. I was just notified there are several patients who have arrived at the ETU and need to be triaged. You need to go out and triage; please come with me.*



Record time



Say what is in italics



Things to do



Transition

### Activity 3c: Briefing on triage and transporting new patients into ETU



The trainer walks toward the triage location; hopefully, a student will ask if they need to don PPE. If the students don't ask, the trainer will remind them they need to don low-risk PPE:

- ▶ Goggles
- ▶ Surgical mask
- ▶ Long-cuff exam gloves



The Station 3 trainer guides the students to don low-risk PPE (activity 5e), then takes them out to meet a triage trainer (activity 5f).



## Station 4: Donning High-risk PPE

### OVERVIEW

At Station 4, students don high-risk PPE. Students arrive at Station 4 in scrubs and boots. Whether PPE is used for an exercise or in a real ETU, there will likely be differences in the PPE and donning protocols. Regardless of equipment used, PPE must be donned properly to provide adequate protection.

- ▶ **Activity 4b:** Don high-risk PPE (heavy-duty rubber gloves)

### Purpose

- ▶ Practice supervised donning of high-risk PPE
- ▶ Learn principles of donning PPE correctly

### Key points for students

- ▶ Donning will be supervised by a trainer to ensure it is done correctly in this exercise; in a real ETU, trained observers should monitor to make sure PPE is used correctly.
- ▶ Buddies should check each other's PPE.
- ▶ Students should check themselves in a full-length mirror.

### About high-risk PPE used in this exercise:

High-risk PPE includes 7 pieces of equipment. Note that students are already wearing scrubs and boots.

1. **Inner gloves.** Hands are the primary means of contact between healthcare workers and patients, so gloves are essential. This exercise uses non-sterile, powder-free, long-cuff examination gloves.
2. **Impermeable protective suit.** This suit should cover the body and include wrist and ankle elastics, thumb loops or thumb holes to prevent sleeves from riding up, a front zipper with a self-adhesive zipper flap closure system, and an adhesive flap seal over the neck. Different styles may be used, including suits that have an attached hood; however, use of an attached hood is not described in this exercise.
3. **Surgical N95 respirator** (referred to hereafter as N95 respirator). This exercise uses a duckbill style.
4. **Hood.** This exercise uses a separate hood. Suits with attached hoods are sometimes the only type available and are adapted for use. If the suit has an attached hood, students are directed to fold over the hood as a collar.
5. **Fluid-resistant or impermeable apron.** This exercise uses a disposable apron that is reused for training purposes. A reusable heavy-duty apron is another option.
6. **Full face shield.** This exercise uses a full face shield; goggles are another option for eye protection.
7. **Outer gloves.** The type of outer gloves depends on the work that will be performed.
  - a. For cleaning up body spills or transporting a patient or corpse, use heavy-duty rubber gloves (Day 3 activities 5h, 5i, and 5j).

### Station 4 video

<http://youtu.be/Sto2K1DEFYM>



Record time



Say what is in italics



Things to do



Transition

**Activity 4b: Donning high-risk PPE**

**Station preparation**

**Time allotted:** 20 minutes (this station is critical for controlling the time for the entire exercise)  
**Timekeeping:** Trainers should check on progress at Station 5 to ensure timely flow of students through the stations  
**Number of trainers:** 1 trainer for each pair of students. An extra trainer is helpful to assist students with gathering supplies to take into the high-risk zone for each day's activities.

**Verify that these supplies are ready:  
 For all 3 days**

- ▶ High-risk PPE laid out in the order to be donned (for this exercise, high-risk PPE includes 7 pieces of equipment – inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and outer gloves)
- ▶ Chairs for students to sit when donning the suit, if necessary
- ▶ Mirrors for students to check their PPE
- ▶ Duct tape and marker to mark time entering the ETU on the PPE suit

**For Day 3, activity 5h**

- ▶ Stretcher to transport new patient from triage to ETU high-risk zone
- ▶ Sprayer

**Trainer Script and Notes**



Note time when students have arrived.



*This is the high-risk PPE donning station. High-risk PPE includes 7 pieces of equipment – a pair of inner gloves, a suit, an N95 respirator, a hood, an apron, a face shield, and a pair of outer gloves. Trainers will direct you to be sure you don each piece correctly. Remember you should always enter the high-risk zone and perform your work with a buddy. You and your buddy should check each other's PPE before entering and throughout the shift.*



As students go through the process of donning, the trainer should ask questions to facilitate learning. This also helps students remember how many pieces of PPE they need. For example, trainers can ask about the next step in the process or explain why they are doing things in a particular way. Encourage students to think independently about the steps.



**Activity 4b: Donning high-risk PPE**



1. *Put on the inner gloves. Check the gloves and each item of PPE carefully to make sure there are no holes or tears.*
2. *Put on the suit. After unzipping the suit, roll back the top while gathering the sleeves to prevent them from dragging.*
  - a. *Put on the suit one leg at a time, being careful not to tear the suit as you pull it over the boots. Chair may be used, if needed. The trainer assists the student with getting the suit over the shoulders and straightening the arms.*
  - b. *Zip the suit zipper up to the neck.*
  - c. *Close the flap over the zipper if the suit has a flap covering. In this exercise, do not remove the adhesive tape covering because we will reuse the suits. In a real ETU, you will seal the adhesive flap.*
  - d. *Make sure the gloved thumb goes through the thumb loops or thumb hole.*
3. *Put on the N95 respirator, touching only the edges.*
  - a. *Bend nose piece slightly into a curve to open it and separate the straps.*
  - b. *Pull one strap above the ears and the other below the ears.*
  - c. *Use both hands to mold the nose piece around the bridge of the nose.*
  - d. *The N95 should fit snugly around the face and below the chin.*
  - e. *Perform a seal check.*
4. *Put on the hood.*
  - a. *Place the upper part of the face opening at the top of the eyebrows (supraorbital arch).*
  - b. *Place the lower part of the face opening just below the chin and on top of the respirator.*
  - c. *Do not tuck the hood into the collar of the suit because droplets on the hood could then drip under the suit.*
  - d. *The trainer ensures the top of the hood is smooth and flush with the skull and straightens the hood at the back and front.*
5. *I will assist you with the apron.*
  - a. *Pull the top apron strap over your head so it helps secure the hood.*
  - b. *The trainer ties the apron at the back as follows:*
    - i. *Thread one side strap through the top strap that is around the neck.*
    - ii. *Pull down tightly on the side strap to raise the apron up near the chin.*
    - iii. *Tie the apron straps in a bow fashion, leaving a long strap on one end. This will help students find the strap to untie the apron when they are doffing.*
6. *Put on the face shield; this is your eye protection.* *The trainer assists with centering the face shield, ensuring that the top rests just above the eyebrows.*
7. *Now look at yourself in the full-length mirror to make sure the PPE is donned correctly. Make sure the face shield is centered correctly on your face and head.*
8. *Put on the outer gloves. Pull the cuff of the glove up your forearm on top of the suit as far as possible.* *The choice of outer gloves varies depending on the activity the students will perform.*
9. *Take a moment to move around in the suit to make sure you are comfortable. Then check your buddy's PPE.*



**Activity 4b: Donning high-risk PPE**



10. *At this point, you should not make any other adjustments. You should not touch your face again until you doff your PPE.* The trainer can make any necessary adjustments.



11. Before entering the high-risk zone, students should note the time. Write the time on the students' sleeves to provide a reminder of how long the students are in their PPE. In this exercise, duct tape is applied to the suit sleeve and the time is written on the tape so suits can be reused. Before the students depart for the high-risk zone, the trainer and each buddy check the fit and do a visual evaluation to ensure the PPE is on correctly and no skin is exposed.



When students leave, they need to take the following supplies:

For Day 1, activities 5a and 5b

- ▶ Tray to hold blood draw supplies, including blood collection tube, needle, tourniquet, alcohol wipes, bandage, gauze pad, 1 sealable plastic bag, 1 red biohazard bag, paper towel

For Day 2, activity 5d

- ▶ Pre-labeled body bag to transport corpse to morgue

For Day 3, activity 5h

- ▶ Stretcher to transport new patient from triage to ETU high-risk zone
- ▶ Sprayer

On Days 1 and 2, a Station 4 trainer escorts students in high-risk PPE to the gate of the ETU high-risk zone. On Day 3, the students return to the triage area.



Note time when students leave.

**Options**

**Other PPE options:**

1. Médecins Sans Frontières (MSF) uses a hood with a built-in surgical mask containing a slit. An N95 respirator fits through the slit. To imitate the MSF hood, a fluid-resistant surgical mask with a slit torn horizontally through the center can be used to fit over the N95.
2. Goggles are an option for eye protection in place of the face shield. If goggles are used,
  - Have the student check himself in the mirror to make sure no skin is exposed outside of the goggles, and
  - Have the buddies check each other.



## Station 5: High-risk Zone: Triage and Transport

### OVERVIEW OF ACTIVITIES 5E-5J

---

In the ETU high-risk zone, there are 2 patient areas: 1 for patients with suspected Ebola infection and another for patients with confirmed infection. The lab, morgue, and burn pit are adjacent to the confirmed patient area. All the activities take place in the ETU high-risk zone except the triage activity.

- ▶ **Day 3:** Triage and Transport

### Purpose

- ▶ Prioritize activities and bring needed supplies into the high-risk zone.
- ▶ Safely enter the high-risk zone and move from the suspect area to the confirmed area.
- ▶ Experience the challenges of performing procedures while wearing high-risk PPE.

### Key points for students

- ▶ Any procedure in an ETU can be risky.
- ▶ Always assess the safety of the situation.

### Station 5 video

[http://youtu.be/\\_98Di5yPI4w](http://youtu.be/_98Di5yPI4w)



Record time



Say what is in italics



Things to do



Transition

ACTIVITIES 5e, 5f, AND 5g: TRIAGE AND LOW-RISK PPE

**NOTE:** While 5e, 5f, and 5g activities are listed under Station 5 (high-risk zone activities), together, they are a low-risk PPE activity on Day 3. (See [ETU Three-Day Practical Exercise At-A-Glance](#))

**Purpose**

- ▶ Experience wearing low-risk PPE to perform triage; students, wearing scrubs and boots, don gloves, a surgical mask, and goggles or a full face shield.
- ▶ Triage new patients to determine whether they should be admitted to the ETU.

**Key points for students**

- ▶ All patients must be safely triaged before entering an ETU.
- ▶ Healthcare workers should rapidly triage patients while wearing low-risk PPE.
- ▶ When in low-risk PPE, always maintain a minimum distance of 1 meter, or 3 feet, from a patient.

**Low-risk PPE donning and doffing video**

<http://youtu.be/PPHqj2v2dKo>

**Activities 5e, 5f, and 5g: Triage and low-risk PPE**

**Station preparation**

**Time allotted for station:**

15 minutes

**Number of trainers: 2:**

1 to coach; 1 to play the role of the mother

**Verify that these supplies are ready:**

- ▶ Low-risk PPE—surgical mask, gloves, and goggles or face shield
- ▶ Glo Germ (a product that uses an ultraviolet light to simulate the spread of germs and show how quickly and broadly germs can be spread in a short period of time)
- ▶ Adult mannequin with blood on the face and vomit on the clothing
- ▶ Child mannequin with a bandage on one leg

**Trainer script and notes**



Note time when students have arrived.



Before the students' arrival, sprinkle Glo Germ on the adult mannequin that will be triaged.



**Activity 5e**

The trainer from the 3c briefing escorts the students to the low-risk PPE area.

After donning the low-risk PPE (gloves, surgical mask, and goggles or face shield), students exit the ETU low-risk zone and move outside to the triage area. A Station 5 trainer is waiting outside the ETU to escort them to triage.



## Activities 5e, 5f, and 5g: Triage and low-risk PPE



## Activity 5f



1. Lead the students to the adult mannequin. Instruct the students: *One of our staff members saw a car drive by and leave this man alone before speeding off down the road. He's unresponsive and bleeding a little from his nose and gums. There is vomit on his clothing. What are you going to do?*
2. Questions and prompts for the students:
  - a. *Stay 1 meter, or 3 feet, from the patient.*
  - b. *Do you believe this person needs to be admitted to the ETU?*
  - c. *How would you get the person to the ETU?*
  - d. *What kind of PPE would you wear to move this person to the ETU?*

If questioned about whether or not the patient has a fever, tell the students you don't know because they didn't bring a thermometer. Ask them whether a fever is necessary for ETU admission. Remind the students that the unexplained bleeding makes the patient a suspected case according to the algorithm studied in the lectures, even if the patient is afebrile.

3. Once the students have decided to admit the patient to the ETU, draw their attention to the second patient, a child being held by his parent. A trainer plays the role of the parent and says: *My child has been hit by a car. Can you help us?* The purpose of the second patient is to emphasize the need for early and safe referral. Not all patients coming to triage will be suspected of having Ebola. There are three triage decisions: admit, refer to a non-ETU healthcare facility, or discharge to the community.
4. Instructions for trainer playing the role of child's parent: the mother of this child has walked 4 kilometers from her village carrying her child. She heard there were doctors here that could help her child. The nearest general healthcare facility is 8 kilometers away. The child was near the road this morning and was hit by a car, suffering a broken leg. The mother is worried and desperate to get care for her child, who is badly injured. She doesn't understand why the students are asking so many questions unrelated to his leg when it's obvious the child is in pain. The mother does not volunteer any other history or information other than the injury to the leg. When asked direct questions, she does respond but quickly returns to asking why they aren't helping her child when it is obvious the leg is broken. The child has no symptoms of Ebola. The mother and other family members have no symptoms of Ebola and have not been in contact with anyone who has Ebola. She and the family live in a village where Ebola cases and deaths have occurred, but they have stayed in their home away from all sick people. They have not attended any funerals. The mother is insistent her child receive care at this ETU.



**Activities 5e, 5f, and 5g: Triage and low-risk PPE**

5. Questions and prompts for the students:
  - a. *Will you admit this child to the ETU, refer to another healthcare facility, or discharge to the community?*
  - b. *How will you refer this child to another facility? Would you put him in the ETU ambulance? Even when disinfected, an Ebola ambulance could pose a risk. What about taxis? How available are they? How safe are they?*
  - c. *Would you treat the child in any way before sending him to another facility?* No, the ETU would not provide any care. Discuss the ethical challenges of not being able to treat the child.
  - d. *How long would you keep the child in the area near the ETU (for example, to arrange transport)? The longer the child stays near the ETU, the greater the risk of exposure to Ebola for him and his mother.*

**Activity 5g**

1. Following the triage discussions about the two patients, the trainer sends the students back into the ETU to doff the low-risk PPE and don high-risk PPE. The students pass through the staff entrance into the low-risk zone and begin activity 5g.
  - a. Each student steps through the 0.5% chlorine solution footbath into the low-risk zone.
  - b. *Wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
  - c. *Remove your goggles and place them in the bucket of 0.5% chlorine solution.*
  - d. *Wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
  - e. *Remove your surgical mask by untying it or breaking it in the back and discard it in the trash.*
  - f. *Wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
  - g. *Remove your gloves using aseptic technique and discard them in the trash.*
  - h. *Wash your hands with 0.05% chlorine solution and pour some solution on top of the tap.*



Note the time when the last student has doffed the low-risk PPE and gone to the donning station.



Students proceed to Station 4 to don high-risk PPE and return to the triage area with a sprayer and a stretcher to transport the patient.



ACTIVITY 5h: TRANSPORT PATIENT FROM TRIAGE TO ETU HIGH-RISK ZONE

Purpose

Transport a new patient into the ETU suspect area while in high-risk PPE.

Key points for students

- ▶ Moving or transporting patients with Ebola requires wearing high-risk PPE and careful attention to other infection prevention and control measures.
- ▶ To safely transport the patient, four people should carry the stretcher. Do not walk backwards.
- ▶ During transport, backs should never be to the stretcher. The back is the least protected area of the suit.
- ▶ Try to focus any contact with the patient or stretcher on your apron so you do not contaminate the rest of your suit.
- ▶ Avoid being directly over a patient's face when transporting a patient.

Activity 5h: Transport patient from triage to ETU high-risk zone

Station preparation

Time allotted for station:

10 minutes

Make sure the students bring:

- ▶ Stretcher
- ▶ Sprayer

Number of trainers: 1

Trainer script and notes



Note the time when all students are at the triage area ready to begin transporting the patient.



The trainer meets the students, now dressed in high-risk PPE and carrying the stretcher, as they exit the low-risk zone to return to the triage area.

The trainer walks with the students back to the triage area to transport the patient into the ETU.



Record time



Say what is in italics



Things to do



Transition

**Activity 5h: Transport patient from triage to ETU high-risk zone**



1. *Find a level area on the ground, spray the area with 0.5% chlorine solution, and open the stretcher on the ground. Confirm the stretcher is locked and will not fold onto itself.*
2. *Work together to move the patient from the ground to the stretcher with the least amount of contamination. Three students move the patient's head and upper body and one student moves the patient's feet.*
3. *Once the patient is transferred to the stretcher, the trainer instructs the students: Spray your hands with 0.5% chlorine solution. The sprayer is used when a handwashing station is not available.*
4. *Instruct one student: Spray the area where the patient was lying with 0.5% chlorine solution.*
5. *How will you arrange yourselves to transport this patient to the ETU? Give students a little time to answer. The students must coordinate their actions.*
6. *The trainer will confirm or instruct students: The two in the front should walk with the stretcher at their sides; the two in the back can walk with the stretcher in front of them. To safely transport the patient, four students should carry the stretcher. No one should walk backwards. Your back should never be to the stretcher, as it is not covered by the apron.*



Note time when students leave.



Before transporting the patient, students should confirm a cot is available in the suspect area of the ETU. The students carry the stretcher to the triage entrance of the suspect area of the ETU. When they reach the ETU, the trainer opens the gate. As they enter, students step through the footbath of 0.5% chlorine solution. The trainer closes the gate.

The students await instructions from the trainer (activity 5i) before they transfer the patient to the cot.

When students depart this station they need to take a mannequin on a stretcher.



## ACTIVITY 5i: TRANSFER PATIENT FROM STRETCHER TO COT

### Purpose

Learn how to safely transfer a patient from a stretcher to a cot while in high-risk PPE.

### Key points for students

- ▶ Moving or transporting patients with Ebola requires wearing high-risk PPE and careful attention to infection prevention and control measures.
- ▶ Avoid being directly over a patient's face when transferring a patient from a stretcher to a cot.
- ▶ Assess the environment and make sure adequate room is available to safely transfer a patient from a stretcher to a cot.

### Activity 5i: Transfer patient from stretcher to cot

#### Station preparation

#### Time allotted for station:

5 minutes

#### Verify that these supplies are ready:

- ▶ Footbath where students enter high-risk zone from triage

#### Number of trainers: 1

#### Trainer script and notes



Note time when students have arrived.



Wait for the students at the entrance to the high-risk zone.



1. When the students have entered the high-risk zone, the trainer instructs them: *Assess the area to make sure you have room to maneuver the patient safely to the cot.*
2. Ask students: *How will you safely transfer the patient from the stretcher to the cot?* Give students a little time to answer.
3. Instruct students: *Rest one side of the stretcher on the cot. Two of you should hold the stretcher securely in place. The other two will slide the patient onto the cot. You should avoid being directly over the patient's face.*
4. Ask students: *What should you do with the stretcher?* Give students a little time to answer. *In a real ETU, a hygienist would spray the stretcher with 0.5% chlorine solution and remove it for disinfection.*
5. Instruct students: *When the patient is on the cot, wash your hands with 0.5% chlorine solution and pour some solution on top of the tap.*
6. Students are ready to exit the suspect area. They step through a 0.5% footbath and are escorted to a room past the confirmed area for an activity using Glo Germ (5j).



Note time when students leave.



Record time



Say what is in italics



Things to do



Transition

ACTIVITY 5j: GLO GERM CONTAMINATION ASSESSMENT PRE-DOFFING

Purpose

Use Glo Germ to illustrate how effectively students have avoided contaminating their PPE.

Key points for students

- ▶ There are various ways to contaminate PPE, such as brushing against a contaminated surface or adjusting PPE with contaminated gloves.
- ▶ Frequent and proper hand hygiene is essential. Consider areas commonly missed such as webs of fingers and thumbs.
- ▶ Each PPE layer serves a critical purpose.

Activity 5j: Glo Germ contamination assessment pre-doffing

Station preparation

**Time allotted for station:**  
5 minutes

**Verify that these supplies/facilities are ready:**

- ▶ Ultraviolet (black) light
- ▶ Dark room

**Number of trainers:** 1

Trainer script and notes



Trainer escorts students to a dark room to use Glo Germ to assess how effectively students have avoided contaminating their PPE.



Note time when students have arrived.



*Transporting a patient is one of many activities in the ETU that can lead to high levels of contamination. The mannequin in the triage area was pre-treated with Glo Germ. Glo Germ is a liquid, gel, or powder that illuminates when exposed to an ultraviolet, or black, light. This activity will show how effectively you performed the triage activity without contaminating yourselves. I will now close the door and turn on the black light to see if any areas of your PPE were contaminated.*



The trainer closes the door and turns on the black light. The trainer passes the black light up and down the students' PPE to illuminate contaminated areas. Important areas to assess:

- ▶ Back (students might have brushed against the stretcher or mannequin during transport).
- ▶ Face, neck, and shoulder areas (ask students if they or their group members made any adjustments to PPE).
- ▶ Hands (highlight the importance of proper hand hygiene; students should always pay close attention to areas commonly missed such as webs of fingers and thumbs).
- ▶ The underside of the apron (highlight why several layers of PPE are important; in an ETU, healthcare workers will be surrounded by patients excreting body fluids containing Ebola virus).



**Activity 5j: Glo Germ contamination assessment pre-doffing**



*You will now doff your PPE. There will be another black light activity after doffing. This last activity is designed to show that if doffing is done correctly, no contamination will be observed on your body.*



The trainer opens the door and guides the students to the footbath of 0.5% chlorine solution that leads to Station 6.



Note time when students leave.



After the students walk through the footbath of 0.5% chlorine solution, the trainer leads them to the doffing area, where the trainer for Station 6 (Doffing) takes over.



Record time



Say what is in italics



Things to do



Transition

## Station 6: Doffing High-risk PPE

At Station 6, students doff their high-risk PPE. Doffing PPE is a process that should not be done alone in training or in a real ETU. In this exercise, the trainer coaches and supervises the doffing process. Posters are used to assist trainers with the doffing sequence. In a real ETU, a trained observer watches the doffing process to reduce the risk of error.

During the three days of the ETU exercise, the type of outer gloves differs depending on the activity being performed. The sequence of removing PPE varies, depending on which type of gloves are worn.

### OVERVIEW

- ▶ **Day 3:** Doffing high-risk PPE when heavy-duty gloves are used (activity 6b) and Glo Germ is used to illustrate how effectively students have avoided contamination during the doffing process (activity 6c).

### Option for Day 3

Students may assist other students with doffing (under trainer supervision). Students can spray the other students as they doff, following the process outlined in activity 6b.

**Note:** *This option is voluntary and dependent on student level of exhaustion and capability.*

### Purpose

- ▶ Learn how to avoid self-contamination while doffing PPE.
- ▶ Learn how to ensure high-risk PPE is doffed correctly.

### Key points for students

- ▶ Doffing contaminated PPE carries a high risk for exposure to Ebola virus. The trainer always observes and coaches students during the doffing process. Doffing should be performed methodically and in the same order every time.
- ▶ Different protocols may require the use of different gloves depending on the activity to be performed. Remember to follow the doffing order for that specific protocol.
- ▶ When doffing, always remove the most heavily contaminated PPE first. The sequence will vary depending on the type of outer gloves worn.
- ▶ Hand hygiene between every step of doffing is critical. Washing gloved hands in 0.5% chlorine solution between every step allows students to remove PPE without spreading contamination.
- ▶ In general, the order for removing PPE goes from dirtiest to cleanest. Dirty touches dirty; clean touches clean.
- ▶ Students should protect their faces by holding their chins up and closing eyes when removing PPE from the head or when they get sprayed.

### Station 6 video

<http://youtu.be/j1JWafiJjlo>



### Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves

#### Station preparation

**Time allotted for station:**  
12 minutes

**Number of trainers:** 4

#### Verify these supplies are ready:

- ▶ 4 Containers (2 between doffing lane – 1 for reusable PPE and 1 for trash)
- ▶ 4 Sprayers (1 for each doffing lane)

#### For exercise purposes only:

- ▶ Some items (e.g., apron, face shield, and impermeable suit) are collected and disinfected for reuse.
- ▶ Students may keep some pieces (N95 and hood) for individual reuse to practice additional donning and doffing (an additional activity if time permits at the end of the exercise).

#### Trainer script and notes



Note time when students have arrived.



Doffing begins when the trainers signal the students into their lanes.



1. Make sure students enter the doffing station through the 0.5% chlorine footbath.
2. *I know you are ready to get out of your PPE. I will guide you through each step. There is nothing you need to remember. All you have to do is stay centered and calm. For each step, wait until I tell you what to do, and be sure you do it slowly and deliberately. If you want to know the sequence, you can see it on the poster on the wall.*
3. *In a real ETU, all PPE except your boots and scrubs will stay inside the high-risk zone; some is disposed of and some is decontaminated.*
4. *Hold your arms out to the sides and look up slightly.* Spray suit front and back with 0.5% chlorine solution, from nipple line down, avoiding face.
5. *Think about the order in which you remove items, from dirtiest to cleanest. You should remove the heavy-duty outer gloves.*



Record time



Say what is in italics



Things to do



Transition

**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves**



**Outer gloves (heavy-duty rubber gloves)**



1. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
2. *Remove your heavy-duty rubber gloves using aseptic technique. Put the rubber gloves in the bucket of 0.5% chlorine solution near the handwashing station.*
3. *Wash your inner gloves with 0.5% chlorine solution and pour some solution over the tap.*

**Apron**

1. *You will now remove the apron. Turn around so I can guide you to find the long end of the apron strap. Pull it to untie the strap. Now face me.*
2. *Use your thumbs to loosen and pull the apron from your body. With your eyes closed, bend forward at the waist and use both hands to grab the apron near the top. Alternately, because safety is the top priority, if there is a concern about the student remaining balanced with eyes closed, first have the student bend forward at the waist and grab the apron before closing eyes.*
3. *Gently lift it over your head, making sure it does not touch your face area.*
4. *Touching the clean side of the apron, fold it, and place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*
6. *Close your eyes and tilt your head back slightly. Extend your arms out at your sides. Spray suit front (not back), concentrating on the zipper.*
7. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Face shield (if using goggles for eye protection, the process is the same)**

1. *You'll now remove your face shield.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the face shield on the sides and close your eyes. **Note:** If you are concerned that your faceshield may be contaminated you can also remove the faceshield by grabbing the headband at the back of your head.*
4. *Slowly pull the face shield down and away from your head. Try not to let the strap snap to avoid splashing any contaminants.*
5. *Place the face shield in the designated container.*
6. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

**Hood**

1. *Next you will remove your hood.*
2. *Bend forward at the waist 90 degrees.*
3. *With both hands, grab the hood at the crown of your head, close your eyes, and lift the hood off your head.*
4. *Discard the hood in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*



### Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves



#### Suit



1. *Now you will carefully remove the suit.*
2. *Look up slightly.*
3. *Start at mid-chest and move up to find your zipper pull. Don't rush. Do this slowly so you don't touch your neck. You can use a mirror to help students find the zipper pull.*
4. *While looking up, unzip your suit.*
5. *I will help you so the outside of your suit doesn't touch your scrubs or skin. Grab the outside of the suit at your shoulders or at your sides toward the back to pull the suit off your shoulders.*
6. *Shrug your shoulders to help get the suit off, turning it inside out. Touch the outside of the suit as little as possible.*
7. *Pull your arms up and out to get your arms out of the sleeves. With your hands at your sides, bend your elbows so the sleeves fall inside out to cover your gloved hands.*
8. *Stop when the sleeves are at your wrist. Now you can use the sleeves like mittens.*
9. *Pull the suit down to the top of your boots, taking care NOT to touch your boots. Now pull your hands out of the sleeves.*
10. *Remember you are wearing only the inner pair of exam gloves; touch only the inside of the suit.*
11. *Next you will step out of the suit. Step on a slack area of the suit and kick one leg backward. Repeat with your other foot. Continue repeating these steps until you are out of the suit. Step away from the suit. Notice where you step so you can touch a cleaner part of the suit when you pick it up.*
12. *The trainer then sprays the suit with 0.5% chlorine solution.*
13. *To avoid letting the suit touch your scrubs, carefully pick up the suit with a pinching motion, touching a part you have not stepped on and keeping the suit away from your body. Place the suit in the designated container.*
14. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

#### N95 respirator

1. *I will now tell you how to remove the N95 respirator. This should be done slowly to avoid letting the straps snap and prevent spreading contamination.*
2. *Bend forward at the waist 90 degrees.*
3. *Using both hands, grab the N95 respirator on the side seams close to the front and close your eyes.*
4. *Pull the N95 respirator down and away from your head. Place it in the designated container.*
5. *Wash your hands with 0.5% chlorine solution and pour some solution over the tap.*

#### Inner gloves

1. *Remove your inner gloves using aseptic technique and discard them in the trash.*

**Do not wash your bare hands in the high-risk zone, which is considered highly contaminated.**



Record time



Say what is in italics



Things to do



Transition

**Activity 6b: Doffing high-risk PPE with heavy-duty rubber gloves**



**Exiting the High-risk Zone**



1. *I will now spray your boots. Before you leave the high-risk zone, your boots must be disinfected with 0.5% chlorine solution.*
2. *Stand parallel to the line that marks the exit from the high-risk zone.*
3. *Remain sideways, pick up the foot closest to the line, keeping it in the high-risk zone until I finish spraying. Then place that foot across the line. Now we will repeat the process on the other foot. The trainer sprays both sides of students' boots. You will step across the line into the low-risk zone.*
4. *Now that you are out of the high-risk zone, wash your bare hands with 0.05% chlorine solution.*
5. *Before removing boots and scrubs, step into the 0.5% chlorine footbath to clean your boots.*
6. *Now you can proceed to the boot removal area. Use the bootjack to pull off your boots without touching the boots or the bootjack. A hygienist will disinfect the boots and hang them to dry. You can now remove your scrubs and change into street clothes.*



After students doff, the trainers remove the doffed PPE students may want to reuse for additional practice from the containers and place items in the low-risk zone for the students to retrieve.



When students depart this station, they need to retrieve their used PPE if they are going to practice donning and doffing (an additional activity if time permits).



Note time when students leave the station.



### ACTIVITY 6c: GLO GERM CONTAMINATION ASSESSMENT POST-DOFFING

#### Purpose:

Use Glo Germ to illustrate how effectively students have avoided contamination during the doffing process (activity 6b).

#### Key points for students

- ▶ Doffing contaminated PPE carries a high risk for exposure to Ebola virus. Doffing should be performed methodically and in the same order every time.
- ▶ Following safe procedures minimizes risk of contamination during doffing.
- ▶ Frequent and proper hand hygiene is essential. Consider areas commonly missed such as webs of fingers and thumbs.

#### Activity 6c: Glo Germ contamination assessment post-doffing (Day 3)

##### Station preparation

##### Time allotted for station:

2 minutes

##### Number of trainers: 1

##### Verify that these supplies/facilities are ready:

- ▶ Black or ultraviolet light
- ▶ Dark room

##### Trainer script and notes



The trainer escorts students to a dark room to assess how effectively they have avoided contamination during the doffing process.



*After transporting a patient today that was pretreated with Glo Germ, you assessed how much potential contamination was on your PPE. Doffing high-risk PPE is one of many activities in the ETU that can lead to high levels of contamination. Using the ultraviolet light, we will determine how effectively you doffed the contaminated PPE. I will now close the door and turn on the black light to see if any areas of your clothes or skin were contaminated.*



The trainer closes the door and turns on the black light. The trainer passes the black light up and down the students' exposed skin, scrubs, and boots to illuminate contaminated areas. Important areas to assess:

- ▶ Back
- ▶ Face, neck, and shoulder areas
- ▶ Hands (highlight the importance of proper hand hygiene; they should always pay close attention to areas commonly missed such as webs of fingers and thumbs)
- ▶ Scrubs
- ▶ Boots



When students depart this station, they should take their used PPE if they are going to practice donning and doffing (an additional activity if time permits).



Record time



Say what is in italics



Things to do



Transition

## Station 7: Debriefing

### ACTIVITY 7: DEBRIEFING

#### Purpose

Participate in a debriefing session with a facilitator.

Station 7 is the final station of the exercise. If possible, the facilitator should be a healthcare worker who has returned from working in an ETU in West Africa.

#### Station 7 video

<http://youtu.be/zGpMivK1vKY>

### Activity 7: Debriefing

#### Station preparation

**Time allotted:** 10-20 minutes, depending on subsequent activities

**Number of trainers:** 1-2 (if possible, at least 1 should be a returned responder)

#### Verify that these supplies are ready:

- ▶ Chairs in a quiet area
- ▶ Water and snacks

#### Trainer script and notes



Students have removed their PPE and picked up water and a light snack on their way to the debriefing. Students can get hot while wearing PPE and should be reminded to rehydrate after removing it.

Students sit in a circle in a quiet area. If possible, the facilitator is a healthcare worker who has returned from working in an ETU in West Africa and can discuss the experience.

Ask students how the exercise went (e.g., what went well for them, what they need to work on, how it compared with the day before, and how they felt). Remind them to have their pulse and blood pressure checked (if your organization is implementing this practice).

#### Options

Additional activities can take place concurrently with or following the debriefing.

1. Practice donning and doffing with the PPE students have saved.
2. Practice 1-minute handwashing technique.
3. Participate in tabletop exercises.

#### Closing video

<http://youtu.be/gIYtJiqg33c>







1

2

3

## Administration

# PREPARING Healthcare Workers TO WORK IN **Ebola** Treatment Units (ETUs) IN AFRICA: Training Toolkit



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

## Disclaimer

These Ebola response training materials are intended only for healthcare workers preparing to work in Ebola Treatment Units (ETUs) in Africa in response to the Ebola epidemic. They are not intended to prepare healthcare workers to work in the United States. The information in these materials is accurate as of December 2014. Additionally, the mention of any product name in these materials is not meant to serve as an official endorsement of any such product by the Centers for Disease Control and Prevention (CDC) or any other entity of the United States government.

This exercise is designed to illustrate best practices for infection prevention and control principles. It is based on information from similar courses developed by Médecins Sans Frontières (MSF) and the World Health Organization (WHO), and on CDC guidelines for infection prevention and control. It is not intended to endorse a particular protocol, product, or procedure. In a real ETU, supplies, conditions, and protocols will vary. When healthcare workers deploy to work in real ETUs, they are expected to receive additional training and coaching before they begin working independently.

Cover: Healthcare worker donning high-risk PPE.

# CONTENTS

<b>Overview.....</b>	<b>339</b>
<b>Course Planning.....</b>	<b>341</b>
▶ Facility Requirements.....	341
▶ Budget.....	342
▶ Staff, Instructor, and Trainer Requirements.....	342
▶ Target Population.....	343
▶ Recruiting Students.....	343
▶ Student Application and Selection.....	345
▶ Logistics Information for Students and Trainers.....	345
▶ ETU Facility and Station Setup.....	345
<b>Course Management.....</b>	<b>345</b>
▶ Supplies.....	346
▶ Risk and Safety.....	346
<b>Continuing Education Credits &amp; Course Evaluation.....</b>	<b>349</b>
▶ Continuing Education.....	349
▶ Student Evaluations.....	349
▶ ETU Practical Exercise Trainer Debriefing/Evaluation.....	349
▶ Knowledge Assessment.....	349
▶ Course Sponsor Evaluation.....	349
<b>Appendices -</b>	
▶ Appendix A - Staff Roles and Responsibilities.....	351
▶ Appendix B - CDC Applicant Prioritization Worksheet.....	353
▶ Appendix C - Social Media.....	354
▶ Appendix D - CDC Course Application Form.....	355
▶ Appendix E - ETU Design and Setup.....	356
▶ Appendix F - Signs for ETU Practical Exercise.....	369
▶ Appendix G - Course Supplies.....	373
▶ Appendix H - CDC Course Evaluation.....	378



## Overview

Information on administration and evaluation is provided to help your organization understand administrative and programmatic aspects of replicating the *Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa* course. This booklet outlines the major steps and resources required for implementation. This three-day course requires enough space, sufficient financial resources, a dedicated staff, and effective recruitment of students. The materials in this booklet cover best practices and lessons learned from the CDC course in the areas of course planning, management, and evaluation.

Course planning materials address the high-level tasks and considerations needed to initially set up the course. Course sponsors will need to secure a facility, identify instructors and trainers, promote the course, and recruit students.

Course management materials address the logistics and details of running the course; they also provide information to help with implementing course activities. Course staff will be responsible for the administrative management of students, ordering of supplies, setup of classroom facilities and ETU practical exercise activities, and other tasks involved in administering the course. These activities may include assigning staff to support the ETU practical exercise for each training cycle or to select expert guest lecturers.

Evaluation data are critical to identify training gaps and guide changes to improve future iterations of the course. Course evaluation materials include tools to assess the effectiveness of the curriculum, performance of instructors and trainers, and assessment of student knowledge.

Tools and templates can be adapted for your organization's use and are included in the Appendices of this booklet.



# Course Planning

Planning for this course requires the identification of facilities as well as logistical and resource support based on the intended student population. Start by clearly defining your training goal (e.g., *our non-governmental organization will train 50 people each calendar quarter to sustain patient care in our ETU(s) in West Africa*). Pay special attention to securing a facility that meets the needs of your organization. The number of courses planned can determine whether the space can be temporary or should be fixed. The facility should meet the requirements for establishing a mock ETU for the ETU practical exercise, should provide space for lecture and tabletop exercises, and must satisfy other needs such as proximity to lodging or an airport. In addition, consider the types of students, instructors, and trainers who should take part in this course. Finally, course marketing and student recruitment are essential and should start early in the planning phase.

## FACILITY REQUIREMENTS

The course requires facilities for traditional classroom instruction, breakout rooms for tabletop exercises, and space for the ETU practical exercise. Your organization will need to consider the following size and space information when selecting the host site.

Activity	Recommended Space
Course Lectures and Tabletop Exercises	<p><b>Course Lectures</b></p> <ul style="list-style-type: none"><li>▶ Traditional classroom, auditorium, or other large group space</li><li>▶ Classrooms equipped with tables, chairs, and audiovisual equipment</li></ul> <p><b>Tabletop Exercises</b></p> <ul style="list-style-type: none"><li>▶ Traditional classroom, auditorium, or other breakout rooms for small group discussions</li><li>▶ Breakout sessions are designed for small groups of 12 students or less. Multiple breakout spaces will be required to accommodate all students. If the classroom space is large enough, multiple small groups can meet within the same room</li></ul>
ETU Practical Exercise	<ul style="list-style-type: none"><li>▶ The mock ETU can be conducted in a building, in one large tent (or multiple tents) outdoors, or in a combination of these options</li><li>▶ A minimum of 8,000–10,000 square feet is recommended and will vary depending on the number of students. This square footage estimate includes space for the mock ETU, storage, and changing areas</li></ul>

When selecting a facility, also consider the following:

- ▶ Lodging needed for students, instructors, trainers, and staff
- ▶ Transportation to and from the facility for students, instructors, trainers, and staff, including any participants coming from out of town
- ▶ Whether meals can be provided on-site, or whether participants will need to leave the facility

### BUDGET

---

When planning the course budget, consider the following factors:

- ▶ Classroom facilities and needs
- ▶ ETU practical exercise setup
- ▶ Meals
- ▶ Personnel
- ▶ Personal protective equipment (PPE)
- ▶ Printing and supplies
- ▶ Staff and student lodging
- ▶ Transportation

### STAFF, INSTRUCTOR, AND TRAINER REQUIREMENTS

---

This course requires an experienced leadership team consisting of a course director, a course manager and a curriculum director. These individuals will be responsible for overseeing all aspects of the course planning and management. The leadership team will be responsible for securing knowledgeable instructors for the lectures, capable trainers for the tabletop exercises and ETU practical exercise, and skilled support staff.

An optimal instructor and trainer team will contain a mix of Ebola subject matter experts, public health experts, and returned responders. Some instructors or trainers could have diverse experiences and skills to fill multiple roles. The following list shows the minimum types of background and experience needed to run a successful course.

- ▶ Public health outbreak experience
- ▶ Academic knowledge of Ebola
- ▶ Experience working in Africa
- ▶ Infection prevention and control experience
- ▶ Clinical experience working in an ETU

A minimum of one instructor (if using the e-lectures) and 12 trainers are needed for the course. However, it is likely additional instructors and trainers will be needed depending on the number of students participating. Given the large number of trainers required, your organization may wish to outsource for trainers. Roles and responsibilities of staff members CDC used in the course are described in [Appendix A](#).

### TARGET POPULATION

---

This training course is designed to teach healthcare workers infection prevention and control principles needed to work safely in an ETU.

The course should target the following students:

- ▶ Healthcare workers intending to deploy to provide clinical care to patients with Ebola in ETUs in Africa
- ▶ Healthcare workers currently licensed by a recognized professional agency to provide clinical care in a particular jurisdiction (e.g., who hold a medical, nursing, or other license to provide care in a state in the United States) and have relevant experience providing direct care to patients within the past two years
- ▶ Healthcare workers and other personnel affiliated with a group (e.g., a non-governmental organization or U.S. government entity), that is arranging deployment to areas affected by the outbreak

The course director should give priority to applicants already scheduled for deployment, followed by those affiliated with a non-governmental organization or U.S. government entity who have a planned deployment that has not yet been scheduled. Criteria for selecting students are included in [Appendix B](#).

### RECRUITING STUDENTS

---

Finding prospective students for the three-day course is a critical aspect of course development. Recruitment and commitment of students are the basis for the size of the course and need for facilities, logistics, trainers, and financial resources. Recruitment requires multiple communication methods, including advertising on the sponsoring organization's website, using social media, and reaching out to other sponsoring organizations by telephone and email. CDC announced the course and available staff positions on its website and through social media. CDC's Facebook announcement and Twitter messages about the course can be found in [Appendix C](#).



# Course Management

Along with overall course development, managing the logistics and delivery of each course component is critical to successfully administering the course. Course managers will need to procure the appropriate resources to support each course offering and manage all aspects of the lectures and course exercises. Staff members will also need to carefully plan the logistics of assembling students, instructors, and trainers, as well as provide the detailed guidance and support required for participation in each activity. Resources to assist with course management are available in the Appendices.

## STUDENT APPLICATION AND SELECTION

---

Throughout the process of selecting students, personnel should be assigned to respond to inquiries, communicate with prospective students, and process applications. Applicants should be screened on the basis of your organization's eligibility criteria. Selected students can then be assembled into training cohorts. In some cases, demand for the course may exceed capacity. CDC created criteria for eligible applicants using an internal prioritization system. The worksheet can be found in [Appendix B](#). The course application form used by CDC is also included as [Appendix D](#).

## LOGISTICS INFORMATION FOR STUDENTS AND TRAINERS

---

Approximately 10 days before each course starts, the sponsoring organization should provide course staff and students with information on the logistics of the training, including a course agenda, packing list, and transportation and lodging information.

Remind students and trainers that all clothing should be suitable for field operations and must include shoes with closed toes and covered heels.

CDC suggested students pack:

- ▶ Three sets of scrubs to wear under PPE
- ▶ Sweatshirts and sweat pants to wear under scrubs if the ETU is set up outside and the weather will be cool
- ▶ Eyeglass strap to be worn with PPE gear
- ▶ Ponytail holders and bobby pins to pin up long hair
- ▶ Sunscreen
- ▶ Umbrella or raincoat

Trainers should pack:

- ▶ Warm clothing to wear if the mock ETU is set up outside and the weather will be cool
- ▶ Sunscreen
- ▶ Umbrella or raincoat

## ETU FACILITY AND STATION SETUP

---

The mock ETU requires specific facility and station setup. Ideally, two large spaces should be prepared: one space for the ETU practical exercise and a second space with seating to serve as a student waiting and debriefing area, which can also be used as a supply room.

Before setting up the mock ETU, course managers should tour the available space to assess options for student flow and activities. Repeated walk-throughs can guide decisions about which areas would work best for specific activities. The flow of the facility must simulate the one-way flow required in an ETU. Safety and efficiency are key considerations for preparing the mock ETU. Any obvious hazards should be mitigated. Ensure adequate heating, ventilation, and air conditioning; remember that wearing PPE can cause heat illness.

Course managers should identify needs for signage. Signs designating specific areas and activities should be easy to see and understand. Signs can be placed on fences, walls, and walkways. Plans should include placement of equipment and supplies within each area, as well as marking thresholds between them. Space for briefings, staff activities, and restroom facilities should be included. Information on the mock ETU setup can be found in [Appendix E](#) and signage needs are included in [Appendix F](#). More detailed information about the ETU practical exercise can be found in the [ETU Practical Exercise](#) booklet.

### SUPPLIES

---

In general, three types of supplies are needed to fully implement the course: classroom supplies, ETU practical exercise supplies, and PPE. Office supplies and audiovisual equipment are needed for classroom lectures and exercises. Medical and other supplies (e.g., fencing and mannequins) are needed to simulate a mock ETU.

Note: PPE supplies are limited because of the current Ebola epidemic. For training purposes, course sponsors should consider reusing supplies whenever possible.

A list of supplies needed for the course can be found in [Appendix G](#).

### RISK AND SAFETY

---

Because of the physical demands of working in an ETU in Africa, as well as the challenges of the ETU practical exercise, all students should receive medical clearance before participating in this course. The medical clearance should focus on assessment of fitness and ability to safely and effectively deploy on a response.

The sponsoring organization should also implement the following standards and guidelines as appropriate:

- ▶ If the organization sponsoring this Ebola training is located in the United States and students will be using N95 respirators, you must ensure compliance with all elements of the [OSHA Respiratory Protection Standard, 29 CFR 1910.134](#), including fit testing, medical evaluation, and healthcare worker training.
- ▶ If the organization sponsoring this Ebola training is not located in the United States, you might consider following the [OSHA Respiratory Protection Standard, 29 CFR 1910.134](#), to ensure the health and safety of the healthcare worker.

Depending on where your course is held (a hospital, university, or government facility), other risk and safety procedures may be required. For example, additional OSHA standards, including Bloodborne Pathogens ([29 CFR 1910.1030](#)) and Personal Protective Equipment ([29 CFR 1910.132](#)), may apply.

Checking pulse and blood pressure before donning (putting on) and after doffing (taking off) PPE helps to ensure appropriate precautions for working in a hot environment. Students can get hot while wearing PPE during the exercise. CDC provides recommendations for healthcare workers on how to limit heat burden and prevent heat-related illnesses while wearing PPE during treatment of patients with Ebola at <http://www.cdc.gov/vhf/ebola/hcp/limiting-heat-burden.html>.

Finally, it is also important for course organizers to know the sponsoring organization's policies for treating individuals who may become ill or injured at your facility. Make sure students also know evacuation plans and routes in case of emergency.



# Continuing Education Credits & Course Evaluation

Continuing education (CE) and evaluation and knowledge assessments are important components of a training course.

Evaluation processes provide important information for assessing achievement of training goals as well as identifying strengths and weaknesses of training activities. CDC included evaluations from course trainers and students throughout the course. CDC is also requesting course sponsors evaluate this training toolkit. Samples of CDC's evaluation tools are in [Appendix H](#).

## CONTINUING EDUCATION

---

The CDC course is accredited through several agencies to offer CE to a variety of professional audiences, including CE for physicians (CME), nurses (CNE), health professionals (CEU) and pharmacists (CPE). Sponsoring agencies should consider applying for accreditation through organizations such as the Accreditation Council for Continuing Medical Education (ACCME), the International Association of Continuing Education and Training (IACET), and the American Nurses Credentialing Center's Commission on Accreditation (ANCC).

## STUDENT EVALUATIONS

---

Student evaluations assess both the lectures and the practical exercise components from each day. The final day contains an evaluation of the daily activities and an overall course evaluation.

## ETU PRACTICAL EXERCISE TRAINER DEBRIEFING/EVALUATION

---

In the CDC training, the exercise manager holds a daily debriefing with all station trainers.

Trainers provide feedback about their experiences at their respective stations and their overall observations on what worked well and what might need improvement. The group also discusses what is needed for the next day's exercise.

## KNOWLEDGE ASSESSMENT

---

An evaluation tool is also offered for e-lectures in this training toolkit. Knowledge assessment questions are included in each of the e-lectures and can be used as pretests and post-tests. Course sponsors or managers might also want to consider using these knowledge assessment questions when the lectures are delivered in person. These materials may be found in the *Course Lectures and Tabletop Exercises* booklet, [Appendix J](#).

## COURSE SPONSOR EVALUATION

---

CDC requests sponsoring organizations' feedback on this training toolkit. Your responses will provide valuable information about how this toolkit is being used and will help CDC improve the training materials.

Approximately 3 months after you register to receive the toolkit, you will get an email with a link to an evaluation survey. The email message will be sent to the address your organization used to register for the toolkit. Please make sure to update your spam filters to accept email messages from [ebolatrkit@cdc.gov](mailto:ebolatrkit@cdc.gov).



# Appendix A - Staff Roles & Responsibilities

## STAFF ROLES AND RESPONSIBILITIES

---

CDC used the following staff roles and responsibilities to develop and deliver the course.

### Course Leadership

- ▶ **Course Director:** Responsible for the overall course and staff. Works with scientific subject matter experts to ensure the course content is updated as needed.
- ▶ **Course Manager:** Responsible for day-to-day management of the course. Oversees curricula updates, on-site logistics, administrative support, and partnership outreach and communications.

### Curriculum Leadership

- ▶ **Curriculum Director:** Responsible for instructional design and educational integrity of the course. Oversees the classroom lectures, tabletop exercises, and ETU practical exercise to ensure the instruction adheres to educational best practices.

### Classroom Lectures and Tabletop Exercises Leadership

- ▶ **Classroom Manager:** Responsible for overall classroom logistics. Coordinates with the logistics and administrative managers to schedule instructors, prepare classroom facilities, and ensure educational materials are available for the students.
- ▶ **Instructor(s):** Responsible for delivering the lectures to the students. Should be thoroughly familiar with the course content and able to answer student questions and provide real-life examples. (Note: the toolkit provides e-lectures for delivering the content; however, an instructor familiar with the content should be available to answer students' questions.)
- ▶ **Classroom Trainer(s):** Responsible for the small group tabletop exercises in which students apply the content of the lectures. Facilitates thoughtful conversation and answers student questions.

### ETU Practical Exercise

- ▶ **Exercise Manager:** Responsible for supervising the ETU practical exercise. Coordinates with the logistics and administrative managers to ensure exercise stations are prepared and exercise activities progress on schedule. Walks through the stations during the exercise to answer questions, address issues, observe station trainers, and observe students' performance of the exercise. Hosts debrief session with trainers at the conclusion of each day's ETU practical exercise.
- ▶ **Station Trainers:** Responsible for delivering the station scenario and reinforcing safety principles during the ETU practical exercise. Ensures the assigned stations are ready when students arrive, and help to clean and secure the stations following the exercise each day. Initiate the tasks students will perform at each station and moderates discussions. Coach students through the activities by asking thoughtful questions and answering questions as needed. Provide additional information and resolve questions as required.

## Appendix A > Staff Roles and Responsibilities

### Administration

- ▶ **Logistics Manager:** Responsible for facilities, logistics, and supplies for the overall course and the ETU practical exercise. Responsible for preparing the facility for the ETU exercise. Coordinates logistics and orders supplies, including PPE, for the ETU practical exercise. Stores and cares for PPE supplies and oversees the daily setup of the ETU.
- ▶ **Administrative Manager:** Responsible for addressing issues that arise on-site and facilitating discussions among students, instructors, trainers, logistics manager, and course leadership on issues related to the course. Serves as liaison with contractors and facility staff.
- ▶ **Support Staff:** Responsible for assisting with the exercise by setting up or moving props, guiding students from one station to the next, or informing students of times for pulse and blood pressure checks.

## Appendix B > CDC Applicant Prioritization Worksheet

### Appendix B

#### CDC APPLICANT PRIORITIZATION WORKSHEET

In general, applicants are registered on a first-come, first-served basis. However, if there is high demand for the course, it may become necessary to prioritize the registration of applicants in order of need.

This is the prioritization worksheet used by CDC.

Priority Level	Number Reserved
<b>HIGHEST</b> priority goes to U.S. citizen healthcare workers who are currently affiliated with a non-government organization (NGO) or a U.S. government entity and who have an imminent deployment departure date and an Ebola Treatment Unit (ETU) assignment.	
<b>HIGH</b> priority goes to U.S. citizen healthcare workers who are currently affiliated with an NGO or a U.S. government entity and who have an imminent deployment departure date but no ETU assignment yet.	
<b>HIGH</b> priority goes to U.S. citizen healthcare workers who are currently affiliated with an NGO or a U.S. government entity who have a planned deployment but no departure date yet.	
<b>MEDIUM</b> priority goes to CDC personnel who intend to deploy to affected countries in a capacity other than direct patient care provider for whom the training is relevant (e.g., staff conducting infection control training or healthcare facility assessments).	
<b>MEDIUM</b> priority goes to qualified individuals who have committed to serve as trainers for at least three subsequent course sessions.	
<b>MEDIUM</b> priority goes to observers from the U.S. government or large NGOs who do not intend to deploy to an ETU, but wish to take the course to decide whether it will prepare their constituencies to deploy safely.	
<b>MEDIUM</b> priority goes to observers from organizations who intend to use the course as a basis for developing a similar training course either in a different setting or for a different audience.	
<b>MEDIUM</b> priority goes to non-U.S. citizen healthcare workers who are affiliated with an NGO or a U.S. government entity who intend to work in an ETU in an affected country.	
<b>LOW</b> priority goes to appropriately trained individuals who have committed to serve as trainers for one subsequent course session.	
<b>LOW</b> priority goes to non-U.S. citizen healthcare workers who are affiliated with an NGO or a U.S. government entity who do not intend to work in an ETU in an affected country (e.g., someone who wants to learn how to safely care for patients with Ebola should one be identified in their country).	
<b>LOWEST</b> priority goes to observers who are not affiliated with an NGO or a U.S. government entity (e.g., media observers) but who may help market the course.	

## Appendix C > Social Media

### SOCIAL MEDIA

The following are samples of Facebook and Twitter announcements about CDC's course.

#### Twitter announcement



"Prepare to work in an Ebola Treatment Unit in West Africa. Take the 3-day course. [go.usa.gov/AFpm](http://go.usa.gov/AFpm)"



"Licensed US HCW? Going to W. Africa re: **#Ebola**? Let **CDC** train you <http://1.usa.gov/1wiB4CA>"

#### Facebook announcement



"Interested in participating in the Ebola response in West Africa? Take the 3-day safety training course designed to simulate working conditions in Ebola Treatment Units. Learn about what the course covers, who is eligible, and how to register. <http://go.usa.gov/AFpm>"

#### Additional Staffing Requests



"@CDC is seeking nurses for **#Ebola** safety training course (mock **ETU**). Trainings take place in Alabama from Oct-Mar <http://ow.ly/DdNjx>"<sup>1</sup>



"CDC is looking for trainers to facilitate a training course in a mock Ebola Treatment Unit (ETU). Docs RNs and MS4s <http://www.cdc.gov/vhf/ebola/hcp/safety-training-course/index.html?mobile=nocontent>"<sup>2</sup>

1 Twitter, **AACN@AACNursing**, October 23, 2014

2 Twitter, **Atul Grover, MD, PhD@AtulGroverMD**, October 27, 2014

## Appendix D > CDC Course Application Form

### CDC COURSE APPLICATION FORM

First name: \_\_\_\_\_ Middle name: \_\_\_\_\_ Last name: \_\_\_\_\_

Street address of residence: \_\_\_\_\_

State of residence: \_\_\_\_\_ Zip code: \_\_\_\_\_ Country of residence: \_\_\_\_\_

Date of birth: \_\_\_\_\_

Employer:

CDC

USPHS

Military, specify Branch \_\_\_\_\_

Non-CDC federal agency, specify \_\_\_\_\_

NGO, please specify

Partners in Health

International Medical Corps

International Rescue Committee

UNICEF

MSF

Samaritan's Purse

Save the Children

Serving In Mission

Red Cross

Other \_\_\_\_\_

Country of citizenship  U.S.  U.S.P.R.

Other \_\_\_\_\_

Certification(s) or Degree(s)  MD  RN  EMT

PA  DO  NP

LPN  CNM

Other \_\_\_\_\_

Years in practice \_\_\_\_\_

Direct patient care within past 2 years?  Yes  No

How will you use the training?

To provide direct patient care in an ETU

To assist in an ETU, but no direct patient care

To serve as a trainer for this course

To observe the course for my organization

To observe the course to duplicate it elsewhere

To learn more about Ebola should a case(s) occur in my country/locality

Other \_\_\_\_\_

Are you able to perform physical activities while wearing full personal protective equipment (PPE)?  Yes  No

If you plan to deploy to an ETU, please provide the following information:

Name of organization that will deploy you: \_\_\_\_\_

Contact person at organization: \_\_\_\_\_

Contact telephone number: \_\_\_\_\_

Contact email: \_\_\_\_\_

Anticipated date of departure for deployment: \_\_\_\_\_

Anticipated duration of deployment: \_\_\_\_\_

Location of assignment Name of ETU: \_\_\_\_\_

City/Town: \_\_\_\_\_

Country: \_\_\_\_\_

Which course would you like to attend? \_\_\_\_\_

## Appendix E > ETU Design and Setup

### ETU DESIGN AND SETUP

The following information describes how CDC set up its mock ETU for the ETU practical exercise. The information is based on four students moving through the exercise together. Students sometimes work in pairs and other times work as a group of four. This information, in conjunction with the supplies and signage lists, will help you set up your physical facility. Included are:

- ▶ Setup instructions for each of the seven stations
- ▶ Supplies needed (detailed information found in Course Supplies, [Appendix G](#))
- ▶ Signage (detailed instructions found in Signs for ETU Practical Exercise, [Appendix F](#))
- ▶ Photographs of CDC's mock ETU

It may also be useful to view the station videos in the *ETU Practical Exercise* booklet.

### Daily Setup

After the physical facility for CDC's mock ETU was established, it took two people approximately two hours each day to set up the seven stations. Your time will vary depending on the physical facility you select. Several of the stations in CDC's mock ETU were located in adjacent areas outside the building; supplies had to be moved indoors each evening and moved back out the next morning.

Each day, before the practical exercise begins:

- ▶ Check the water supply at each of the portable handwashing stations, in the footbath trays, and the compression hand sprayers.

**NOTE:** *Water is used instead of chlorine solution for the ETU practical exercise. However, all portable handwashing stations and compression hand sprayers should be marked with the strength of the simulated chlorine solution.*

- ▶ Ensure boots are at Station 2.
- ▶ Update the daily patient scenario in Station 3.
- ▶ Set out in Station 4 the supplies students need for the day's patient care activities in the high-risk zone (Station 5).
- ▶ Rearrange mannequins and supplies in Station 5 as needed for the day's activities.
- ▶ Stock Station 7 with snacks and drinks.

Detailed instructions for each station follow.

### General Information

- ▶ A portable handwashing station consists of a water container, spigot, cradle, and a bucket to catch water. The water container should be filled with water only and marked with the appropriate level of chlorine solution being simulated. Information on assembling a handwashing station can be found in the Course Supplies, [Appendix G](#).
- ▶ An area is set up at the end of Station 4 where students get the day's patient care supplies they need for Station 5. There is also a clock and a reminder sign for students to mark on their sleeves with duct tape the time they enter the high-risk zone.

## Appendix E > ETU Design and Setup

- ▶ Tape on the floor is used to designate the flow within the mock ETU and to mark different parts and stations. Use different color tape to designate:
  - Flow (CDC used yellow for the low-risk zone, red for the high-risk zone, and green for any additional arrows needed)
  - Entrance and exit points (CDC used yellow for low-risk and red for high-risk)
  - Lanes for students to doff PPE in Station 6 (any color)
- ▶ Stations 1, 2, 4, 6, and 7 remain the same for the ETU practical exercise. Stations 3 (Briefing) and 5 (High-risk Zone) vary depending on the day's activity schedule.

### STATION 1: ENTRANCE TO THE ETU LOW-RISK ZONE

Station 1 is the entry to the ETU low-risk zone and the start of the practical exercise. The area is marked with plastic fencing and includes two signs: one for entering the ETU and one noting the entrance to the ETU low-risk zone. An enclosed room with entry and exit doors could also be used. Students will have their shoes sprayed and wash their hands at this station. The setup for this station is the same each day.



### Supplies

- ▶ Clock (1)
- ▶ Compression hand sprayer (1)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Plastic fencing, if necessary (to set off the area, leaving open the entrance to the ETU and the exit from Station 1 to enter Station 2. Indicate the entrance with a plastic fencing gate or rope)
- ▶ Portable handwashing station (1)
- ▶ Safety vest for trainer (1)

### Signage

- ▶ Entering Low-risk Zone
- ▶ ETU entrance
- ▶ Reminders poster
- ▶ 0.05% chlorine solution (for portable handwashing station)
- ▶ 0.5% chlorine solution (for compression hand sprayer)

### Tape

- ▶ Arrow outside the mock ETU pointing into the ETU
- ▶ Arrow inside the ETU pointing toward Station 2
- ▶ Line marking the entrance into the ETU

## Appendix E > ETU Design and Setup

### STATION 2: SCRUBS AND BOOTS

Station 2 consists of male and female changing areas and an area for students to pick up boots. Students will change from street clothes into scrubs (if they did not start the exercise wearing scrubs) and boots at this station. The changing areas will have chairs and numbered containers for students to place any personal belongings they did not leave outside the ETU. Use tables to display the boots and provide chairs for students to put on boots in the boot area if they do put them on in the changing area. The setup for this station is the same for each day.



### Supplies

- ▶ Boots (1 pair per student)
- ▶ Chairs (6; 1 in each changing area, and 4 in boot area)
- ▶ Clock (1)
- ▶ Containers for student belongings (varies)
- ▶ Curtains or plastic sheeting (sufficient to enclose the 2 changing areas)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Safety vest for trainer (1)
- ▶ Scrubs, if not already worn by students (varies)
- ▶ Tables for boots and scrubs (5)
- ▶ Bobby pins, ponytail holders, and eyeglass straps (optional)

### Signage

- ▶ Scrubs and Boots
- ▶ Male Changing Area
- ▶ Female Changing Area
- ▶ Boot size signs
- ▶ Numbers (place on containers for students' belongings)
- ▶ Reminder poster (2; 1 in each changing area)

### Tape

- ▶ Arrow pointing to Station 3

## Appendix E > ETU Design and Setup

### STATION 3: BRIEFING

Station 3 is the briefing area. The Station 3 trainer has a timekeeping role critical to avoiding backlog and keeping the entire exercise on time. Therefore, if possible, this area should be open to Station 4 so the Station 3 trainer can observe how quickly the students are donning PPE and adjust the briefing time as needed. The Station 3 trainer also has the role of signaling the Station 1 trainer for the next group of students to start; if possible, the Station 3 trainer should be within sight of Station 1 as well.

Arrange chairs in a semicircle for students around an easel with a poster or flip chart that describes daily patient and activity information. The information changes daily for the different patient care simulations. Also for Day 2, notepads and pens should be provided.



### Supplies

- ▶ Clock (1)
- ▶ Chairs for students (4)
- ▶ Flip chart (if not using posters with Day 1 and Day 2 information)
- ▶ Easel (1)
- ▶ Markers (2)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Safety vest for trainer (1)

### Day 2 Supplies

- ▶ Notepads (4)
- ▶ Pens (4)

### Day 3 Supplies\*

- ▶ Table for low-risk PPE supplies (1)
- ▶ Goggles
- ▶ Surgical masks
- ▶ Long-cuff exam gloves

*\*These items are placed near where students will leave Station 3 to triage new patients (activity 5f).*

### Signage

- ▶ Briefing
- ▶ Posters (Day 1 and Day 2 information, unless using flip chart)

### Tape

- ▶ Arrow pointing to Station 4

## Appendix E > ETU Design and Setup

### STATION 4: DONNING HIGH-RISK PPE

Station 4 is where students will don (put on) their PPE. The room should be large and open so students can move around freely. There should be sufficient space for tables to lay out the PPE supplies, chairs for students to sit in while donning the PPE, and full-length mirrors for students to check themselves. Posters explaining the donning process should be visible. All PPE, including both types of gloves used for different days, should be on the table each day.



### Supplies for High-risk Zone Activities

Supplies for each day's exercise in the high-risk zone should be located near the exit from Station 4 for students to pick up. For Days 1 and 2, the supplies should be placed on a table for students to collect and label after they don their PPE. For Day 3, students will collect a sprayer and a stretcher to transport a patient into the ETU. Markers and duct tape are also provided here for students to mark the time they leave this station on the sleeves of their PPE.



### Supplies

- ▶ Anti-fog spray for glasses (1)
- ▶ Chairs (4)
- ▶ Clock placed at the exit (1)
- ▶ Duct tape to mark PPE sleeves and body bags
- ▶ Easels, if the donning process signs are not posted on wall (2)
- ▶ Markers (2)
- ▶ Mirrors, full length (4)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Safety vests (1 for each trainer)
- ▶ Tables (4)
- ▶ Trash can (1, 12 gallon)

### High-risk PPE Supplies\*

- ▶ Long-cuff examination gloves, inner
- ▶ Impermeable coveralls/suits (two types)
- ▶ Surgical N95 respirators
- ▶ Surgical hoods
- ▶ Impermeable aprons
- ▶ Face shields
- ▶ Long-cuff examination gloves, outer (for Day 1 and a different color than the inner gloves)
- ▶ Chemical protective gloves (heavy-duty rubber, for Days 2 and 3)

*\*The PPE supplies are laid out in the order listed.*

## Appendix E > ETU Design and Setup

### Day 1: Supplies for Station 5

- ▶ Alcohol wipes
- ▶ Bandages (adhesive)
- ▶ Biohazard waste bags
- ▶ Blood collection needles
- ▶ Blood collection tubes
- ▶ Gauze pads
- ▶ Medical supply or cafeteria trays
- ▶ Paper towels
- ▶ Sealable plastic bags
- ▶ Tourniquets

### Day 2: Supplies for Station 5

- ▶ Body bags

### Day 3: Supplies for Triage Area

- ▶ Hand compression sprayer
- ▶ Stretcher

---

### Signage

- ▶ Donning High-risk PPE
- ▶ Donning process posters (2)
- ▶ Timekeeping reminder (at exit where students write the time on their sleeves)
- ▶ Entering High-risk zone

---

### Tape

- ▶ Arrow pointing to Station 5 and high-risk zone

## Appendix E > ETU Design and Setup

### STATION 5: HIGH-RISK ZONE

Station 5 is the ETU high-risk zone, where students will perform simulated patient care activities. There are two patient areas: one for suspected cases and another for confirmed cases. An entrance from the low-risk zone to the high-risk zone is defined by walls and doors or by plastic fencing. Another entrance from the triage area to the suspect patient area is also defined. The lab and morgue are adjacent to the confirmed area. The burn pit can be set up in a corner of the confirmed area or in an adjacent area. The entrance to Station 5 has two footbath trays. While the physical setup of Station 5 is the same for the three days, the placement of items differs depending on the activity.

The general setups for the suspect patient area, the confirmed patient area, and the adjacent areas (lab, morgue, and triage area) are provided. Information on each day's activities and setup follows the general setup information.



### Suspect Patient Area Setup

#### Supplies

- ▶ Step stools or small tables (2)
- ▶ Biohazard waste bags
- ▶ Buckets (9; 4 labeled vomit, 4 labeled commode, 1 labeled 0.5% chlorine solution)
- ▶ Chair (1)
- ▶ Clock, visible from both the suspect and confirmed areas (1)
- ▶ Compression hand sprayer (1)
- ▶ Cots (4)
- ▶ Footbath trays (5; 2 at entrance to Station 5, 2 at the entrance from the triage area, 1 between the suspect patient area and confirmed patient area)
- ▶ Halogen light (1)
- ▶ ID wristband (1, place on female mannequin -Yaya Sesay #0321)
- ▶ Mannequins (4)
- ▶ Markers (2)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Plastic fencing, if necessary (to frame the perimeter of the high-risk zone if walls aren't present, to mark the gates between high-risk and low-risk zones and the entrance to the suspect patient area from the triage area, and to place a divider [with a gate] between the suspect and confirmed areas - gates can also be designated with rope)
- ▶ Portable handwashing station (1)
- ▶ Safety vests (1 for each trainer)
- ▶ Sealable plastic bags
- ▶ Sharps container (1)
- ▶ Trash can, 12 gallon (1)

## Appendix E > ETU Design and Setup

### Signage

- ▶ Entrance to High-risk Zone
- ▶ Suspect Patient Area
- ▶ Vomit (4, 1 for each bucket)
- ▶ Commode (4, 1 for each bucket)
- ▶ .05% chlorine solution (3; 1 for portable handwashing station, 1 for compression hand sprayer)

### Tape

- ▶ Line between low-risk zone and high-risk zone
- ▶ Arrow toward confirmed area

### Confirmed Patient Area Setup

#### Supplies

- ▶ Step stools or small tables (2)
- ▶ Buckets (8; 4 labeled vomit, 4 labeled commode – place 1 by each cot)
- ▶ Chair (1)
- ▶ Compression hand sprayer (1)
- ▶ Cots (4)
- ▶ Footbath trays (2, placed at exit from confirmed area to Station 6)
- ▶ Halogen light (1)
- ▶ Hazard cones to mark off burn pit (2)
- ▶ ID wristband (1, place on male mannequin – John Komora #0310)
- ▶ Markers (2)
- ▶ Mannequins (3)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Portable handwashing station (1)
- ▶ Safety vests (1 for each trainer)
- ▶ Sharps container (1)
- ▶ Trash can, 12 gallon (1)
- ▶ Trash can, 55 gallon for burn pit (1)

#### Signage

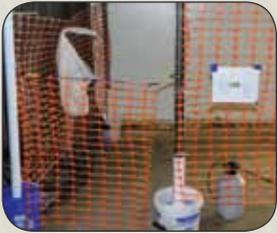
- ▶ Burn Pit
- ▶ Confirmed Patient Area
- ▶ Vomit (4, 1 for each bucket)
- ▶ Commode (4, 1 for each bucket)
- ▶ 0.5% Chlorine Solution (1, for handwashing station)

#### Tape

- ▶ Arrow pointing to doffing station

## Appendix E > ETU Design and Setup

### Lab Setup



A lab should be adjacent to, but not part of, the confirmed area of the high-risk zone. The lab can be a separate room or designated by plastic fencing. A gate, designated either by fencing or rope, should be accessible from the confirmed area. Information about supplies needed for the lab activity can be found under Day 1: Blood Draw and Breach.

### Supplies

- ▶ Plastic fencing, if necessary (to define the separation of confirmed patient area and lab and to make a gate – the gate can also be done with rope)

### Signage

- ▶ Lab

### Tape

- ▶ None

### Morgue Setup



A morgue is set up adjacent to the confirmed patient area. The morgue is a part of the high-risk zone, but should be separate from the confirmed area. The morgue can be designated by plastic fencing or can be a separate room. Three body bags are placed in the morgue (with mannequins, if available). All body bags should have the tops of the bag placed against one of the walls.

### Supplies

- ▶ Body bags (3)
- ▶ Mannequins (3)
- ▶ Plastic fencing, if necessary (to define the morgue, adjacent to the confirmed area and still within the high-risk zone and to make a gate – the gate can also be made with rope)

### Signage

- ▶ Morgue

### Tape

- ▶ None

## Appendix E > ETU Design and Setup

### Glo Germ Activities Setup



Students will perform two Glo Germ activities on Day 3. The adult mannequin in the triage area was pre-treated with Glo Germ. Glo Germ is a liquid, gel, or powder that illuminates when exposed to an ultraviolet (black) light. Before doffing PPE, the students will enter a dark room in the high-risk zone (Station 5) to assess how effectively they avoided contaminating their PPE during patient transport. They will assess exposure again after doffing their PPE. This can occur at Station 6 or after they leave the mock ETU. Once students leave Station 5, they cannot return to perform the Glo Germ post-doffing exercise. Therefore, two rooms are likely to be necessary, although a single room with access to both areas can be used. A dark room and an ultraviolet light are needed for the activity.

### Supplies

- ▶ Ultraviolet (black) light (2; 1 for each room)

### Signage

- ▶ Glo Germ Activity (Pre-doff)
- ▶ Glo Germ Activity (Post-doff)

### Tape

- ▶ None

## STATION 5: DAILY ACTIVITY SETUP

The activities in Station 5 vary each day. Therefore, the props within the high-risk zone need to be arranged to meet each day's needs. The information provided outlines the daily activities and the setup required.

### Day 1: Blood and Breach



On Day 1, students wearing high-risk PPE will simulate a blood draw and experience a breach in PPE (activities 5a and 5b). The setup includes placing two of the mannequins (the two patients with ID wrist bands, Yaya Sesay in the suspect area and John Komora in the confirmed area) in chairs. Place a small stool or table on both sides of the mannequins. Also place a sharps container, compression hand sprayer, small trash can, and yellow halogen light near each mannequin. After students simulate drawing blood and preparing the specimen, students will take the specimen to the lab (see lab setup directions under Station 5: Lab Setup). At the lab, a trainer—posing as the lab technician—will wear low-risk PPE. This exercise will also utilize the burn pit.

### Supplies

- ▶ Compression hand sprayer in lab (1)
- ▶ Low-risk PPE (goggles, surgical mask, and long-cuff exam gloves)
- ▶ Trash bag, 12 gallon (in lab)

## Appendix E > ETU Design and Setup

### STATION 5: DAY 2 CLEAN AND CORPSE



On Day 2, students wearing high-risk PPE clean up vomit, then prepare and transport a corpse to the morgue (activities 5c and 5d). The suspect area will be set up with a body spill (e.g., vomit). Food representing vomit (hash browns, oatmeal, or similar items) should be placed on the floor in a small enough pool that students can clean the amount of substance with only one disposable absorbent pad. Biohazard bags and disposable absorbent pads are available inside the step stool or on top of the small tables.

In the confirmed patient area, students will prepare a mannequin for transport to the morgue. Before students arrive for the exercise, the mannequin marked Yaya Sesay will need to be moved from the suspect area to the confirmed area. Also, during setup, make sure there is space to place a body bag next to the cot where students will be preparing the mannequin for transport. Use of a sheet on the mannequin is optional. Otherwise, no additional supplies are needed. See morgue setup instructions in Station 5: Morgue Setup.

#### Supplies

- ▶ Biohazard bags
- ▶ Disposable absorbent pads
- ▶ Food used as vomit
- ▶ Measuring cup
- ▶ Sheets (optional)

### STATION 5: DAY 3 TRIAGE AND TRANSPORT



For setup, place an adult and a child mannequin in the identified triage area. For CDC's exercise, the triage area was outside; a separate room can also be used. There are no special setup requirements for this area as no fencing or signage are necessary. Mannequins will need to be placed in this area with the adult mannequin sitting up and a trainer holding the child mannequin. Place food or fake vomit to simulate vomit on the adult mannequin's clothing. Also, place red marks near the mouth and nose to simulate blood. On the child mannequin, place a bandage on the leg. Before each group arrives for the Day 3 activity, sprinkle Glo Germ on the front and back of the adult mannequin's clothing.

After students make a decision to admit the adult patient, they don high-risk PPE to transport the patient into the ETU on a stretcher. Make sure Station 5 has been set up to allow for entrance from triage into the ETU suspect area.

After students complete the triage and transport activities, they will go to the dark room for the Glo Germ activity. See Station 5: Glo Germ Activities Setup for information about the dark room setup.

#### Supplies

- ▶ Bandage for leg of child mannequin (1)
- ▶ Glo Germ powder (1)
- ▶ Food or fake vomit (to place on adult mannequin)
- ▶ Mannequin, adult (1)
- ▶ Mannequin, child (1)
- ▶ Marker (red, to mark blood on adult mannequin face)

## Appendix E > ETU Design and Setup

### STATION 6: DOFFING HIGH-RISK PPE

After completing Station 5, students go directly to doff (take off) their PPE at Station 6. Within Station 6, use tape to create four doffing lanes, one lane for each student.

Two doffing lanes will share two 55 gallon trash cans: one for reusable PPE and one for trash. Two portable handwashing stations are included at the end of the lanes; two lanes share one station. A compression hand sprayer is provided for each lane. Also place mats in each of the doffing lanes. Full-length mirrors should be available to assist students finding the zipper on their suits during the doffing process.

A taped line with “low-risk zone” written on it will mark the exit from the high-risk zone to the low-risk zone at the exit from Station 6. A portable handwashing station and footbath tray should be located on the low-risk zone side. Also provide a place to remove boots with chairs, bootjack, and a boot drying area, either with boot pegs or mats. The setup for this station is the same each day.

A post-doffing Glo Germ activity is set up for Day 3 once students have doffed their PPE. See Station 5: Glo Germ Activities Setup for additional information. NOTE: Students should not return to the confirmed patient area of the high-risk zone for this activity. The post-doffing Glo Germ activity should be located adjacent to the doffing area once students exit the high-risk zone.



### Supplies

- ▶ Boot pegs or mats
- ▶ Bootjack
- ▶ Chairs (4)
- ▶ Clock (1)
- ▶ Compression hand sprayers (2; 1 between two doffing lanes)
- ▶ Footbath trays (1)
- ▶ Easels, if necessary (2 for the doffing process posters if they are not posted on a wall)
- ▶ Mats, for doffing lanes (4)
- ▶ Mirrors, full length (2)
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Plastic fencing, if necessary (to define the boundaries of the high-risk zone and make a gate between the high-risk zone and the low-risk zone - the gate can also be made with rope)
- ▶ Portable handwashing stations (3; 2 at the end of the doffing lanes - shared between two lanes, 1 in the low-risk zone)
- ▶ Safety vests (1 for each trainer)
- ▶ Trash cans, 55 gallon (4; 2 between two doffing lanes)

## Appendix E > ETU Design and Setup

### Signage

- ▶ Doffing High-risk PPE
- ▶ Doffing process posters (2)
- ▶ 0.5% chlorine solution (6; 1 for each sprayer and 2 handwashing stations in doffing lanes)
- ▶ 0.05% chlorine solution (1; for handwashing station after the end of doffing and in the low-risk zone)
- ▶ Reusable PPE (2; on trash cans)
- ▶ Trash (2; on trash cans)

### Tape

- ▶ Lanes for doffing
- ▶ Line to mark exit from high-risk zone

### STATION 7: DEBRIEF



Station 7 is the final station and the close of the exercise. It should be set up in a quiet area or room. The setup for this station is the same for each day and consists of a circle of chairs. Provide light snacks and water for students when they are on their way to this station or in the same area.

### General Supplies

- ▶ Chairs (4)
- ▶ Water
- ▶ Light snacks
- ▶ Notepad (1)
- ▶ Pen (1)
- ▶ Table, if necessary (for snacks)

### Signage

- ▶ Debrief

### Tape

- ▶ None

## Appendix F > Signs for ETU Practical Exercise

### SIGNS FOR ETU PRACTICAL EXERCISE

The following table describes the signs used to label the seven stations and other designated spaces in the CDC-designed mock ETU. Sign locations, wording, format, and number needed are described here. The requirements and needs of your facility may differ.

Location	Wording	Format	Number Needed
<b>Station 1</b>			
Station Entrance	Station 1: ETU Entrance	8.5x11	1
Station Entrance	Entering Low-risk Zone	8.5x11	1
Station Entrance	<b>Reminders:</b> <ol style="list-style-type: none"> <li>1. Remove jewelry</li> <li>2. Pull long hair back and away from face</li> <li>3. Secure glasses</li> <li>4. No cell phones</li> <li>5. Use bathroom prior to entry</li> </ol>	Poster or foam board	1
<b>Station 2</b>			
Station Entrance	Station 2: Scrubs and Boots	8.5x11	1
In each changing area	Please remove all jewelry and cell phones. Secure glasses and hair.	8.5x11	2
On containers for personal belongings	Number containers (1, 2, 3) for personal belongings	3x5	Varies
Posted in Male Changing Area	Male Changing Area	8.5x11	1
Posted in Female Changing Area	Female Changing Area	8.5x11	1
Above boots tables	Boot Size 40 (6) Boot Size 41 (7) Boot Size 42 (8) Boot Size 43 (9) Boot Size 44 (10) Boot Size 45 (11) Boot Size 46 (12) Boot Size 47 (13)	8.5x11	1 (each size)

## Appendix F > Signs for ETU Practical Exercise

Location	Wording	Format	Number Needed
<b>Station 3</b>			
Station Entrance	Station 3: Briefing	8.5x11	1
Posted on easel	<b>Specimens:</b> Confirmed: John Komora ID #0310 Suspected: Yaya Sesay: ID #0321	Poster (this may also be handwritten on a flip chart)	1
Posted on easel	<b>Afternoon Shift</b>  <b>Suspect Area</b> 2 pools of vomit 2 patients tested positive 3 patients tested negative (1 has symptoms that began yesterday, 2 have symptoms that began 7-8 days ago)  <b>Confirmed Area</b> 2 patients died overnight (bodies taken to the morgue) - Baby Sesaye and Fatuma Dukuly 3 patients are very ill, need attention Togar Nagbe Ibrahim Conte Yaya Sesay (just died)	Poster (this may also be handwritten on the flip chart)	1
<b>Station 4</b>			
Station Entrance	Station 4: Donning High-risk PPE	8.5x11	1
Posted on easel	<b>Donning Process</b> 1. First pair of gloves 2. Suit 3. N95 respirator 4. Hood 5. Apron 6. Face shield 7. Second pair of gloves 8. Visual evaluation	Poster	2
Station Entrance	Timekeeping Reminder	8.5x11	1
Station Exit	Entering High-risk Zone	8.5x11	1

## Appendix F > Signs for ETU Practical Exercise

Location	Wording	Format	Number Needed
<b>Station 5</b>			
Station Entrance	Entrance to High-risk Zone	8.5x11	1
Posted on wall	Suspect Patient Area	8.5x11	1
Posted on wall	Confirmed Patient Area	8.5x11	1
On vomit buckets	Vomit	8.5x11	8
On commode buckets	Commode	8.5x11	8
Adjacent to Confirmed Patient Area	Lab	8.5x11	1
Adjacent to Confirmed Patient Area	Morgue	8.5x11	1
Adjacent to Confirmed Patient Area	Burn Pit	8.5x11	1
Posted on door to dark room (Day 3 only)	Glo Germ Activity (pre-doff)	8.5x11	1
<b>Station 6</b>			
Posted on wall	Doffing of High-risk PPE	8.5x11	1
On trash cans	Reusable PPE	8.5x11	2
On trash cans	Trash	8.5x11	2
Posted on wall or easel	<p><b>Doffing Process</b></p> <ol style="list-style-type: none"> <li>1. Spray suit and gloves</li> <li>2. Wash gloves</li> <li>3. Remove apron</li> <li>4. Wash gloves</li> <li>5. Remove outer gloves</li> <li>6. Wash inner gloves</li> <li>7. Spray zipper</li> <li>8. Remove goggles/ face shield</li> <li>9. Wash gloves Remove hood (Remove surgical mask first if using)</li> <li>10. Wash gloves</li> <li>11. Remove suit</li> <li>12. Wash gloves</li> <li>13. Remove N95</li> <li>14. Wash gloves</li> <li>15. Remove inner gloves</li> <li>16. DO NOT WASH HANDS</li> <li>17. Spray boots</li> <li>18. Exit high-risk zone</li> <li>19. Wash hands in 0.05% chlorine solution</li> <li>20. Step into 0.5% chlorine solution footbath</li> </ol>	Poster	2
Posted on door (Day 3 only)	Glo Germ Activity (post-doffing)	8.5x11	1

## Appendix F > Signs for ETU Practical Exercise

Location	Wording	Format	Number Needed
<b>Station 7</b>			
Posted on wall	Debrief	8.5x11	1
<b>Other ETU Locations</b>			
On handwashing station at Station 1 and the last handwashing station at Station 6	0.05% Chlorine	8.5x11	2
All sprayers and all other handwashing stations	0.5% Chlorine	8.5x11	13
Orientation Area	Student Orientation	Banner	1
Orientation Area	Come Home Healthy	Banner	1

## Appendix G > Course Supplies

### COURSE SUPPLIES

The following list describes the supplies obtained and used for the CDC course. The list is divided into the following categories:

- ▶ Classroom supplies (those needed for the lectures and tabletop exercises)
- ▶ ETU practical exercise supplies (those needed for the mock ETU)
- ▶ PPE supplies (those needed for students during the ETU practical exercise)

In an effort to be green and conserve resources, CDC provided tablet computers to each student for use during the course. The lecture slides, supporting documents, and evaluations were pre-loaded onto each tablet. Students were able to take notes on the tablets and email themselves their notes, the lecture slides, and other information. The tablets were returned at the end of the course.

Where applicable, the course supply quantities are based on a monthly count, with 50 students per course and four courses per month.

### CLASSROOM SUPPLIES

Item	Quantity
Binders for letter-sized paper*	1 per student and staff
Computer with PowerPoint and Internet capability	1
Flip chart (self-stick paper)	1
Duct tape	1 roll
Easel	1
Markers (black, permanent)	9
Microphone (speaker)	1
Notepads in different colors (4"x6", self-stick)	12
Pens*	1 per student and staff + 20
Projector	1
Projector screen	1
Refreshments (morning and afternoon each day)	varies
Tables and chairs for students	varies
Table tents	1 per student
Whiteboards (or 3 additional flip charts and easels)	3

\*CDC offered a green course so binders were not needed for each student, and few pens were required. Tablet computers were preloaded with all lectures, supporting documents, and evaluations. Students were able to take notes on the Tablets and email their notes, the lecture slides, and other information to themselves at the conclusion of the course.

## Appendix G > Course Supplies

### ETU PRACTICAL EXERCISE SUPPLIES

Item	Quantity
Absorbent pads (disposable)	2 packs (375 each)
Bandages (adhesive)	2 packs (100 per pack)
Biohazard waste bags (red, small)	1 pack (100 per pack)
Blood collection needles	2 packs (48 needles per pack)
Blood collection tubes (red-top, non-glass)	1 pack (100 tubes per pack)
Bobby pins for students at Station 2 (optional)	2 packs (50 per pack)
Body bags	10
Boot pegs or mats for drying boots after ETU practical exercise	varies
Bootjack (wooden)	1
Buckets (plastic) for simulated vomit and commodes	18
Chairs	74 (includes 50 for student orientation at the mock ETU facility)
Clocks at each station and in the orientation room	8
Clothes (used) for mannequins	varies
Containers for student belongings	varies
Cots	8
Curtains (or heavy-duty plastic) for changing areas in Station 2	varies
Duct tape (to be used as directional markers on the floor and to hang signs, different colors)	7 rolls
Easels	5
Eyeglass straps for students at Station 2 (optional)	20
Food (oatmeal, hash browns, etc.) used for vomit	
Footbath trays/containers	10
Gauze pads (about 1.5" x 1.5")	100
Glo Germ powder	4 bottles
Halogen lights (yellow, if necessary for lighting in high-risk zone)	2
Hand cleanser/sanitizer (62% alcohol with pump dispensers)	8
Hand sprayer (compression IK 1.5)	9
Hazard cones	2
ID wristbands	2
Mannequins (adult)	6
Mannequin (baby)	1
Mannequin (child)	1
Mannequin (any type) to fill additional beds and morgue	4

## Appendix G > Course Supplies

Item	Quantity
Markers (permanent, black)	8
Markers (permanent, red)	1
Mats for the doffing area lanes	4
Measuring cup for placing vomit in suspect area	1
Medical privacy screens for Station 5	2
Medical supply trays (or cafeteria trays)	8
Mirrors (full length) for Stations 4 (4) and 6 (2)	6
Notepads at each station (2 at Station 5 and 4 at Station 3)	12
Paper towels	1 roll per class
Pens	24
Plastic bags (sealable, XL)	1 pack per course (50 per pack)
Plastic fencing (orange, with zip ties)	varies by size of facility
Ponytail holders for students at Station 2 (optional)	50
Portable handwashing station* (entire station, including water capture plastic buckets)	6
Rope to mark entrances and exits	1 small reel
Safety vests (orange, enough for all trainers and course management staff)	varies
Sharps containers	2
Step stool (round commercial rolling) or small tables	4
Stretchers	6
Tables (6-foot, rectangular)	11
Trash bags (to fit 55 gallon, for doffing area trash cans)	1 pack (100 per pack)
Trash bags (to fit 12 gallon, for lab, orientation and donning areas)	1 pack (100 per pack)
Trash cans (55 gallon, for doffing area and burn pit)	9
Trash cans (12 gallon, 1 for orientation area, 1 for doffing, 1 in suspect area, and 1 in confirmed area)	4
Tourniquets	1 pack (100 per pack)
Two-way radios (for use in ETU)	varies
Ultraviolet or black lights (for Glo Germ activities)	2
Vomit (fake) for adult mannequin in triage area	1
Wipes (alcohol)	200

\* **Instructions on how to build a portable handwashing station as provided by University of Minnesota:**

<https://www.youtube.com/watch?v=SMa5OTa3PnU#t=103> PPE Supplies

## Appendix G > Course Supplies

### PPE SUPPLIES\*

The estimates for PPE are based on a monthly supply for 50 students per course and four courses per month.

Disposable items	Number needed monthly
<b>Gloves</b>	
Long-cuff examination gloves (disposable, S)	10 packs (100 per pack, 5 packs of 2 different colors)
Long-cuff examination gloves (disposable, M)	10 packs (100 per pack, 5 packs of 2 different colors)
Long-cuff examination gloves (disposable, L)	10 packs (100 per pack, 5 packs of 2 different colors)
Chemical protective gloves (disposable, S)	10 packs (50 per pack)
Chemical protective gloves (disposable, M)	10 packs (50 per pack)
Chemical protective gloves (disposable, L)	10 packs (50 per pack)
<b>Hoods</b>	
Surgical hoods (extend over the shoulder)	6 packs (100 per pack)
Masks (face protection)	6 packs (100 per pack)
Surgical N95 respirator	18 packs (35 per pack)
Surgical face mask (3-ply, BFE>99%)	12 packs (50 per pack)
<b>Coveralls/Suits</b>	
Coveralls, size L, Single use coverall that meets or exceeds ISO 16603 class 3 exposure pressure, preferred without integrated hood and with thumb/finger loops	5 packs (25 per pack)
Coveralls, size XL, Single use coverall that meets or exceeds ISO 16603 class 3 exposure pressure, preferred without integrated hood and with thumb/finger loops	5 packs (25 per pack)
Coveralls, size L, Single use coverall that meets or exceeds ISO 16604 class 2 exposure pressure, preferred without integrated hood and with thumb/finger loops	5 packs (12 per pack)
Coveralls, size XL, Single use coverall that meets or exceeds ISO 16604 class 2 exposure pressure, preferred without integrated hood and with thumb/finger loops	5 packs (12 per pack)
<b>Supplies</b>	
Anti-fog spray for glasses	5 bottles
Tape (duct, to mark coveralls and body bags)	5 rolls

## Appendix G > Course Supplies

Reusable items	Number needed monthly
<b>Scrubs</b>	
Trousers, surgical, woven M	50
Trousers, surgical, woven L	50
Trousers, surgical, woven XL	50
Trousers, surgical, woven M	50
Tunics, surgical, woven L	50
Tunics, surgical, woven XL	50
<b>Eye/Face Protection</b>	
Face shield (crystal-clear plastic with foam band, fog resistant, full-face length, disposable)	4 packs (25 per pack)
Protective goggles (plastic frame with clear lens, adjustable head band)	70
<b>Boots</b>	
Boots (size 40 [6], PVC, black with anti-slip profile, knee-high)	5 pair
Boots (size 41 [7], PVC, black, with anti-slip profile, knee-high)	10 pair
Boots (size 42 [8], PVC, black, with anti-slip profile, knee-high)	10 pair
Boots (size 43 [9], PVC, black, with anti-slip profile, knee-high)	15 pair
Boots (size 44 [10], PVC, black, with anti-slip profile, knee-high)	15 pair
Boots (size 45 [11], PVC, black, with anti-slip profile, knee-high)	10 pair
Boots, (size 46 [12], PVC, black, with anti-slip profile, knee-high)	5 pair
Boots, (size 47 [13], PVC, black, with anti-slip profile, knee-high)	5 pair
Boots, (size 48 [14], PVC, black, with anti-slip profile, knee-high)	5 pair
<b>Aprons</b>	
Impermeable aprons (heavy-duty, non-woven)	100

*\* The estimates for PPE are based on a monthly supply for 50 students per course and four courses per month.*

## Appendix H > CDC Course Evaluation

### CDC PREPARING HEALTHCARE WORKERS TO WORK IN EBOLA TREATMENT UNITS IN AFRICA COURSE EVALUATION

#### Day 1

Circle the number that represents your response to each item, and include any specific comments.

Date: \_\_\_\_\_

#### Overview of 2014 Ebola Epidemic and Response - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

#### Ebola Virus Disease and Clinical Care Part I: History, Transmission, and Clinical Presentation - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### Infection Prevention and Control for Healthcare Workers - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Triage of Persons Presenting to an ETU - Tabletop Exercise

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this exercise, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### Blood and Breach - ETU Practical Exercise

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this exercise, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Returned Responder Discussion Session I

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The open discussion was helpful.	5	4	3	2	1	NA
After completion of this discussion, I feel I am more knowledgeable about what I will experience when I deploy to Africa.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### CDC PREPARING HEALTHCARE WORKERS TO WORK IN EBOLA TREATMENT UNITS IN AFRICA COURSE EVALUATION

#### Day 2

Circle the number that represents your response to each item, and include any specific comments.

Date: \_\_\_\_\_

Staff Health and Support - Lecture						
	5-Agree	4-Somewhat Agree	3-Neutral	2-Somewhat Disagree	1-Disagree	NA-Not Applicable
The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA
<b>Session Comments:</b> Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.						
Ebola Virus Disease and Clinical Care Part II: Diagnosis and Clinical Management - Lecture						
	5-Agree	4-Somewhat Agree	3-Neutral	2-Somewhat Disagree	1-Disagree	NA-Not Applicable
The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA
<b>Session Comments:</b> Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.						

## Appendix H > CDC Course Evaluation

### Disinfection and Waste Management in the ETU - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Ebola Treatment Unit - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### Designing a Safe Ebola Treatment Unit - Tabletop Exercise

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this exercise, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Clean and Corpse – ETU Practical Exercise

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Returned Responder Discussion Session II

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The open discussion was helpful.	5	4	3	2	1	NA
After completion of this discussion, I feel I am more knowledgeable about what I will experience when I deploy to Africa.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### CDC PREPARING HEALTHCARE WORKERS TO WORK IN EBOLA TREATMENT UNITS IN AFRICA COURSE EVALUATION

#### Day 3

Circle the number that represents your response to each item, and include any specific comments.

Date: \_\_\_\_\_

#### Interactions with the Community: Health Promotion and Contact Tracing - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

#### Ebola Virus Disease and Clinical Care Part III: Experimental Treatments and Vaccines - Lecture

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met.	5	4	3	2	1	NA
My personal learning objectives were met.	5	4	3	2	1	NA
The content was organized and easy to follow.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
The visual aids and/or examples provided were helpful.	5	4	3	2	1	NA
After completion of this presentation, I feel confident in my ability to explain the key points of the material to others.	5	4	3	2	1	NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### Resiliency Discussion

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The open discussion was helpful. 5 4 3 2 1 NA

After completion of this discussion, I feel I am more knowledgeable about what I will experience when I deploy to Africa. 5 4 3 2 1 NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Triage and Transport - ETU Practical Exercise

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The training objectives were met. 5 4 3 2 1 NA

My personal learning objectives were met. 5 4 3 2 1 NA

The content was organized and easy to follow. 5 4 3 2 1 NA

The time allotted for the training was sufficient. 5 4 3 2 1 NA

The visual aids and/or examples provided were helpful. 5 4 3 2 1 NA

After completion of this exercise, I feel confident in my ability to explain the key points of the material to others. 5 4 3 2 1 NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

### Returned Responder Discussion Session III

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

The open discussion was helpful. 5 4 3 2 1 NA

After completion of this discussion, I feel I am more knowledgeable about what I will experience when I deploy to Africa. 5 4 3 2 1 NA

**Session Comments:** Please provide feedback, including observations about missing resources or visual aids, repetitions in content, etc.

## Appendix H > CDC Course Evaluation

### Logistics and Overall Course

5-Agree 4-Somewhat Agree 3-Neutral 2-Somewhat Disagree 1-Disagree NA-Not Applicable

Advertising/online information was adequate.	5	4	3	2	1	NA
Advance information about the training was sufficient.	5	4	3	2	1	NA
The training rooms met the needs of the activities.	5	4	3	2	1	NA
The time allotted for the training was sufficient.	5	4	3	2	1	NA
Overall, the program was well-organized.	5	4	3	2	1	NA

Overall, what aspects of this training would you change?

# Notes

**PREPARING**  
Healthcare Workers TO WORK IN  
**Ebola** Treatment  
Units (ETUs)  
IN AFRICA: Training Toolkit

U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention